BUSINESS DATA REPORTING (WORD AND EXCEL)



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Word & Excel Essentials

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This text was compiled on 05/07/2026

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Detailed Licensing

Licensing

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*A detailed breakdown of this resource's licensing can be found in **Back Matter/Detailed Licensing**.*

CHAPTER OVERVIEW

1: Introduction to Business Software and Communication

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1.1: The Business Value of Microsoft Word and Excel

1.2: AI Tools in Modern Business Software

1.3: Understanding Your Audience



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1.1: The Business Value of Microsoft Word and Excel

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Introduction

Communication and data are at the heart of decision-making, project management, and achieving goals in nearly every profession. Two of the most versatile and widely used tools that support these functions are **Microsoft Word** and **Microsoft Excel**. Together, they form the foundation of modern digital literacy — skills that remain essential across industries and career levels.

Word and Excel are far more than productivity software; they are the **language of business**. Word communicates ideas and intentions with clarity and professionalism. Excel transforms information into structured insight that supports analysis and decision-making. Whether drafting a proposal, tracking financial results, analyzing customer data, or documenting procedures, these two tools enable professionals to produce organized, measurable, and impactful work.

Even as technology evolves, Word and Excel have remained constant because of their flexibility and universality. They connect departments, bridge industries, and translate complex ideas into formats that others can understand. Learning to master both applications is not only about technical proficiency—it's about understanding **how businesses think, communicate, and operate**.

Microsoft Word: The Foundation of Professional Communication

Microsoft Word is among the most recognizable and influential **professional documentation and communication** tools. Its core purpose is to help individuals and organizations convey information in a structured, readable, and credible way. Word ensures that written communication aligns with the clarity and professionalism expected in today's workplace, from brief memos to complex reports.

Industry Applications

- **Education:** Instructors and administrators use Word to design course syllabi, research proposals, and curriculum plans. Students produce essays, research papers, and project reports formatted to meet academic standards, learning early how professional writing supports academic and career success.
- **Healthcare:** Hospitals, clinics, and medical offices rely on Word for documenting procedures, drafting patient summaries, creating compliance manuals, and producing policy documentation that must follow strict legal and formatting guidelines.
- **Legal Services:** Attorneys and paralegals use Word to draft contracts, legal briefs, and case documents. Features like Track Changes and version history allow multiple reviewers to comment and edit collaboratively while maintaining document integrity.
- **Corporate and Nonprofit Sectors:** Marketing teams use Word to create branded proposals, press releases, and client pitches. Human resources departments produce employee handbooks and performance evaluations. Nonprofits use Word for grant proposals and donor correspondence.

Word provides a professional framework for conveying **visually appealing and structurally sound** ideas. Tools like styles, templates, headers, and tables of contents help maintain consistency across multiple documents, ensuring that organizations present a unified and credible identity.

Equally important are Word's **collaboration features**. With Microsoft 365 integration, users can co-author documents in real time, comment on sections, and view tracked edits across devices. This collaboration improves efficiency and mirrors how modern teams work — distributed, digital, and fast-moving.

Strong Word skills enable professionals to create documents that are grammatically correct and **strategically crafted** to influence decisions, communicate clarity, and represent the brand or individual with professionalism.

Microsoft Excel: Transforming Data into Insight

While Word captures the narrative of a business, **Excel captures its numbers, patterns, and logic**. Excel is the universal platform for data organization, analysis, and visualization. Its ability to handle complex and straightforward datasets has made it a cornerstone of modern business operations — used by analysts, managers, executives, and entrepreneurs alike.

Industry Applications

- **Finance and Accounting:** Financial analysts use Excel to build budgeting models, calculate cash flows, and forecast revenue. Accountants track expenses, reconcile statements, and generate profit-and-loss summaries. PivotTables and formulas such as SUMIFS, VLOOKUP, and INDEX/MATCH allow efficient financial analysis and performance reporting.
- **Marketing and Sales:** Marketing professionals use Excel to analyze campaign metrics, calculate cost-per-click (CPC) and return on ad spend (ROAS), and visualize results through charts and dashboards. To inform strategy and resource allocation, sales teams track lead conversions, quotas, and customer engagement trends.
- **Operations and Supply Chain:** Operations managers depend on Excel to monitor production schedules, optimize logistics routes, and forecast demand. Conditional formatting can alert teams to low inventory levels or delayed shipments, enabling proactive problem-solving.
- **Human Resources:** HR professionals use Excel to manage employee data, calculate compensation, and analyze turnover trends. Excel provides transparency and accuracy for HR metrics used in strategic planning and compliance.
- **Education and Research:** Educators and researchers use Excel to track student performance, manage grades, and analyze survey or experiment data. Its functions for statistical analysis make it a reliable companion for early data exploration before transitioning to specialized software.

What makes Excel invaluable is its versatility. It can be used for everything from simple calculations to complex financial modeling, from one-person data management to enterprise-wide reporting. Excel's **visualization features**—charts, graphs, and conditional formatting—transform raw numbers into clear, actionable insights.

More advanced users leverage **automation tools** like **Macros**, **Power Query**, and **Power Pivot** to process large datasets and standardize reporting. In corporate settings, these capabilities save teams hours of manual work and enable data-driven decision-making consistently.

Ultimately, Excel bridges the gap between information and interpretation. It allows professionals to collect data and **understand what it means**, supporting decisions with measurable evidence rather than intuition.

The Interconnected Value of Word and Excel

While each application serves a distinct purpose, **Word and Excel are the most powerful**. A project manager may use Excel to calculate project costs, timelines, and risk analyses, then embed those tables and charts directly into a Word proposal or presentation. A marketing analyst might generate monthly campaign results in Excel and summarize key takeaways in a Word report to share with executives.

This integration reinforces a key professional skill: communicating **data-driven narratives**. Numbers alone do not tell a story; words alone may lack credibility without evidence. Mastery of both programs enables professionals to present complete, persuasive work — grounded in data and articulated with clarity.

Excel provides the **quantitative analysis**, while Word provides the **qualitative communication**. Together, they create the foundation of business intelligence and professional storytelling.

Why These Skills Are Essential in Every Industry

Across every career field, mastery of Word and Excel remains one of the strongest indicators of workplace readiness. Job descriptions across industries — from entry-level to executive roles — routinely list proficiency in Microsoft Office as a core requirement.

These skills are not limited to administrative roles; they are strategic.

- **In healthcare**, data entered and analyzed in Excel drives performance tracking, while documentation in Word ensures accuracy and compliance.
- **In finance**, reports created in Excel feed directly into client-facing documents formatted in Word.
- **Administrators** use Excel to track enrollment data and Word to prepare accreditation and grant materials in education.
- **In small business management**, owners often rely on Excel for bookkeeping and Word for contracts, proposals, and correspondence.

Excel and Word serve as the **connective tissue of digital workflows**. They unify departments, simplify collaboration, and allow individuals to translate data and ideas into formats everyone can understand.

Employers recognize that individuals with strong Word and Excel skills can complete tasks efficiently and contribute meaningfully to projects that rely on organization, precision, and analysis.

Looking Forward: The Future of Productivity with AI and Microsoft Copilot

While Word and Excel remain timeless tools, how we use them is entering a new era. Integrating **artificial intelligence (AI)** — particularly through **Microsoft Copilot** — transforms how professionals create, analyze, and communicate information.

Microsoft Copilot combines the familiarity of Office tools with the power of large language models (LLMs), allowing users to interact with data and documents using natural language. Imagine typing a request like:

“Summarize the key financial trends from last quarter and draft a summary report.”

Within seconds, Excel can generate an analysis, and Word can produce a professionally formatted report ready for review. This marks a dramatic shift in workplace efficiency — from manual entry and formatting to **strategic guidance and review**.

However, this new level of automation doesn’t eliminate the need to learn Word and Excel. It heightens it. AI can only assist effectively when users understand **how data should be structured**, **how formulas and logic work**, and **how professional communication should sound**. The more you know the underlying mechanics of these tools, the more value you can extract from AI enhancements like Copilot.

In the coming years, professionals who combine **strong foundational skills** in Word and Excel with **AI fluency** will be among the most in-demand in the workforce. As industries increasingly rely on automation and data intelligence, those who can manage both the creative and analytical sides of productivity will shape the future of business communication and data-driven strategy.

Learning Word and Excel today is not only about mastering two applications — it’s about preparing for a future where **human insight and artificial intelligence work together** to enhance productivity, creativity, and decision-making across every industry.

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1.2: AI Tools in Modern Business Software

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Introduction: The AI-Enhanced Workplace

The modern workplace is undergoing a significant transformation. Artificial intelligence is no longer a futuristic concept—it's embedded in the software tools you likely use every day. From drafting emails to analyzing spreadsheets, AI assistants are becoming as common as spell-checkers once were.

Understanding how to work effectively with AI tools is quickly becoming an essential workplace skill, much like proficiency in Microsoft Office has become a baseline requirement over the past few decades. Whether you're pursuing a career in marketing, finance, healthcare, or any other field, you'll likely encounter AI-enhanced tools that can amplify your productivity and capabilities.

This section introduces you to the AI tools currently reshaping how business professionals work with familiar applications, such as Word and Excel. It explains the new skills you'll need to thrive in this AI-augmented environment.

Popular AI Tools in the Business Environment

Today's business professionals have access to a growing ecosystem of AI tools, each designed to enhance different aspects of work. Let's explore the major categories you're most likely to encounter.

Microsoft Copilot represents Microsoft's integration of AI across its entire suite of business applications. Available in Word, Excel, PowerPoint, Outlook, and Teams, Copilot acts as an intelligent assistant that understands natural language commands. For example, you might ask Copilot to "summarize this 20-page report" or "create a chart showing quarterly sales trends." The system interprets your request and performs the task, often in seconds.

Google Workspace AI (formerly known as Duet AI, now integrated as Gemini) offers similar functionality to users of Google Docs, Sheets, Gmail, and other Google applications. If your organization uses Google's ecosystem, you'll interact with AI features that can draft emails, analyze data, and generate content directly within these familiar applications.

ChatGPT and Claude are standalone AI assistants that have gained widespread adoption in the workplace. Unlike Copilot or Google's integrated tools, these are separate applications or websites that professionals use for tasks like brainstorming, drafting content, solving problems, or learning new concepts. Many workers keep these tools open in a browser tab alongside their other applications, consulting them throughout the day for various tasks.

Specialized AI tools are designed to address specific business needs. Grammarly utilizes AI to enhance writing quality beyond basic spell-checking, providing tone suggestions and clarity improvements. Notion AI enhances knowledge management and note-taking. Jasper and Copy.ai focus on marketing content creation. As you enter the workforce, you'll discover that different industries and companies have adopted various combinations of these tools based on their specific needs.

AI in Microsoft Word

Microsoft Word with Copilot transforms the traditional word processing experience into an interactive collaboration between you and an AI assistant. Understanding these capabilities will help you work more efficiently with documents in professional settings.

Drafting and editing assistance is perhaps the most immediately useful feature. Instead of staring at a blank page, you can provide Copilot with a basic prompt, such as "Draft a professional email requesting a meeting with a client to discuss project delays." The AI generates a complete draft that you can then refine and personalize. This doesn't mean the AI writes for you—instead, it provides a strong starting point that you shape into the final product.

Copilot can also assist you in editing existing content. You might highlight a paragraph and ask it to "make this more concise" or "adjust the tone to be more formal." The AI understands context and can rewrite sections while maintaining your document's overall flow and purpose.

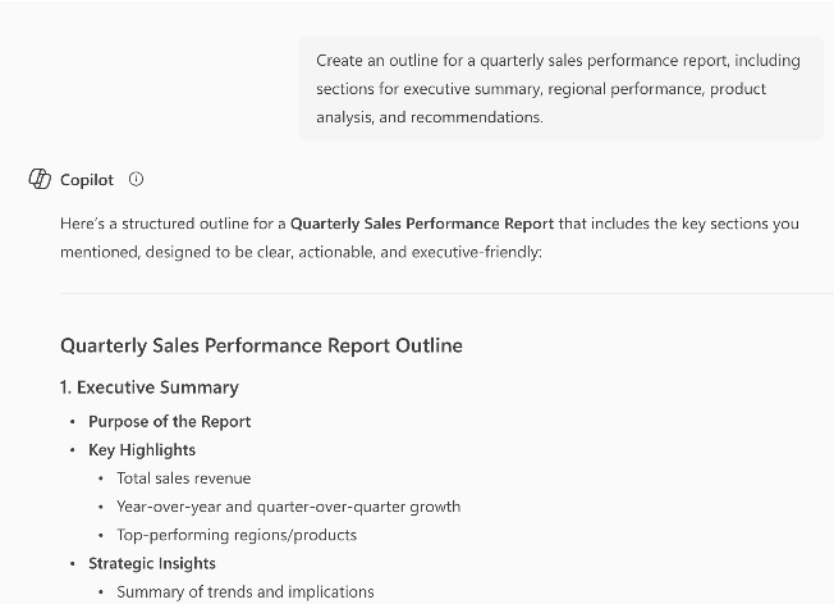
Document formatting and summarization features save a considerable amount of time. Copilot can automatically format lengthy documents with appropriate headings, create tables of contents, or adjust styling to match corporate templates. When you need to

digest information quickly, you can ask Copilot to summarize lengthy documents, extracting key points and action items.

Real-world example: Creating a business report. Imagine you're an intern tasked with creating a quarterly performance report. You have data from various sources, meeting notes, and previous report templates. Here's how AI might assist:

1. You start by asking Copilot to "Create an outline for a quarterly sales performance report including sections for executive summary, regional performance, product analysis, and recommendations."
2. Copilot generates a structured outline. You then paste your raw data and notes into different sections.
3. For each section, you might ask Copilot to "draft a summary of this data, highlighting the most significant trends." The AI analyzes your numbers and writes initial descriptions.
4. You review what the AI wrote, verify the accuracy against your source data, adjust the interpretation where needed, and add your own insights and observations.
5. Finally, you ask Copilot to ensure consistent formatting throughout and generate an executive summary of the complete report.

Throughout this process, you remain the author and decision-maker. The AI accelerates the mechanical aspects of report creation, allowing you to focus more time on analysis, interpretation, and strategic thinking.



AI in Microsoft Excel

Excel has evolved from a spreadsheet program into an intelligent data analysis platform. AI capabilities in Excel are compelling because they make advanced data analysis accessible to users who may not have extensive technical training in statistics or programming.

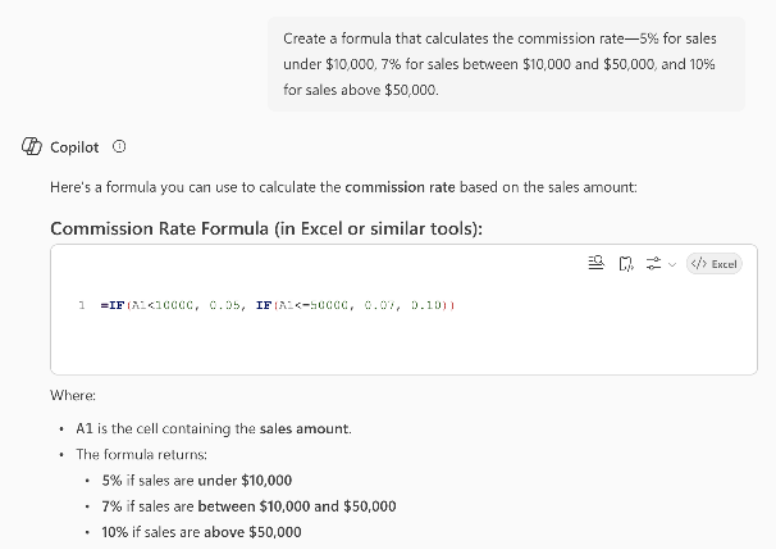
Natural language data analysis is transforming how professionals interact with spreadsheets—previously, analyzing data required knowing specific functions and formulas. Now, you can ask questions in plain English. For example, with a sales dataset open, you might type "What were the top 5 selling products last quarter?" or "Show me a breakdown of revenue by region." Copilot interprets these questions, performs the necessary calculations, and presents results—often with visualizations.

This capability democratizes data analysis. You no longer need to memorize dozens of Excel functions to extract insights from your data. Instead, you can focus on asking the right questions and interpreting the answers.

Automated formula generation addresses one of Excel's steepest learning curves. Complex formulas, particularly those using functions like VLOOKUP, INDEX-MATCH, or nested IF statements, can be intimidating. With AI assistance, you can describe what you want to calculate in everyday language: "Create a formula that calculates the commission rate—5% for sales under $10,000, 7% for sales between $10,000 and $50,000, and 10% for sales above $50,000."

Copilot generates the appropriate formula, often explaining how it works. This serves a dual purpose: you get immediate results, and over time, you learn more about Excel's capabilities by seeing how the AI solves problems.

When formulas contain errors, AI can help identify and correct them. Instead of searching through documentation or online forums, you can simply describe the error you're encountering, and the AI can identify the issue and suggest corrections.



Real-world example: Financial analysis and forecasting. Consider a scenario where you're working in a company's finance department, analyzing monthly expenses to create a budget forecast.

1. You import six months of expense data into Excel—thousands of rows covering various departments and expense categories.
2. You ask Copilot to "identify the top three expense categories and show month-over-month growth rates." Within seconds, you have a summary table and chart.
3. You notice an unusual spike in marketing expenses. You ask, "Which specific marketing expenses increased most dramatically in April?" The AI breaks down the category and identifies the outliers.
4. For forecasting, you request: "Create a three-month projection for each department's expenses based on current trends, accounting for the 5% budget reduction mandate." Copilot generates formulas using appropriate statistical functions and creates forecast tables.
5. You review the projections, apply your business knowledge (perhaps you are aware of an upcoming project that will impact specific departments), and adjust the AI's baseline forecasts accordingly.

Again, the pattern is clear: AI handles data manipulation and calculation, while you provide business context, verify accuracy, and make informed decisions based on the results.

Essential Skills for the AI-Augmented Workforce

As AI tools become ubiquitous in business environments, a new set of skills is emerging as essential for workplace success. These aren't technical programming skills—they're practical competencies that anyone can develop.

Prompt engineering basics refers to the skill of communicating effectively with AI systems. Unlike traditional software, where you click buttons and select menu options, AI tools respond to written instructions, known as "prompts." The quality of your results depends heavily on how well you craft these prompts.

Effective prompts are typically:

- **Specific**: Instead of "help me with this data," try "calculate the average sales per quarter and identify any quarters that were more than 20% below the overall average."
- **Contextual**: Provide relevant background. "I'm drafting a formal proposal for a client in the healthcare industry" yields better results than simply "write a proposal."
- **Iterative**: Start with a basic prompt, review the results, then refine. "Make this more concise" or "add more specific examples" helps you shape the output.

As you practice, you'll develop an intuition for how to phrase requests to get optimal results. This skill—knowing how to "talk to" AI systems effectively—is becoming as valuable as learning how to use advanced software features.

Critical evaluation of AI outputs is perhaps the most crucial skill in the era of AI. AI systems are powerful but not infallible. They can generate plausible-sounding content that contains errors, biases, or hallucinations (completely fabricated information presented confidently as fact).

You must always:

- Verify facts and figures against reliable sources
- Check that AI-generated formulas actually perform the calculations you intended
- Ensure that AI-written content aligns with your organization's voice and values
- Review for potential biases in AI-generated analysis or recommendations

Think of AI as a competent intern: useful and productive, but requiring supervision and verification. You remain responsible for the final product, regardless of how much AI assistance you used in creating it.

Understanding when to use (and not use) AI tools demonstrates professional maturity. AI excels at specific tasks while being inappropriate for others.

Good uses of AI include:

- Generating first drafts and outlines
- Summarizing lengthy documents
- Performing routine data analysis
- Formatting and organizing information
- Brainstorming ideas and alternatives

Poor uses of AI include:

- Making sensitive decisions without human judgment (hiring, firing, medical decisions)
- Handling confidential or proprietary information (depending on your organization's policies)
- Creating content where authenticity and personal voice are crucial
- Situations requiring current, real-time information (unless the AI has internet access)
- Complex strategic decisions requiring deep industry expertise

Part of becoming AI-literate is developing judgment about which tools to use for which tasks, and when human intelligence remains irreplaceable.

Ethical considerations and data privacy must not be overlooked. When you input information into AI tools, consider where that data will be stored and how it may be used. Many AI systems utilize interactions to train and improve their models, meaning that your company's sensitive information could potentially become part of the AI's knowledge base.

Before using AI tools with work-related information, always:

- Understand your organization's AI usage policies
- Never input confidential client information, trade secrets, or personal data into public AI tools
- Be aware of whether your company uses enterprise versions of AI tools with stronger privacy protections
- Consider the ethical implications of AI-generated content, particularly regarding transparency and authenticity

Additionally, remain aware that AI systems can perpetuate biases present in their training data. An AI might generate job descriptions that inadvertently discourage specific demographics from applying, or produce analysis that reflects historical inequities. Your role includes catching and correcting these issues.

Conclusion: Building AI Literacy

As this section has demonstrated, AI tools are not replacing human workers—they're changing what it means to be an effective professional. The most successful workers in the years to come will be those who can seamlessly integrate human judgment, creativity, and expertise with AI's computational power and efficiency.

AI as a collaborative tool, not a replacement. It's essential to maintain a balanced perspective on what AI can and cannot do. These tools handle routine tasks, process large amounts of information quickly, and provide starting points for creative work. However, they lack proper understanding, contextual awareness, and the ability to make nuanced judgments that consider organizational culture, relationship dynamics, and strategic implications.

Your value as a professional lies not in performing tasks that AI can automate, but in providing the human elements: strategic thinking, emotional intelligence, ethical reasoning, relationship building, and contextual decision-making. AI amplifies these human capabilities rather than replacing them.

The importance of continuous learning. AI technology is evolving rapidly. The tools available today will be more capable next year, and entirely new categories of AI assistance will likely emerge throughout your career. Developing a mindset of continuous learning is essential.

This means:

- Staying curious about new AI capabilities as they're released
- Experimenting with AI tools in low-stakes situations to build familiarity
- Learning from colleagues who use AI effectively
- Reading about AI trends and best practices in your industry
- Remaining open to changing your workflows as better tools become available

Next steps for developing AI competency. You don't need to become an AI expert overnight. Start small and build your skills progressively:

1. **Experiment regularly**: Use AI tools for small tasks—summarizing articles you need to read, drafting routine emails, or analyzing simple datasets. Regular practice builds intuition.
2. **Compare and learn**: When you use AI to generate content or analysis, compare it to what you would have created manually. This helps you understand the tool's strengths and limitations.
3. **Seek feedback**: Ask supervisors or mentors to review work you've created with AI assistance. Learn what meets professional standards and what needs improvement.
4. **Stay informed**: Follow reputable sources covering AI in business. Understanding where the technology is heading helps you prepare for future developments.
5. **Share knowledge**: As you discover effective techniques, share them with classmates or colleagues. Teaching others reinforces your own learning and contributes to a more AI-literate professional community.

The integration of AI into business tools represents one of the most significant transformations in the workplace in decades. By developing AI literacy now, while you're still in school, you'll enter the workforce with a competitive advantage and the adaptability needed to thrive in an increasingly AI-augmented professional environment.

Remember: the goal isn't to let AI do your work for you. The goal is to leverage AI, allowing you to focus on higher-level thinking, creativity, and the distinctly human contributions that create real value in any organization.

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1.3: Understanding Your Audience

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Introduction: Why Audience Matters

Have you ever received a 10-page report when all you needed was a yes or no answer? Or been asked to decide without enough information to understand the whole picture? These frustrations happen when communicators forget a fundamental principle: **one message doesn't fit all**.

In business, the same information needs to be communicated differently depending on who's reading it. An executive making a strategic decision needs different information than a manager implementing that decision, and both need something different from the specialist doing the detailed work.

Understanding your audience shapes three critical elements of your communication:

- **Content**: What information to include or exclude
- **Format**: How to structure and present the information
- **Depth**: How detailed or high-level should it be

Master this principle, and you'll save time, reduce confusion, and increase the impact of everything you create in Word and Excel.

Three Types of Business Audiences

Executive Leadership

Who they are: C-Suite executives, VPs, senior leadership

What they need: Strategic insights and bottom-line impact. Executives make high-stakes decisions and need to understand the "so what?" quickly. They're looking for the business implications, not the process details.

Time constraints: Assume 2-5 minutes maximum. Executives juggle dozens of priorities daily and need information that gets to the point immediately.

Preferred format:

- One-page summaries or executive briefs
- Key metrics with clear visual highlights
- Bullet points over paragraphs
- Clear recommendations

Their focus:

- "So what does this mean for the business?"
- "What decision needs to be made?"
- "What's the financial impact?"
- "What action should we take?"

What to avoid:

- Lengthy explanations of methodology
- Technical jargon without context
- Burying important information on page 3
- Presenting problems without potential solutions

Example: Instead of a 5-page analysis of website traffic patterns, provide: "Website traffic down 15% this quarter. Primary cause: mobile page load times increased to 8 seconds (industry standard: 3 seconds). Recommendation: Invest $20K in mobile optimization, projected to recover lost traffic within 60 days."

Management

Who they are: Directors, managers, team leads, department heads

What they need: Tactical information that helps them manage operations, track performance, and identify issues. Managers bridge the gap between executive strategy and day-to-day execution.

Time constraints: Typically 10-15 minutes. Managers can engage with more detail than executives, but they still need efficient and well-organized information.

Preferred format:

- 1-3 page summaries with supporting details
- Trend analysis and comparative data
- Clear section headers for easy scanning
- Context that explains "why" something matters

Their focus:

- "How are we performing against goals?"
- "What needs my attention?"
- "Are we on track?"
- "What issues should I address with my team?"

What to avoid:

- Missing the context of how this fits into broader goals
- No actionable takeaways or next steps
- Unclear what's expected of them
- Too high-level (they need more than executives) or too detailed (they don't need everything)

Example: A monthly sales report for a manager should include an executive summary of overall performance, a breakdown by team member or product line, trends compared to previous months, specific areas of concern with context, and recommended actions for the team.

Colleagues & Specialists

Who they are: Peers on your team, subject matter experts, analysts, technical staff, implementation teams

What they need: Comprehensive information with full context. These audiences often need to understand the "how" behind your work, validate your methodology, or use your information to do their own work.

Time constraints: More flexible. These readers can engage with longer, more detailed documents when necessary.

Preferred format:

- Complete documentation with methodology
- Detailed data tables and technical specifications
- Step-by-step processes
- Appendices with supporting information

Their focus:

- "How does this work?"
- "What are the specific details?"
- "Can I replicate or build on this?"
- "What assumptions were made?"

What to avoid:

- Oversimplifying to the point of being vague
- Missing methodological details
- Unverified data or unclear sources

- Skipping the technical explanations they need

Example: If you're documenting a new data collection process, specialists need the complete workflow, data sources, and validation methods, as well as formulas and calculations used, known limitations, troubleshooting guidance, and information on where to find additional resources.

Key Questions Before You Communicate

Before you create any business document, invest two minutes answering these questions. This quick analysis will save you hours of revision and ensure your communication is effective.

Who will read this? Identify both primary and secondary audiences. Your primary audience determines your approach, but acknowledge secondary readers who might reference your work later.

What will they do with this information? Are they making a decision? Implementing a change? Staying informed? Understanding the intended action shapes what you include.

How much time will they have? A busy executive scanning during a meeting needs different formatting than a specialist reading at their desk.

What's their familiarity with the topic? Can you use technical terms, or do you need to define concepts? This prevents both talking down to experts and confusing non-specialists.

What level of detail is appropriate? More detail isn't always better. Match the depth to what your audience needs to accomplish their goal.

The Layered Approach for Multiple Audiences

In many workplace situations, you'll need to communicate the same information to multiple audience types. Writing three separate documents is inefficient. Instead, use a **layered approach** that serves everyone in a single document.

Structure:

Layer 1: Executive Summary (1 paragraph to 1 page)

- The most important information up front
- Key findings, decisions needed, or recommendations
- Can stand alone for executives who read nothing else

Layer 2: Main Content (2-5 pages)

- Core information with context
- Enough detail for managers to understand and act
- Organized with clear headers for easy navigation

Layer 3: Supporting Details (appendices or attachments)

- Detailed data tables, methodology, and calculations
- Technical specifications
- Additional resources for specialists who need to go deeper

Benefits of This Approach:

Efficiency: Create one document instead of three. When information changes, update it in one place.

Flexibility: Each reader can delve as deeply as needed. Executives read the summary, managers read the main content, specialists dive into the appendices.

Completeness: Nothing important is left out, but readers aren't forced to wade through information they don't need.

Professionalism: Shows respect for everyone's time while providing comprehensive information.

Example Structure:

Email with 3-sentence summary → Links to full document

Page 1: Executive Summary → Key points in half a page

Pages 2-4: Main Report → Context and analysis with visuals

Pages 5+: Appendices → Detailed tables, methodology notes

5. Adapting Your Content

Once you know your audience, you need to adapt three key elements:

Content: What to Include vs. Cut

For executives, focus on:

- Bottom-line impact (revenue, cost, risk)
- Strategic implications
- Clear recommendations
- What's different or changed

Cut: Process details, technical methodology, granular data

For managers, focus on:

- Performance against goals
- Trends and patterns
- Operational impacts
- What needs attention

Cut: Executive strategy discussion, excessive technical detail

For specialists, focus on:

- Complete methodology
- Data sources and validation
- Technical specifications
- Assumptions and limitations

Cut: Nothing—they often need the whole picture.

Language: Professional vs. Technical Terminology

Executive language: Use business terms everyone understands. Instead of "Our API latency increased to 500ms," say "Our system response time slowed by 60%, impacting customer experience."

Management language: Strike a balance between accessibility and accuracy. Define technical terms when first used. "Website bounce rate (visitors who leave after viewing only one page) increased from 40% to 55%."

Specialist language: Use precise technical terminology. Your audience expects it and needs the specificity. "Database query optimization reduced average SELECT statement execution time from 2.3s to 0.4s."

Format: Visual Hierarchy Guides Readers

Use formatting strategically:

- **Bold headers** help scanners find relevant sections quickly
- **Bullet points** break up dense text and highlight key items
- **White space** makes documents less overwhelming
- **Callout boxes** draw attention to critical information
- **Charts and visuals** convey information faster than text

Key Takeaways

As you develop your skills in Word and Excel, remember these principles:

✓ **Know your audience before you start**. Two minutes of planning saves hours of revision.

✓ **Different audiences need different approaches**. What works for your manager won't work for their boss.

✓ **Use a layered structure for multiple stakeholders**. One document can serve everyone if properly organized.

✓ **Always answer: "What should they do with this information?"** Purpose drives content.

The most technically perfect spreadsheet or beautifully formatted document fails if it doesn't give the reader what they need. Put your audience first, and everything else falls into place.

In the following chapters, you'll learn the technical skills to create professional documents in Word and robust analyses in Excel. Keep these audience principles in mind as you build those skills—they'll transform your work from technically correct to genuinely adequate.

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CHAPTER OVERVIEW

2: Microsoft Word Interface and Basics

> This page is a draft and is under active development.

2.1: Chapter Scenario
2.2: Navigating Microsoft Word
2.3: Formatting Document Layout in Microsoft Word
2.4: Formatting Document Content in Microsoft Word
2.5: Document Design
2.6: Chapter Review - Review Questions
2.7: Chapter Review - Practice Exercises
2.8: Chapter Review - Written Questions
2.9: Chapter Review - Case Exercises

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2.1: Chapter Scenario

This page is a draft and is under active development.

You have been tasked with writing a market trends report on the manufacturing division of WorldCorp's consumer goods company, which produces products such as televisions and computer monitors. A market trends report summarizes the current status of an industry, details the major competitors and their market share, and provides some information on where the industry is moving. You are the main document editor, but you need to get information from other WorldCorp employees in different departments, such as the manufacturing and accounting departments, as well as from international business statistics databases. Creating this report will require a considerable amount of collaboration and sharing of information, as well as layout and design skills, to make the final report look good. The process of creating this market trends report will require a thorough, working knowledge of the program you are using to generate it.



Figure 3.1: Many people use word processing software for a variety of purposes, such as writing a paper for an assignment, or creating a report for a manager. Companies often use both Microsoft Word and Google Docs in the workplace. (credit: modification of "WOCinTechChat" by wocintech (microsoft) - 175/Flickr, CC BY 2.0)

Microsoft Word and Google Docs are two of the more popular document preparation and editing software programs. Both programs have a distinct look and feel, as well as their own advantages. Word is full of powerful tools that can be used across different fields, from education to accounting. In contrast, Docs, a free application, has more user-friendly and collaborative features. Offices around the world use both tools for different purposes.

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2.2: Navigating Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Identify the most commonly used tabs in Microsoft Word
- Use the Navigation pane

Microsoft Word is a sophisticated word processing application. It completely transformed the document-creation process, replacing typewriters and existing word processing programs, such as WordPerfect and WordStar, with a user-friendly digital interface and hundreds of options for formatting. The comprehensive features allow users to easily adjust fonts and page layouts, insert graphics, track revisions, communicate collaboratively via comments, check spelling, search for text, and much more.

Let's get started on our market trends report. You should first open a new, blank document in Word. Using the default settings, type the following into the document:

> *Industry and Market Analysis*
>
> *The laptop industry is growing at a rather slow rate with sales expected to grow around 1% annually. Sales in the industry currently are over $20 billion. A large part of sales comes from consumer demand. There are several key players in the laptop industry. The largest companies in the industry in terms of consumer laptop ownership in the United States (market share) are HP, Dell, Apple, Acer, and Lenovo. Individuals can purchase a laptop at various price points based on the features, speed, and storage capabilities of the laptop. These companies also compete in the tablet industry and some consumers might make the decision to choose a tablet over a laptop. There are also laptops that are considered "convertible," meaning that they can be more like a tablet or a laptop with the screen feature that allows full rotation.*

You will use this text to build the framework for the market trends report as you move through the sections in this chapter and in subsequent chapters.

Tabs

Word comes with a set of default tabs (or menus), which are the interface for most of the functions and features you will use. Those tabs are File, Home, Insert, Draw, Design, Layout, References, Mailings, Review, View, and Help.

Mac Tip

These same tabs are on the Mac Menu Bar, but the menu bar varies when you are in Word. There is no File tab on Word's toolbar in Mac. The default tabs you see depend on the settings you have selected. They usually are Home, Insert, Draw, Design, Layout, References, Mailings, Review, View, and Tell Me. You can access Word preferences and settings via the taskbar at the top of the screen.

In this chapter, you will learn more about how the tabs work in Word.

You can customize your menu bar by adding or removing tabs and modifying the tools that appear on each tab. There are hundreds of commands you can choose from; the Word interface is highly customizable. Customization of the tabs was covered in the

chapter on Essentials of Software Applications for Business. The next sections introduce some of the most important default tabs and their overall function, as well as the most-used commands, as Figure 3.2 shows.

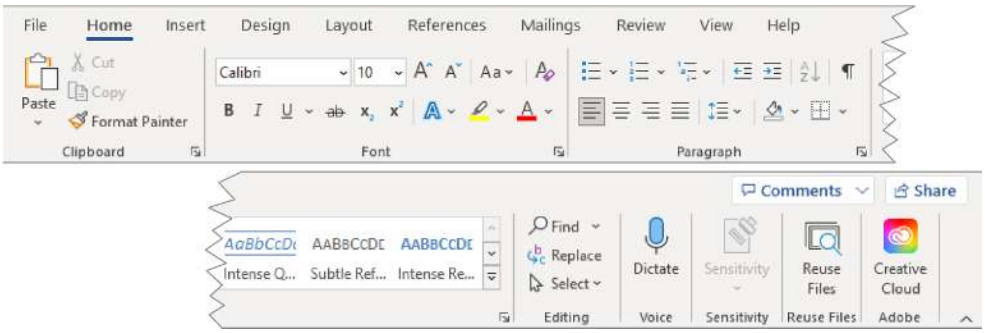


Figure 3.2: Notice there are several tabs, such as Home and Insert, that are common to all Office programs, as covered in Chapter 2. (Used with permission from Microsoft)

Home Tab

The Home tab is where you will spend most of your time, as it contains the formatting of fonts, alignment, headings, numbering, and lists, as well as the Find commands. It is also the default tab that displays when you open your document. We will go over the Home tab commands in detail in Formatting Document Layout in Microsoft Word.

Insert Tab

The Insert tab is useful for adding certain material into your document. The Insert tab also allows the user to include elements such as headers and footers, page numbers, page breaks, and bookmarks. We will review using these features in more detail in the chapter on Document Preparation.

Knowing how to use the Insert tab is particularly important for designing business documents, such as your WorldCorp market trends report. Your report will contain many pages and sections, as well as a table of contents and page numbers. It will also likely contain charts, graphs, and images, all of which need to be inserted into the document. For example, you could insert a chart of the top-selling TV screens (by using the Charts drop-down menu), then add a callout or label explaining the chart (by using the Shapes drop-down menu).

Layout Tab

The Layout tab is where you will configure your page setup. It includes commands for adjusting margins and the paper size, as well as options for shaping the text on the page with columns. The Paragraph command group is for adjusting the alignment of lists, body text, and objects such as pictures in your document. This tab also gives the user options for adding page breaks and line numbers.

Review Tab

If you are working with a team on your documents, you'll likely use the Review tab. This tab has a commenting function that allows users to add comments to a file, and to respond to each other's comments. As Figure 3.3 shows, the Review tab contains the Track Changes feature, which is helpful when many people are taking turns reviewing and contributing to a document. When Track Changes is turned on, edits to the document appear underlined and in colored text. Each user's edits will be colored differently to easily distinguish input from multiple people. This is particularly helpful when documents go through several revisions and are reviewed by many people. The market trends report for WorldCorp is a team effort, requiring several people to contribute to the final product. You can expect that as the document is created and revised, comments will be used to help reach the final version of the report.

The Track Changes process might feel familiar to you, as it is designed to mimic the act of marking up a paper document with a pen. You might have had someone work on your résumé or mark up a homework assignment of yours, using a red pen to make suggestions and revisions on the document itself. In a Word document, comments and Track Changes serve the same purpose as using a red pen on a paper document. This process will be covered in more detail later in the chapter.

The Review tab also has many commands that allow commenting and suggesting changes in documents that are used and edited by multiple people. Figure 3.3 shows two comments that users made by choosing the New Comment function. As people work on the document, they can read and respond to those comments, or remove them by clicking on them and selecting Delete in the Comments menu. There are also options in the Show Markup button found in the Tracking command group to display (or not display) formatting changes such as boldfacing or underlining.

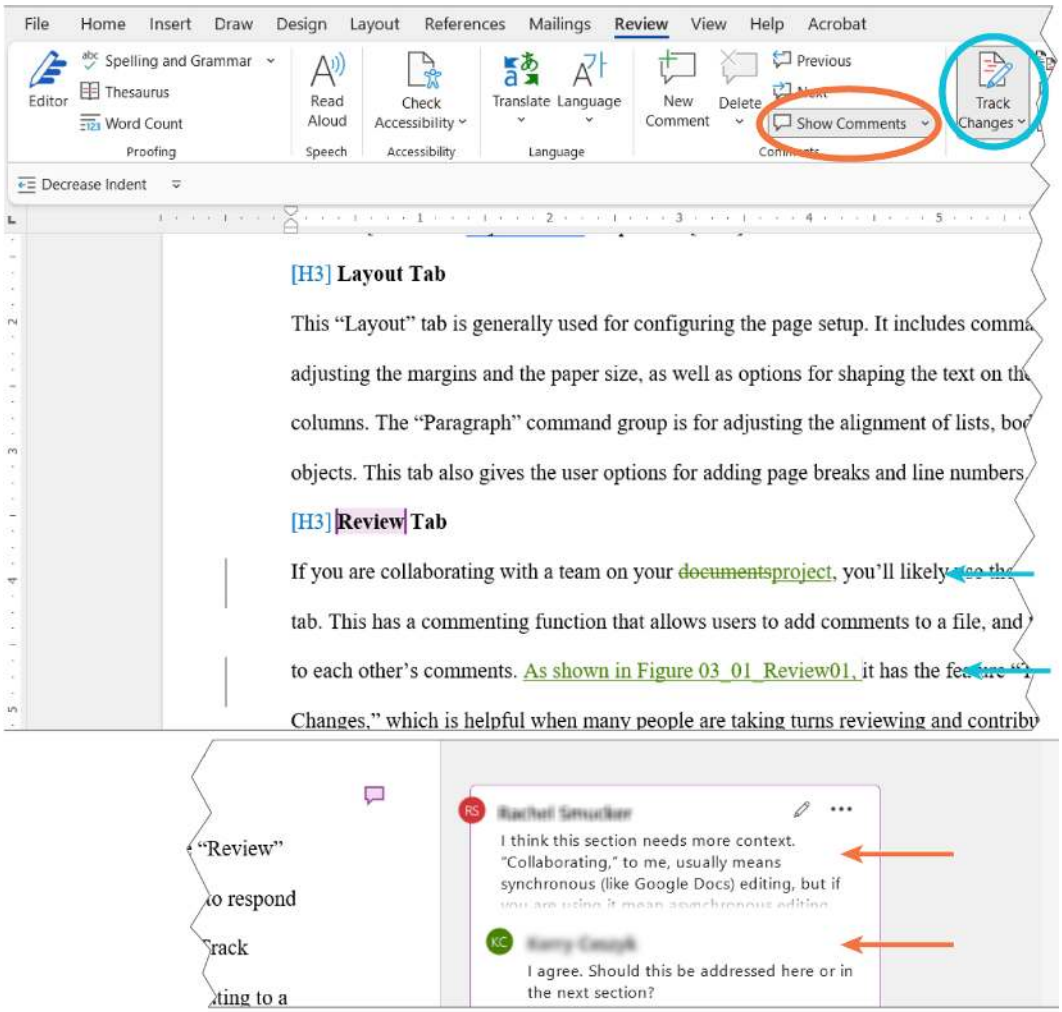


Figure 3.3: The Review tab in Word is helpful when multiple people are working on a document. It allows them to add comments and track revisions. The second comment is the lower one and is the reply to the one above it. (Used with permission from Microsoft)

Also on the Review tab, the Proofing command group contains helpful tools that you will use often when writing and editing a document. You can check your spelling and grammar, look up words in a dictionary or thesaurus, and keep track of your word count.

You will learn more about the Review tab and its features in Formatting Document Layout in Microsoft Word.

View Tab

The View tab is useful for changing how you see your document. For instance, it gives you the option of looking at your document one or two pages at a time. You can also activate the zoom option from here, as well as add rulers and gridlines, which are helpful when placing objects, such as a table or picture, in the report you may be writing. You can also access the Navigation pane in the View tab. You may also use the read, print, or web viewing modes when typing, which give you different ways of seeing your document, as Figure 3.4 shows.

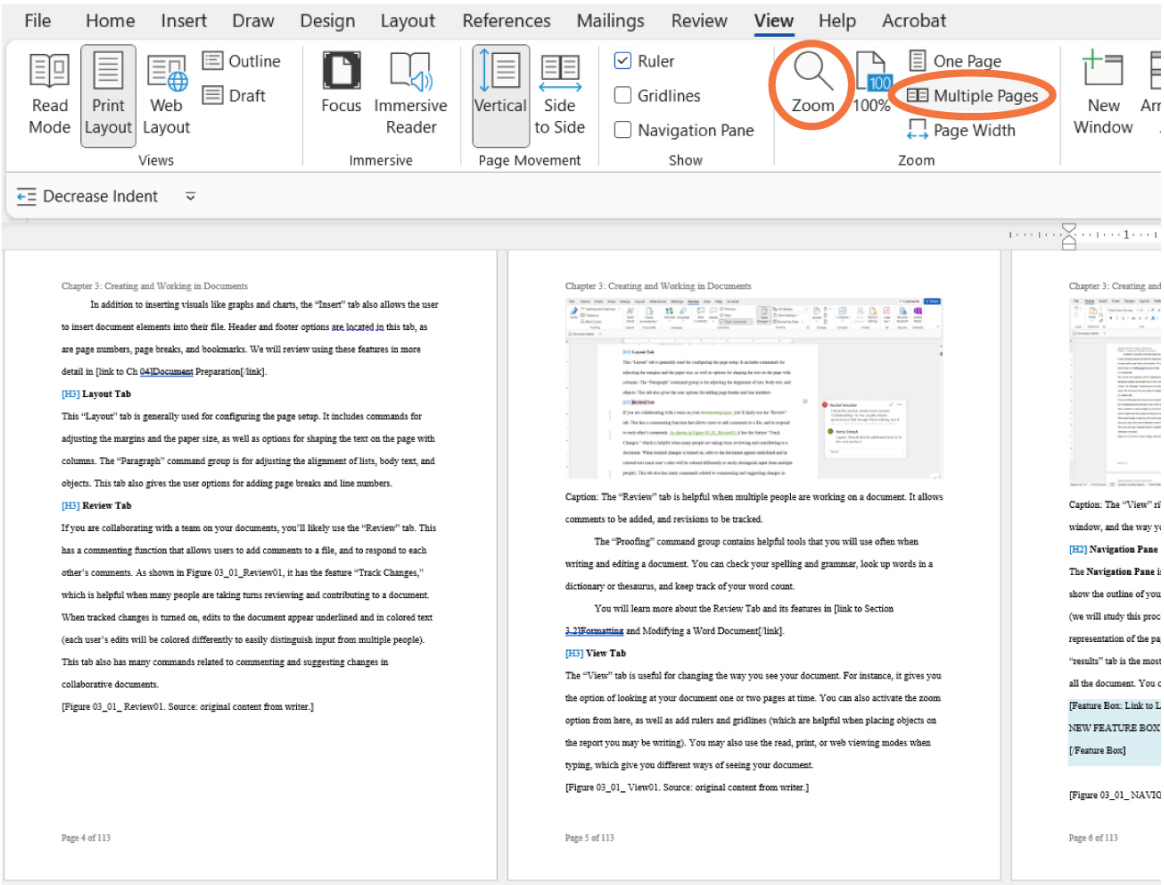


Figure 3.4: The View tab allows users to view documents in a variety of ways. The multiple-page selection, shown here, lets you see several pages at once. (Used with permission from Microsoft)

Navigation Pane

The Navigation pane serves various purposes. The Navigation pane is accessed directly by checking the box on the View tab in the Show command group. You can also get the Navigation pane by selecting Find from the Home tab. With either of these options, a pane will open on the left side of the screen. There are three tabs in the Navigation pane: Headings, Pages, and Results. The first tab, Headings, is the first thing you will see when you open the Navigation pane. This tab shows the outline of your document, but only if you have placed headings for each section and subsection (which you will learn more about in the section on Formatting Document Content in Microsoft Word). The Pages tab shows a thumbnail representation of the pages of the document. The Results tab is used for searching for a particular word, phrase, or number throughout the document, as Figure 3.5 shows. You can always activate the Find function with the Ctrl+F keyboard shortcut.

Mac Tip

To activate the Find function on a Mac, press Command+F.

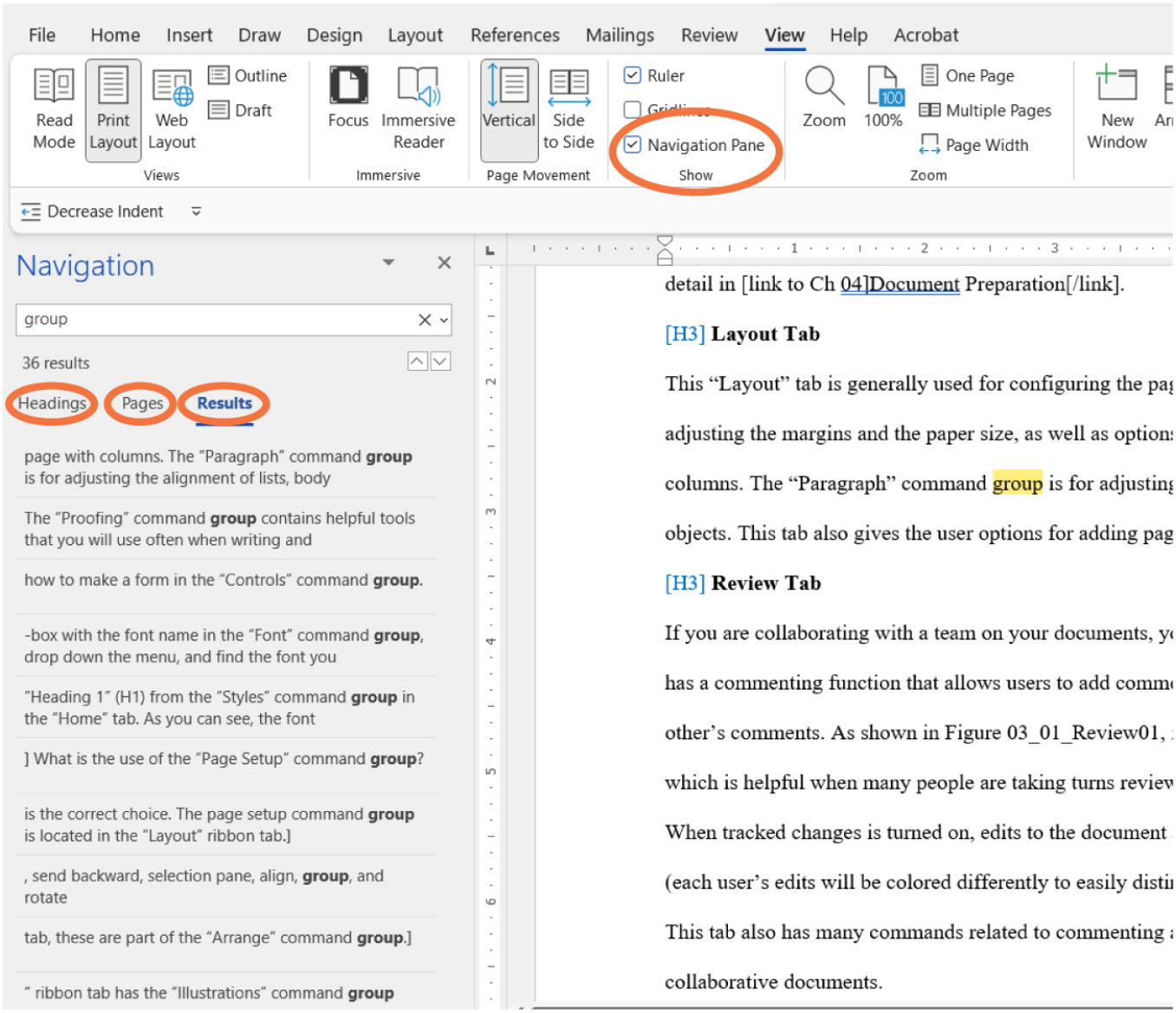


Figure 3.5: The Navigation pane is a sidebar that helps you move quickly from one section of your document to another, or locate a specific term or phrase through its search feature. (Used with permission from Microsoft)

Real-World Application

What Is a Document?

You will likely work in creating, editing, and consuming documents throughout your personal life and professional career. But what exactly is a document? Generally, a document is any type of file that contains information or transferred thoughts/ideas. While historically these documents were transferred to some type of paper or physical presentation on a chalkboard or displayed with an overhead projector, nowadays these are largely found in electronic format. However, when we are referring to a document with respect to Word, we are referring to a very specific type of file. This document file will contain primarily text and images that have been formatted and processed electronically. Hence, Word is a word processor, a type of program that contains a number of different text formatting capabilities for producing primarily text-based files and documents. This is an important distinction, as you can create any number of different text-based files in several different programs.

There will be times when you may not have access to Word or another word processing program. Many computers, and even some portable devices, will come with a preinstalled basic text processing as part of their operating system. Notepad is one example. While you will not be able to format the text (not even bold, italic, or underline), you can capture basic text

> information and save it as a basic text file (.txt) to your computer. This can be useful for jotting down quick notes—hence the name Notepad. Then, later, when you have access to Word, you can copy and paste the text from Notepad into Word, where you can format it and incorporate it into other documents if needed.

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2.3: Formatting Document Layout in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Format page setup and margins
- Create different types of sections and modify section formatting

At WorldCorp, each major division represents a product line. All these divisions have their own functional departments, such as finance, marketing, manufacturing, research and development (R&D), and logistics. To write your report on market trends, you will need to get information on the products from these different departments. For example, the marketing department might provide sales data for a particular product, while the finance department can provide the profit made for each product sold. Practically speaking, this means creating a document that is readable and easy to use for everyone.

Setting the page layout for your document in Microsoft Word allows you to present material in a way that maximizes ease of use. Page layout includes setting margins and page size, choosing the page orientation, introducing features like columns, and breaking up a document into sections so that different parts can have different formats applied. These functions can be accessed using the tools on the Layout tab (see Figure 3.6).

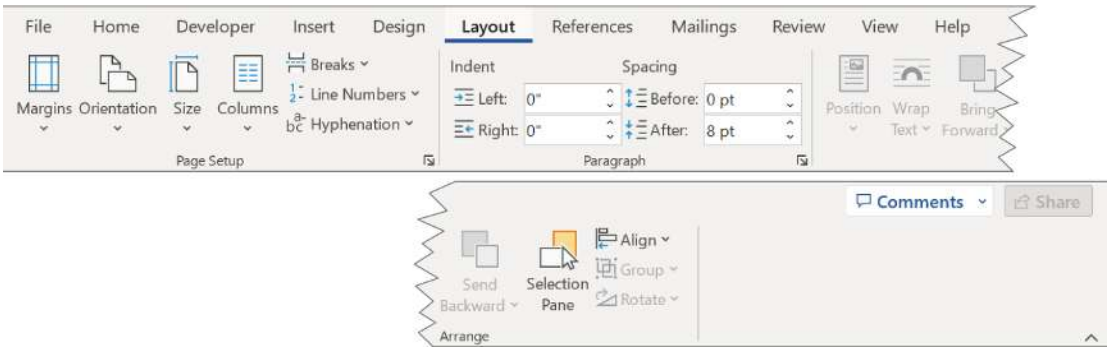


Figure 3.6: The Layout tab has clearly defined drop-down menus and buttons for its page layout tools. (Used with permission from Microsoft)

Page Setup

The Layout tab contains commands and tools for adjusting the overall page setup of your document, located within the Page Setup command group. Page setup typically includes adjusting the paper size, margins, and orientation, as well as adding features like section breaks and columns. There are accepted standards for document formatting, but these can vary by target audience and by industry. For business reports, such as your market trends report, a 12-point font for body text (Calibri, Times New Roman, and Cambria are some popular fonts), and one-inch margins on all sides (top, bottom, left, right) are typically standard. Most reports also have sections and section headings to help break up and organize the content. The line spacing in the reports can vary, but the most common spacing will be either single-spacing, 1.5-spacing, or double-spacing.

Each of these elements has an important role to play in presenting the document to its audience (e.g., business professionals), as well as an impact on readability. Some fonts are easier to read than others, or are more appropriate for a specific genre of document. You may use a style guide (a manual for consistent styling and editorial treatment) like the *Chicago Manual of Style* or the *Modern Language Association* (MLA) style for published corporate reports, but many businesses do not strictly follow a manual of style for internal reports. For reports like your market trends report, it is usually left up to the employee or the supervisor to determine the best formatting and style for the report. For reports that will be distributed externally, such as at a conference, you should ask colleagues in charge of these events if they have formatting and style requirements for documents. It is important to keep the intended audience in mind when setting up the document.

Real-World Application: Style Guides

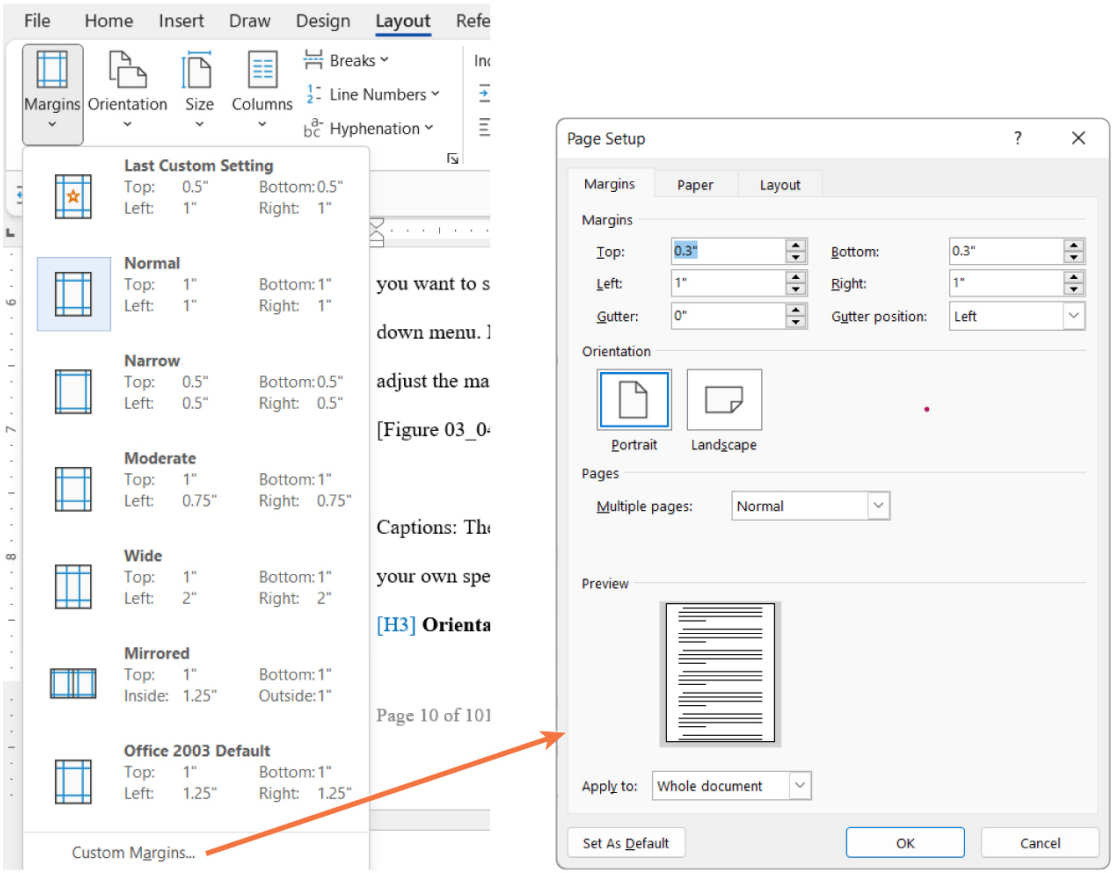
Different industries will establish certain expectations around the types of documents that are typical of their field, as well as how these documents are formatted and presented. For instance, newspapers will use a certain type of font and use only certain types of formatting options. They will also define the paper size, margins, and how the content is laid out on the page. If you review a handful of different printed newspapers, you will find that each has a very specific style and that no two really look alike, although we recognize that they are newspapers because they share a subset of agreed-upon standards (such as page size). So too, will you find that your industry has a specific style, and in your studies, you will be asked to adopt different writing and formatting standards. These are known as style guides, or style manuals. Common ones you may encounter while in college are the APA (*American Psychological Association*) and MLA (*Modern Language Association*) style manuals; however, others exist, including ones used in specific industries, such as the CSE (*Council of Science Editors*) style used in biology and other sciences. These guides will define how documents should be formatted in their entirety, from font type to the general layout of pages, including margin width and line spacing. It is important to know that these styles are updated regularly. You will want to stay abreast of these updates. To make this easier, most major style guides, such as APA and Chicago, have websites that provide information about updates. To ensure that you stay informed, some of these websites offer subscriptions for information about updates.

While Word does not come preset with these formatting requirements, you can create your own style sets, which you will learn more about in later chapters. What's more, there are many online resources that can help guide you in these formatting requirements. For instance, the reference or citation page tends to be a sticky spot for many students. There are several citation styles in the citation tool in Word. There are also many free online services that can help you create your reference list by inputting relevant information into guiding categories. They then generate your reference list for you. A word of caution: You should also review and verify if the produced content does align with the formatting requirements of that style. Styles do change and are updated, and these services do not always remain current.

Margins

All pages in a document have a margin, a blank area from the edge of each side of the page to the content. Margins make a page more readable, and in printed documents, allow space for bindings, notes, and so on. You may encounter projects that need different margins on different pages, or unconventional margins—that is, custom margins.

To adjust the margins of a page, go to the Layout tab. Select the Margins icon, and a drop-down menu will appear. The default margin is Normal (1 inch on all sides), but this can be adjusted via the pre-populated options, such as for different layouts with narrower margins. If you want to set your own margins, choose the Custom Margins option at the bottom of the drop-down menu. In the dialog box shown in Figure 3.7, notice how you can adjust the margins to various measurements.



(a) (b)

Figure 3.7: The Margins tab in the Page Setup dialog box lets you (a) choose from predetermined selections, or (b) create your own specifications through the custom margin dialog box. (Used with permission from Microsoft)

Orientation

Page orientation refers to whether the page is vertical or horizontal. The default in Word is the vertical layout, called portrait orientation. This layout works best for everyday text documents, such as business reports and correspondence. The horizontal layout is known as landscape orientation, and works best for documents with tables and graphs that otherwise would not fit well on a vertical page. Using the Orientation command in the Page Setup command group, you can alter the orientation of your entire document, or also limit the changes to certain pages or sections. Figure 3.8 shows the two layout options.

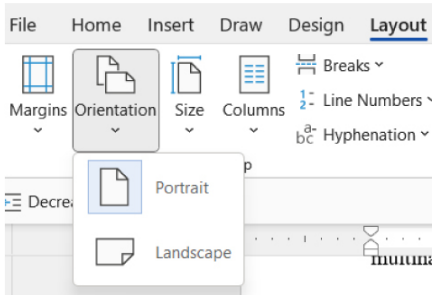


Figure 3.8: Inserting sections in your document allows you to change the page orientation between sections. (Used with permission from Microsoft)

Line Spacing

The space between lines of text as you move through the document is referred to as line spacing. You might be familiar with double-spacing, which is often required when creating documents for a class assignment. However, the default in Word is single-spacing. To change the line spacing, access the Line and Paragraph tool from the Paragraph command group on the Home tab

(Figure 3.9). To change the spacing of text that has already been typed, select the text and change the line spacing to the desired spacing. You can also set the spacing before typing anything in the document.

The line spacing can vary throughout the document. It does not have to be consistent. You can, at any point, change the line spacing by selecting the text you want to apply the different spacing to, and then selecting the spacing from the Line Spacing tool on the Home tab. But keep in mind the professionalism of the document you are preparing. It is not advisable to vary the line spacing throughout the document, as that can impact the readability of the report. It can also look as if you did not take care to ensure consistency in formatting when preparing the report. However, if you have a few sentences that need to stand out for some reason —such as a table caption, or a block quote—having these elements set with a different line spacing might be appropriate.

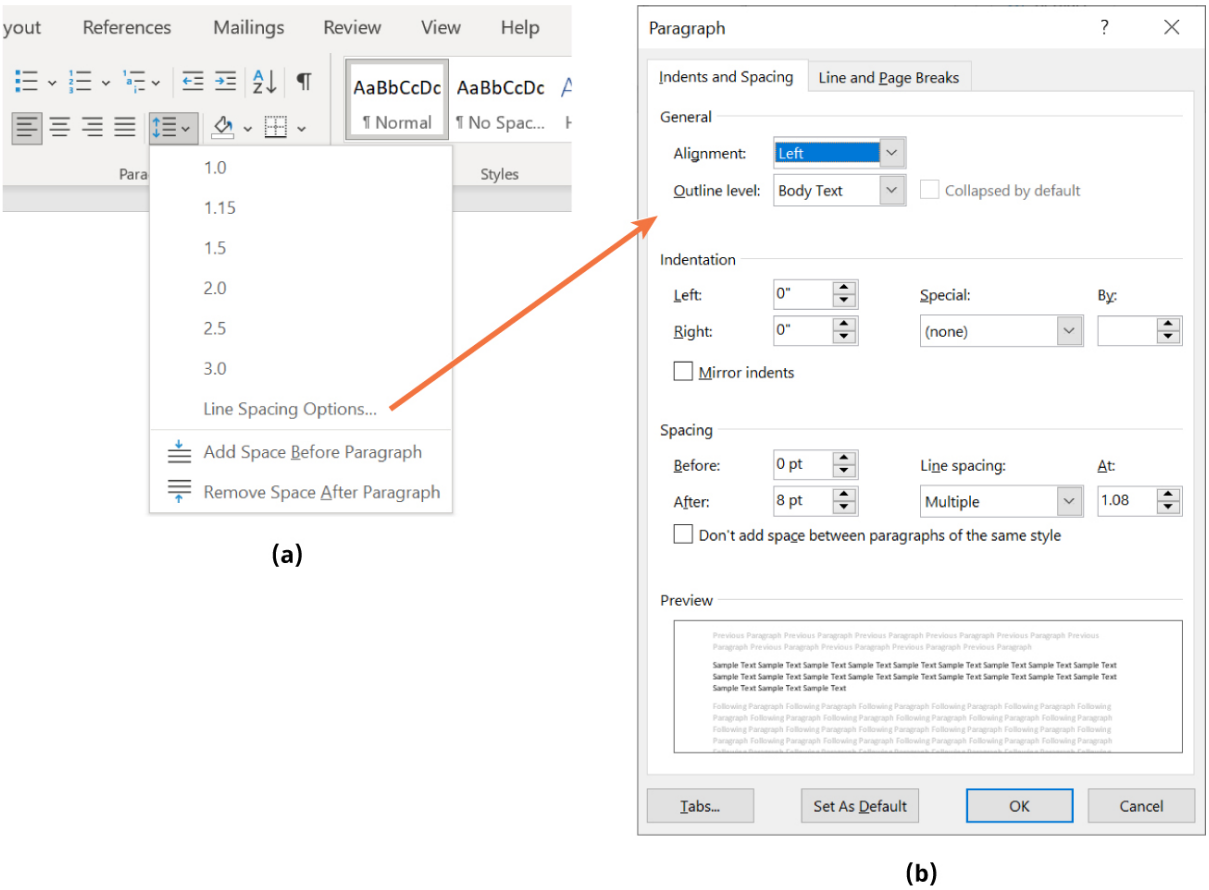


Figure 3.9: (a) You can change the line spacing of a document by using the tool in the Paragraph command group. (b) There are additional options for indentation and line spacing by selecting Line Spacing Options. (Used with permission from Microsoft)

Through the Line Spacing Options tool, you can change the spacing before and after lines of text, the spacing before and after paragraphs, and the indentation of lines of text.

Page Size

Understanding page size is particularly important when working at a global corporation like WorldCorp. Different countries use different standard page sizes, and it is helpful to know how documents might vary across various company locations. For example, the United States uses standard letter size (8.5 inches wide by 11 inches long), whereas Europe and East Asia typically use A4 size (8.25 inches wide by 11.75 inches long).

Similar to margin selection, when you select the Size command, there is a drop-down list of default pages sizes, as Figure 3.10 shows. You can select from these options or choose to create a custom page size. Note that the size selections include materials other than standard pages, such as envelopes.

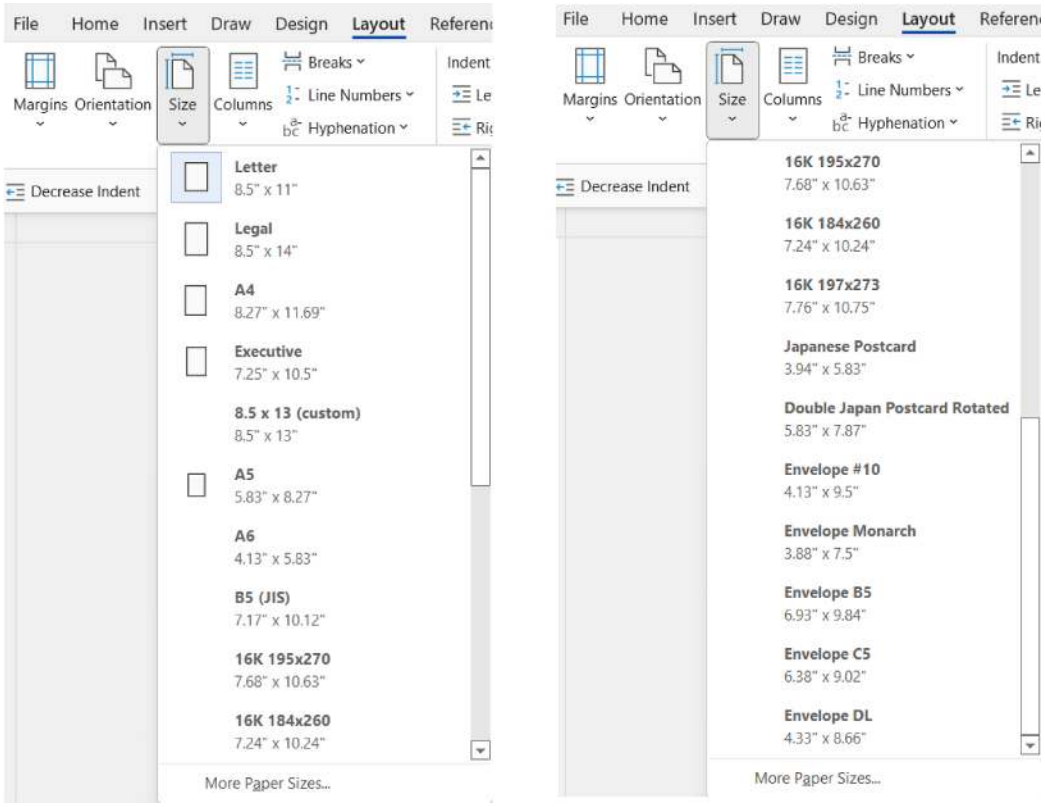


Figure 3.10: You can select from a variety of predetermined page sizes for your document, or create a custom paper size if desired, such as for a poster or invitation. This figure shows the entire drop-down list as two panels. (Used with permission from Microsoft)

Columns

You may be familiar with the column format in print media such as newspapers and magazines, where the text on a page is separated into multiple, vertical columns. Sometimes columns are desired in specific types of Word documents, such as newsletters or brochures. They can also be useful if you have a long list of short terms and want to optimize page space by utilizing columns instead of having a large expanse of white space.

Word has many options for creating columns. To do this, you can select a section of text, go to the Columns drop-down menu, and select from common column layouts. Menu options include columns of equal size, or options where there is one narrower column on the side of a wider column. If you want to customize a column to be of a specific width, or you want more than three columns in one page, choose More Columns. In Figure 3.11, you can see the options. The dialog box shows a preview of how the document will look. A line between the columns is possible, as seen in the dialog box.

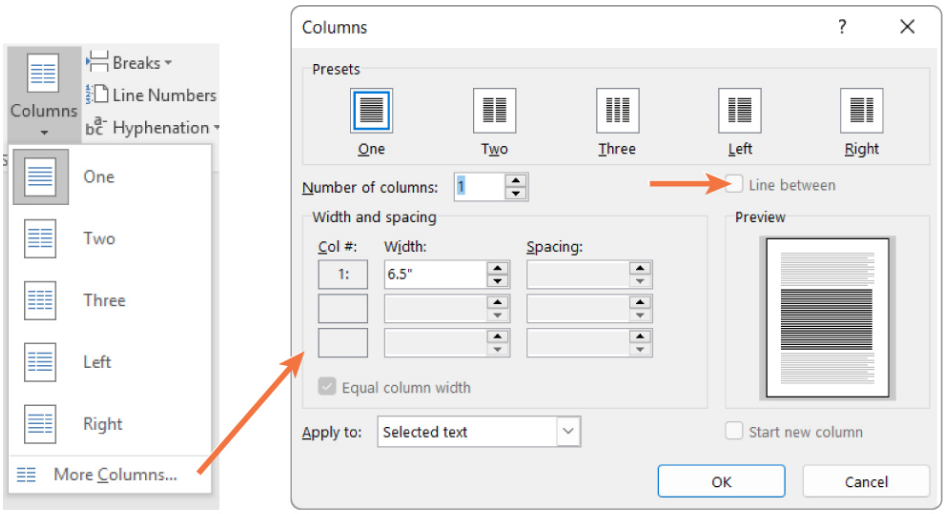


Figure 3.11: (a) More Columns opens a window where you can (b) customize their width and spacing. Columns are common in certain types of documents, such as newsletters and brochures. (Used with permission from Microsoft)

Working with Section Breaks

Sections in Word are especially useful for long documents. A section allows the user to partition part of the document, such as front matter, body text, and back matter, and apply different styles and formatting to each section, while still maintaining all the text in one document. Sections are also important when creating a table of contents and assigning page numbers in a large report. These concepts will be covered in more detail in the chapter on Document Preparation.

The division of a document into front matter, body text, and back matter is more common in longer documents, such as extensive reports, booklets, and manuals. Front matter typically includes the title page, the table of contents, and prefaces or forewords. The body contains the main text of the document. The back matter may include appendixes, an index, a glossary, or references.

Regardless of how you partition a document, having sections allows you to apply different styles to each separately, including page numbering, page orientation, and formatting. Consider an example where your document has a title page and a table of contents, and the main text begins on the third page. You don't want a page number to appear on the title page, but you would like the main content to start on page 1. You can achieve this with a section break.

First, go to the Insert tab, select Page Number, and add page numbers to your document. The market trends report is expected to be quite lengthy. Including page numbers in the WorldCorp market trends report will be essential to help readers navigate through the document to the areas that are of interest to their needs.

To insert a section break, go to the Layout tab, click on the Breaks drop-down menu, and select the Next Page section break, as Figure 3.12a shows. This will start a new section on the next page. Then, choose where you want your page number to appear. As Figure 3.12b shows, it will be on the bottom right. Then, right-click on the page number in that new section and choose "Start at 1" from the dialog box that appears. You can use this feature to apply different page numbering styles, such as using Roman numerals in front matter.

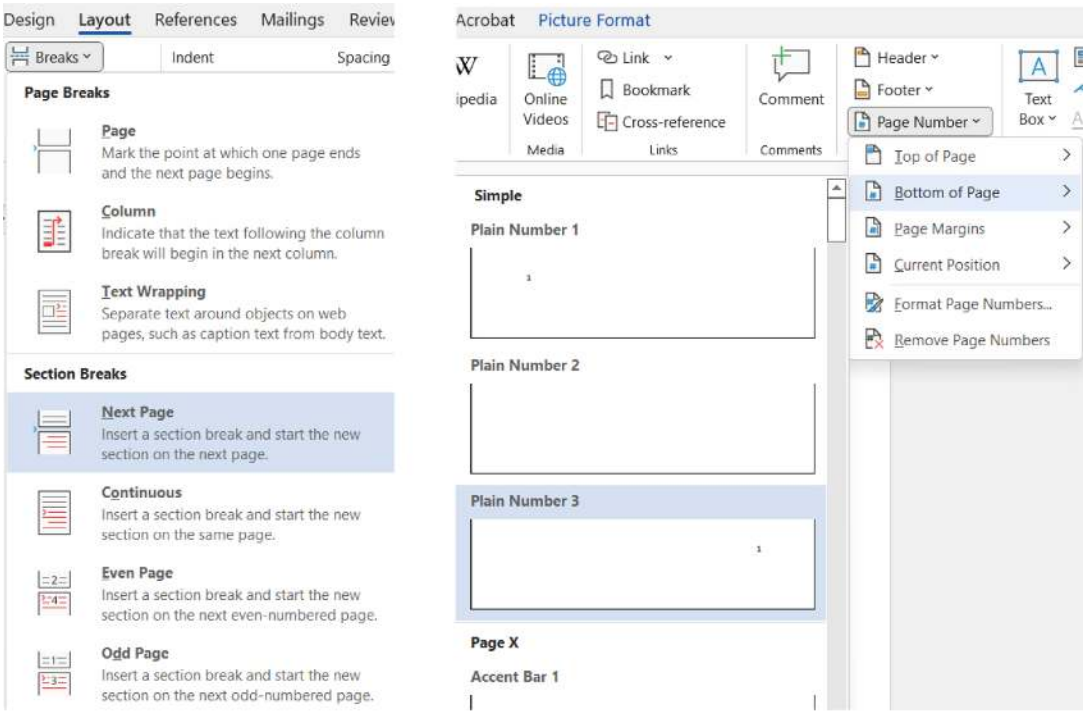


Figure 3.12: Section breaks (a) allow you to have different page formats for different areas of the document. Panel (b) shows that the number will be at the bottom of the page. (Used with permission from Microsoft)

Another advantage to having different sections in a document is that you can accommodate different graphics well. This can be helpful when working with graphics that are best suited for landscape orientation, for example. As with the page numbering, you can change the orientation for a specific section. Figure 3.13 shows successive pages of a document with different orientations.

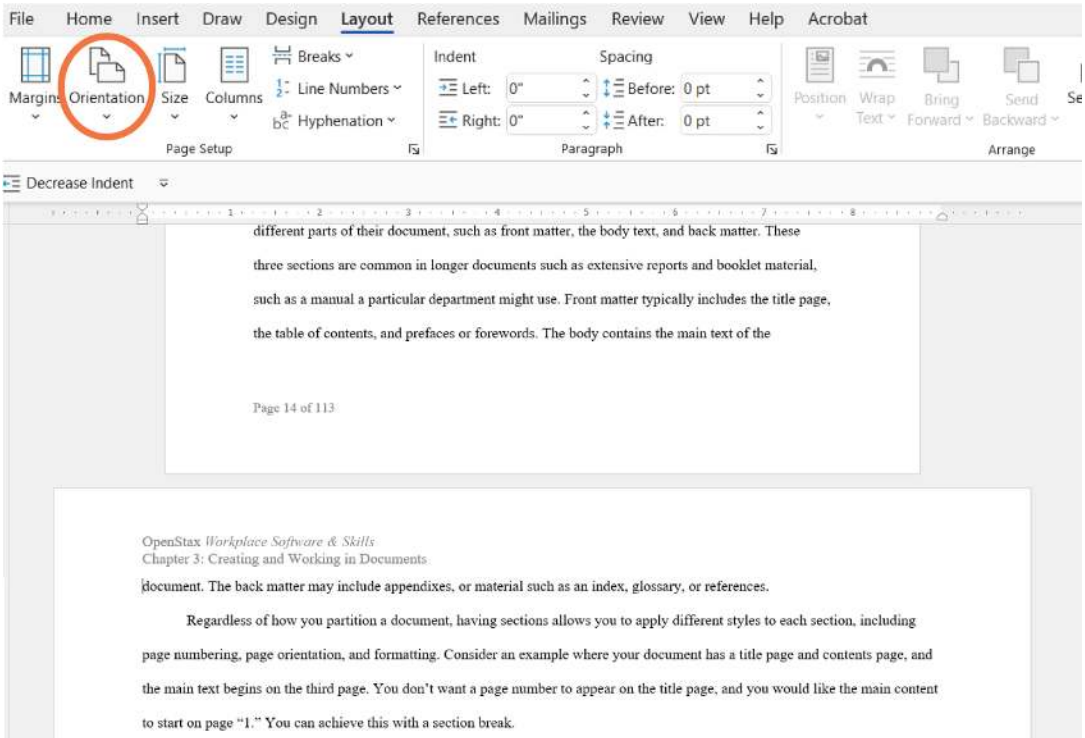


Figure 3.13: Inserting sections in your document allows you to change the page orientation between sections. (Used with permission from Microsoft)

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2.4: Formatting Document Content in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Format font types, sizes, and styles
- Modify paragraph styles in a document
- Use headings for the reader and internal organization
- Adjust settings for how text and graphics flow together

You want your WorldCorp market trends report to look professional. To achieve this, you need to consider how the content should be formatted for its intended audience. Formatting applied to content includes line spacing, font type and size, alignment, and the use of organizational features like headers. Many employees in the organization, including those in upper management, will view the report, so you need the report to show your professionalism and skills in your role in the marketing department.

Formatting Font

There are many ways to change your text formatting in Microsoft Word. The most basic ways of adjusting your text are through the font, font size, and font style (bold, italic, or underlined).

The default Word font is currently Calibri. (Formerly, it was Times New Roman, and could change again.) Fonts are described as either serif or sans serif (Figure 3.14). A serif font is one that has short lines on the ends of the parts of each letter, whereas a sans serif ("without" serif) font doesn't have those embellishments on the characters. Serif fonts are usually considered easier to read when there is a large amount of text being presented, and sans serif fonts are often considered to have a more contemporary look. For accessibility, simple fonts such as Arial are a better choice to accommodate all readers. Fonts that are curvy or more artistic in nature are difficult to read and decipher, particularly for people with vision-related impairment. However, curvy and artistic fonts may be used to attract attention and add flair to promotional materials, such as brochures.

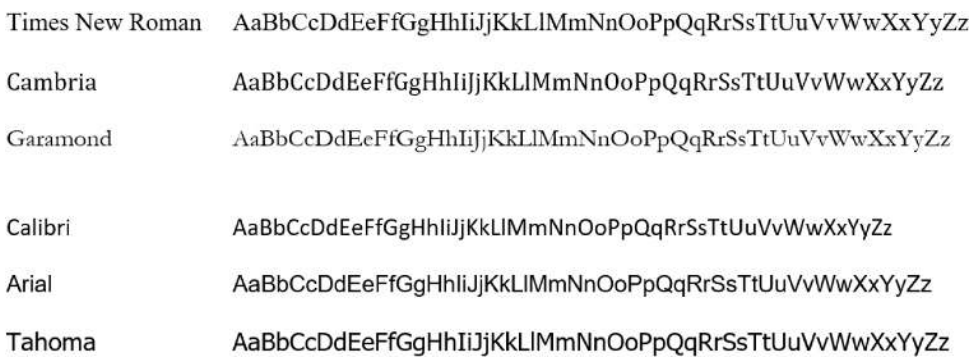


Figure 3.14: The top three fonts are common serif fonts, while the three on the bottom are sans serif. Note the differences in the lines on the ends of the letter strokes. (Used with permission from Microsoft)

You can select fonts using the drop-down menu within the Font options on the Home tab. There are many fonts in Word, most of which are not appropriate for business reports because they are too ornate or decorative. You should think carefully about the type of font you want to use and what it will convey to its readers. You want to stay professional and avoid "fun" fonts like Comic Sans and Papyrus. Font choice also affects the readability of your document. Script-like or blocky fonts can be difficult to read, especially with long documents. Additionally, some fonts are more appropriate for headings or logos instead of the body of a report or document.

Mac Tip

Mac offers some fonts that are not included in the Microsoft OS version, and, by default, is missing some that can be added by downloading and loading the fonts into the application.

To adjust the font size, go to the Font Size drop-down menu, directly to the right of the Font menu on the Home tab. There are other ways to adjust the font in a selection in a document, but this is the most direct way to make the changes. The default font size is 12-point, but you may want to make your font larger or smaller. Most documents use fonts in sizes 10- to 12-point. For your market trends report, you will probably want an 11- or 12-point font for your main body text, and a larger size for your report title and section headings. You should ensure your font size is easily readable, especially if you plan to provide printed copies of your document.

You can apply additional styles to your font, such as bold, italic, or underline, using tools in the Font command group (Figure 3.15). There are also options for special text applications, such as adding superscripted text (text that is raised above the line) and subscripted text (text that appears below the line), and changing font color. Additionally, you can easily change the capitalization style through the Aa drop-down menu. This allows you to set a selection of text in all capitals, all lowercase, or to capitalize each word, such as is common in headers or titles.

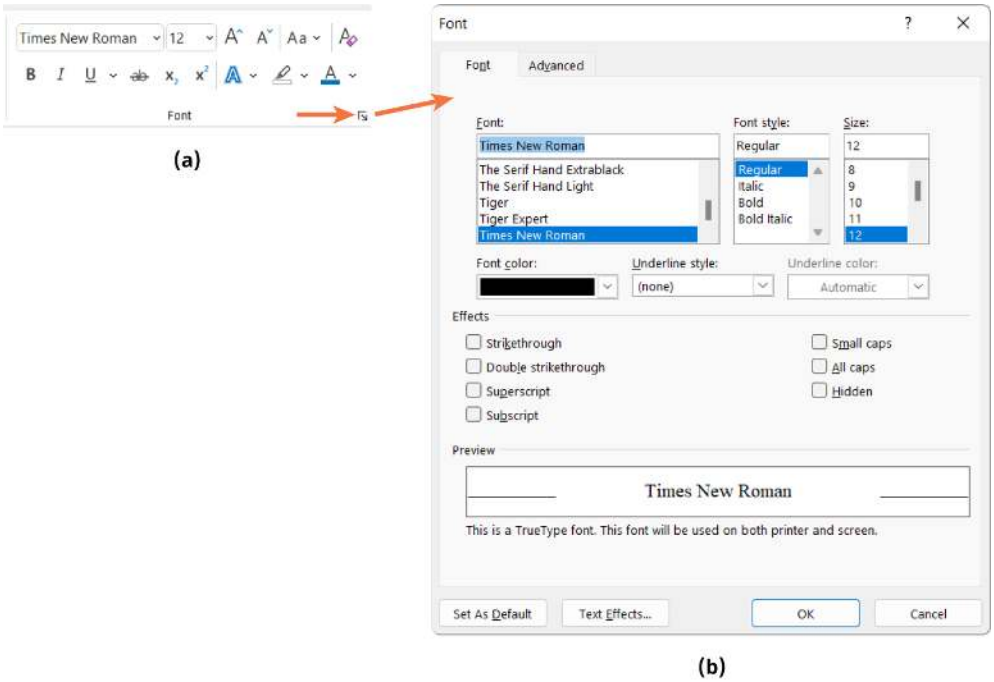


Figure 3.15: (a) The Font command group lets you select your font and font size, apply special treatment like bold or italic, and set case. Selecting the arrow (a) opens the dialog box (b) where you can apply multiple formats at once. (Used with permission from Microsoft)

Formatting Paragraphs

Paragraph formatting entails customizing the way the text appears on the page and how it flows from one paragraph to the next. Specifically, this includes line spacing, tab indentations, and alignment justification of text.

As you learned in Formatting Document Layout in Microsoft Word, line spacing determines how much space there is between the lines of text within a document. There are different advantages to single-spacing versus double-spacing. Most business documents, such as emails and printed letters, use single-spacing. This means that each line of text comes right after the other, with very little space between them. However, double-spacing may be used in working documents, and can be useful when there are multiple collaborators and you are using Track Changes. This allows for better visibility for the changes or edits, and makes it easier to see the revisions in progress. Double-spacing means that there is a complete line of space between lines. In addition to single-and double-spacing, users can use 1.5-spacing, or set custom spacing between lines within a paragraph (Figure 3.16).

You can also specify spacing *between* paragraphs, which is different from the line spacing *within* a paragraph. For example, you might want your paragraphs single-spaced, but want a visual break between paragraphs.

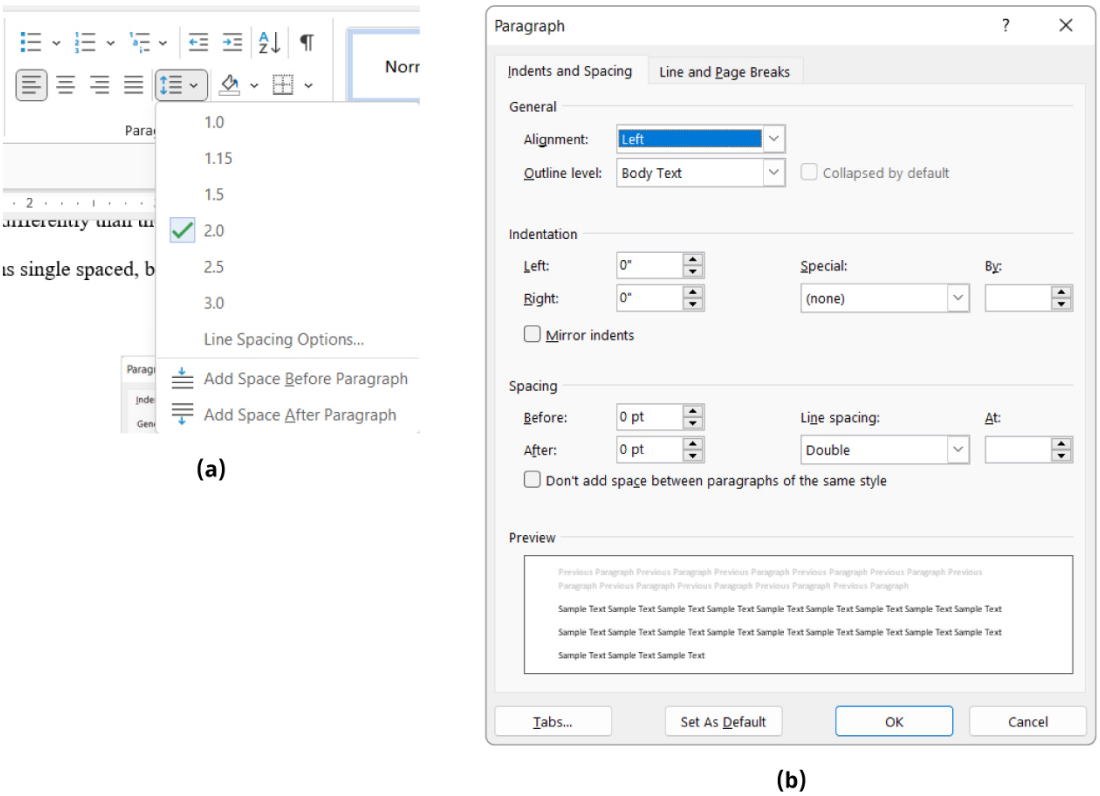


Figure 3.16: The Paragraph command group offers a variety of line spacing options in (a) a drop-down menu or (b) in more detail in a dialog box. (Used with permission from Microsoft)

Paragraph separation is typically indicated in one of two ways: by indenting the first line of the paragraph with a tab indentation as Figure 3.17a shows, or by adding a space between paragraphs, as you can see in Figure 3.17b. In the latter case, the paragraph is usually not indented, as the space serves the same purpose as the indentation (i.e., to indicate a new paragraph). Most documents, including those used in business, have small 0.5" indentations at the start of each new paragraph as the default setting. If indentations are too small, they are difficult to distinguish, and large indentations can look awkward and confuse readers.

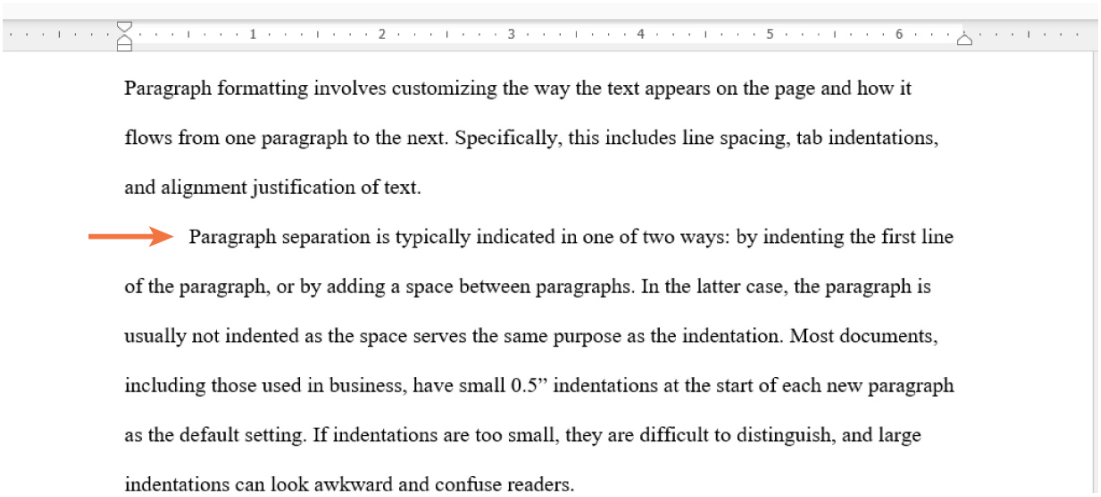


Figure 3.17: Paragraphs can be indicated by (a) a first-line indentation or (b) by spaces between paragraphs. The latter works well in documents where page count is not an issue as it could make for a longer document. (Used with permission from Microsoft)

Paragraphs can also be formatted with different alignment or justification, styles (Figure 3.18). In documents, the most common alignments for the body of the text are left-justified or fully justified. Left-justified means that the text all lines up in a straight line along the left margin, but where the text ends on the right margin varies. Fully justified text lines up in a straight line along both the left and right margins. This produces a clean and professional look and is often used in publishing or print materials. However, full justification can also lead to awkward gaps within lines of text if the material contains a lot of long words or specialized content. Determining which alignment is appropriate for a document depends on the audience. For example, if you submit your WorldCorp market trends report for publication in an industry journal, it should be fully justified.

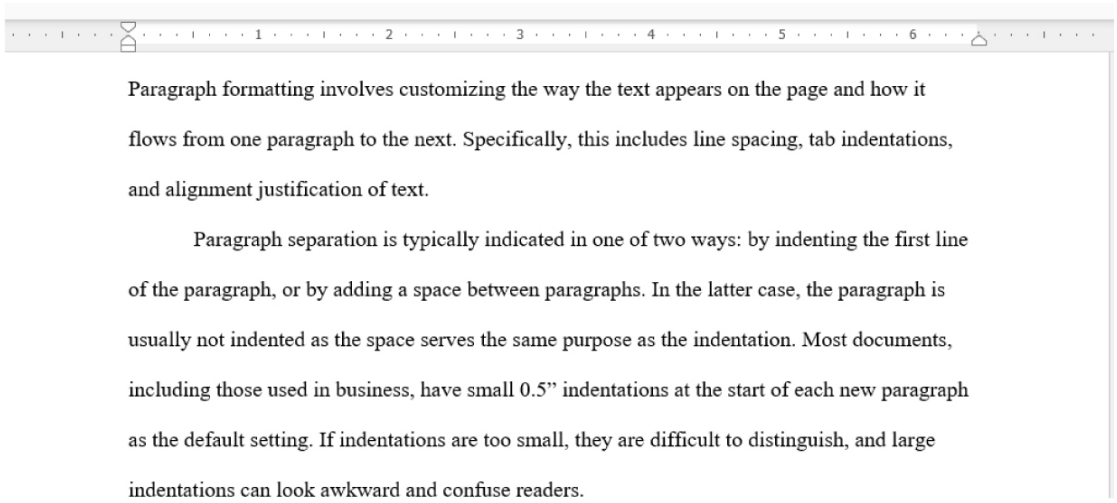


Figure 3.18: Most documents set the main text with either (a) left alignment or (b) full justification. (Used with permission from Microsoft)

Other alignment options include centering text and right alignment. Centering is often used to give special treatment to a particular element of content. Right justification is often used in financial data, where, for example, numbers align best if they align on the right.

Headings

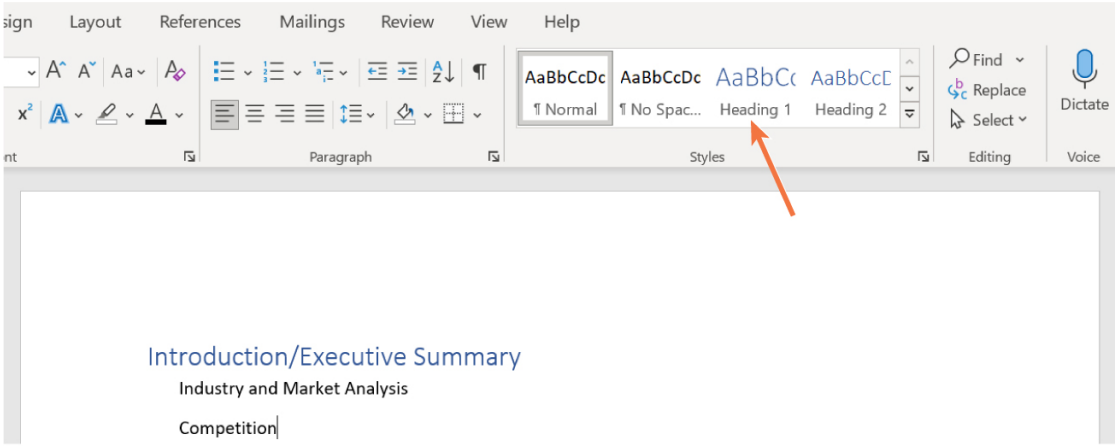
A heading helps readers understand the organization of a document by breaking it into meaningful chunks. Different heading levels can be used to create a hierarchy of content that also helps users best understand the material. In Word, headings can be set using styles that give them additional functionality, such as quickly displaying an outline of your document and providing the ability to link to or between sections. You can also generate a table of contents using headings.

As an example, let's select three section titles from your market trends report. Let's say that the major sections of your report are as follows:

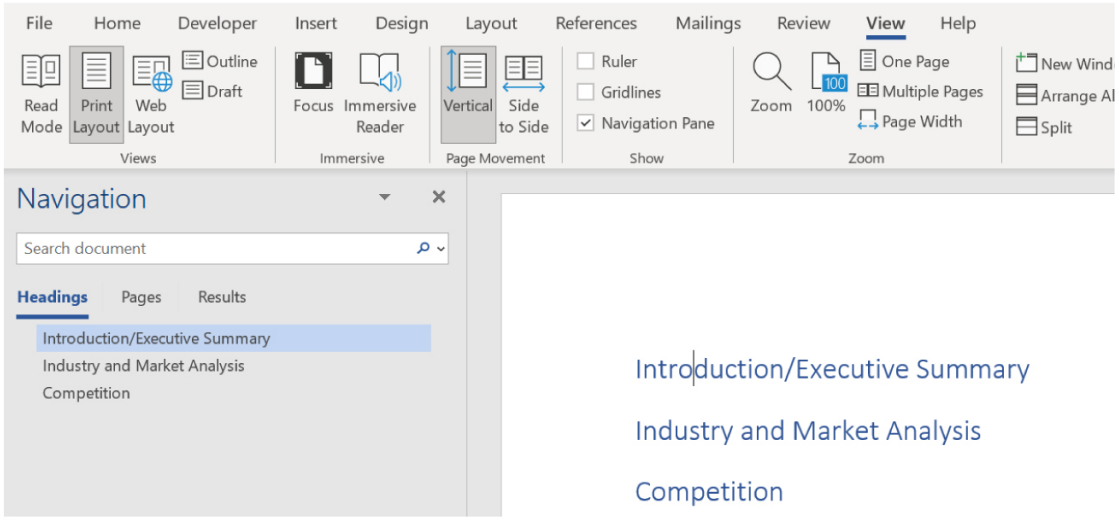
- Introduction/Executive Summary
- Industry and Market Analysis
- Competition
- SWOT (strengths, weaknesses, opportunities, threats)

- Recommendations/Key Findings
- Summary

Open a blank Word document and type in the first three headings from the list above. For each header, select the text, go to the Styles command group, and select Heading 1 (H1). H1 represents the top-level heading, which you might want to use for a title or a high-level section title. As you can see, the font size and the color change automatically because you are selecting from the preset heading styles in Word. Repeat this formatting for your next two headings. If you open the Navigation pane, you will now see that your three H1 headings appear in outline format (Figure 3.19).



(a)



(b)

Figure 3.19: (a) Headings serve as organizational signposts for a reader, collecting passages into sections and providing a hierarchy. (b) Headings can also help you navigate documents. (Used with permission from Microsoft)

Heading hierarchies use the design of the heading to indicate levels of sections. The heading levels are usually referred to by numbers (such as Heading 1), and sometimes the shorthand H1, H2, H3 is used. Word's default heading styles are designed to have a logical and intuitive hierarchy, which typically includes font size and sometimes font style. In general, color should not be used to indicate levels in a hierarchy since this is neither logical (i.e., it is not clear why one color would be higher or lower than another) nor accessible (some colors are not readily conveyed to users who may be visually impaired or have other accessibility needs).

Adjusting Graphic and Text Layouts

If you are using graphics in your document, you will need to determine how the graphics and text should interact in the layout. When you insert a figure into a text document, the figure can be positioned in several ways in relation to the text using the text wrapping menu, as Figure 3.20 shows. Text wrapping refers to how the text is placed around an image or figure you place in the

document. Text wrapping is accessed through the Layout tab in the Arrange command group. Your wrapping style may depend on the size of the graphic, as well as its purpose. If it is an important figure being discussed in the text and/or if it has a caption, you may want to clearly separate it from the text with the "Top and bottom" option, allowing the text to flow above and below the image, but not to either side of it. If the image functions more as a design element, such as a logo or photo to add interest, you might have the text wrap around it.

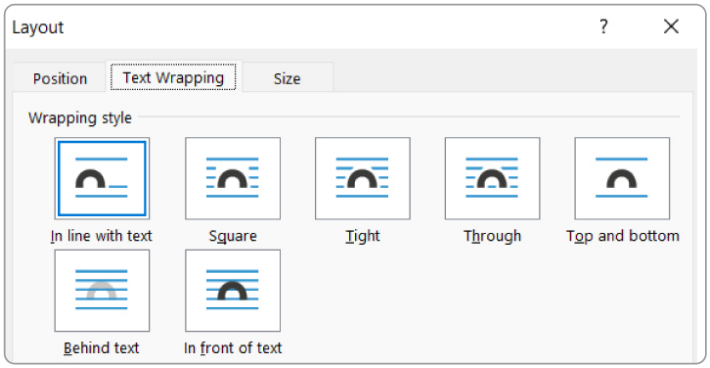


Figure 3.20: The wrapping style of how an image and text interact should be based on the purpose of the image. (Used with permission from Microsoft)

For example, let's assume you want to add an image of one of WorldCorp's products to the market trends report. As you may recall, WorldCorp sells products such as computer accessories, laptops, and TVs. When discussing trends in the laptop industry, you may want to include a picture of a laptop from a top-selling brand in the industry, such as HP. To insert the image into the report, place your cursor in the area of the report where you want the image. Then, copy and paste the image into the market trends report. Then, from the Layout tab, select the Wrap Text tool and select the appropriate text wrapping style to present a professional look for the inserted picture. The Wrap Text tool can also be accessed by right-clicking on the inserted image or figure, as shown in Figure 3.21.

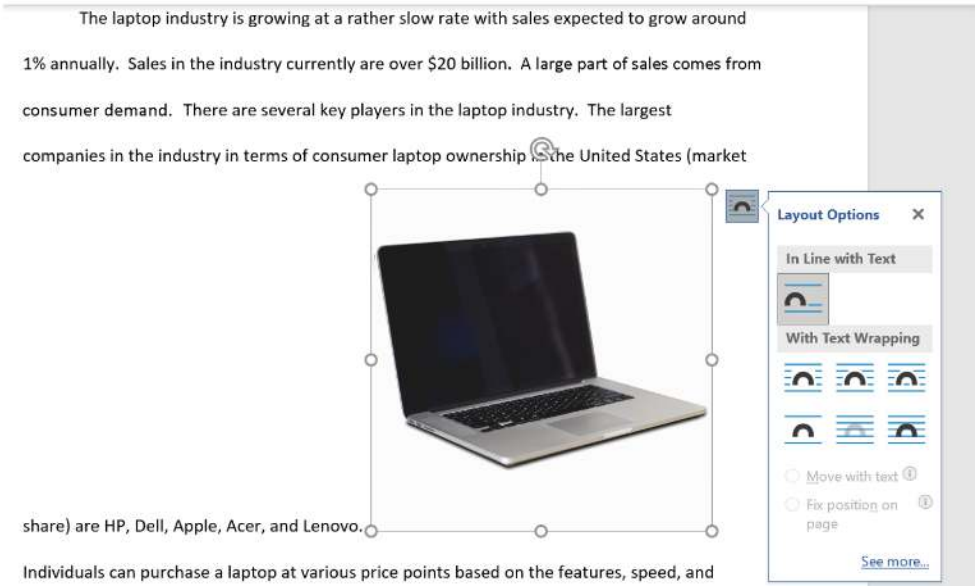


Figure 3.21: The default when inserting a picture is to have the picture inserted where the cursor is located "In line with text." (Used with permission from Microsoft)

Notice that you can change the wrapping style using the tool that appears in the upper-right corner of the image when you paste it in the document (Figure 3.22).

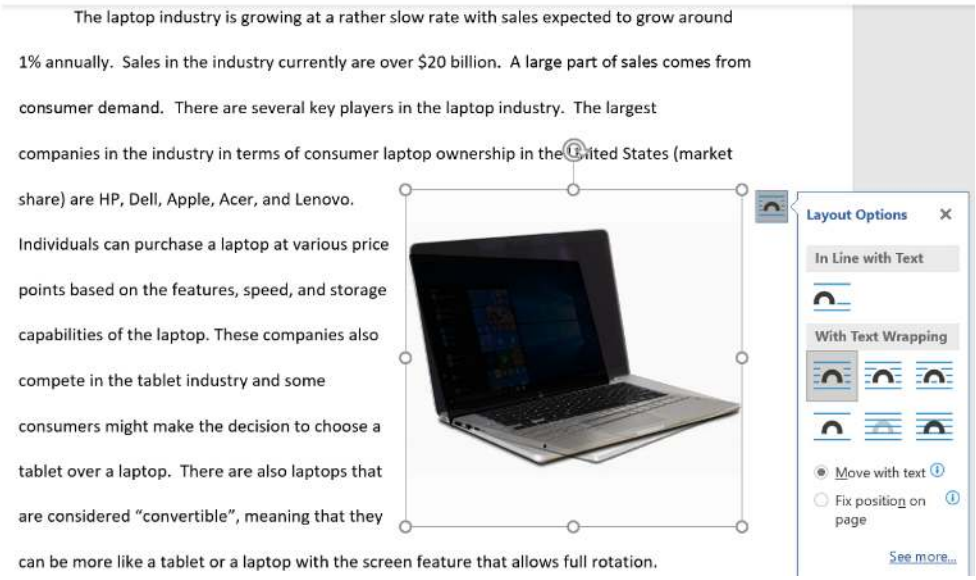


Figure 3.22: You can choose to have the picture inserted with text wrapping blocked around the picture using "Square." (Inserting the picture "In front of text" does not present a professional appearance as it hides some of the text.) (Used with permission from Microsoft)

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2.5: Document Design

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Apply themes and styles to a document
- Use the Page Background command group

When creating your WorldCorp market trends report, you may choose to use custom formatting or existing formatting to add styles to your document. You can achieve this via the options on the Design tab, by using existing templates in Microsoft Word, or by combining those options to customize a template. Some companies may have existing templates with logos, fonts, or colors that are part of the company brand. The Design tab offers many options for quickly changing the graphical formatting of your document, applying styles across the entire document so you do not have to manually make each change. You can change the color scheme, fonts, and paragraphs, either manually or using the themes and styles in Word.

You may also opt to use a template. Templates are pre-designed documents for a variety of purposes, including reports, resumes, flyers, invitations, posters, and more. The advantage of a template is that it already has a design applied. However, you need to ensure the template you select is appropriate for your audience and purpose, and that your content will fit well in the template.

Using Styles and Themes

Your supervisor has suggested that you apply a theme to the WorldCorp market trends report. A theme is a cohesive set of fonts, font sizes, and colors that can be applied to your whole document. However, before you apply a theme to your document, you must "code" your document's style. Styles are preset formatting for font type and size, line spacing, and other formats that are used to change the appearance of text in a document. Generally, you choose the style for the document before beginning to input the text. By choosing the style, you are coding the document so that Word knows how to format various sections. These codes tell Word which parts of the text are body text, titles, subtitles, and so on. Without these style codes, the theme won't know how to apply itself to your document.

Styles Pane

Before you can implement styles, you first must label, or code, all the styles in your document. This means selecting parts of the text and using the Styles pane on the Home tab to identify them. For example, all body text must be selected, and the Normal style applied; all headings must be labeled as Heading 1, Heading 2, and so on. Once all your text has a style applied, then you will be able to use the themes and styles to full capacity.

You can change the default fonts and font styles in the Styles pane, as Figure 3.31 shows. For example, if the default Normal font is Times New Roman, you may want to change it to Calibri. Then, when you select a segment of text and choose the Normal style, it will make the font Calibri, not Times New Roman. In effect, you are telling the program what you consider "Normal" text font in this instance.

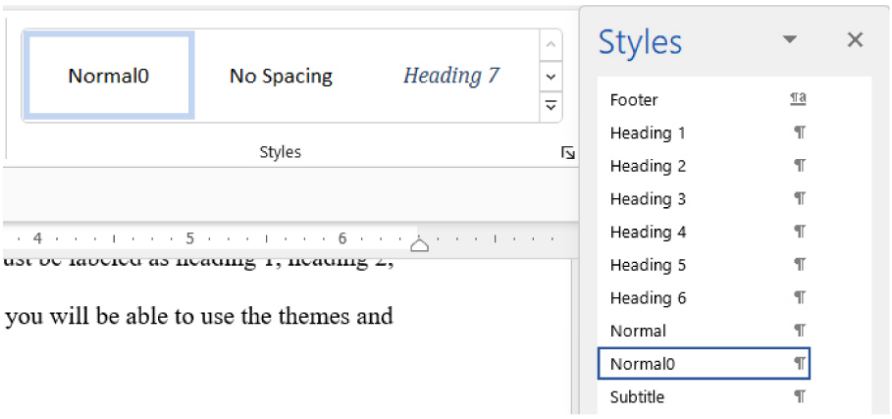


Figure 3.31: The Styles pane allows you to assign each part of a document a functional style, which can then coordinate with Word's existing themes. Hovering over each style choice will reveal the changes to the text block in which you have placed your cursor. (Used with permission from Microsoft)

This is the manual way of applying styles. But the real power in using styles is to simply use them as identifiers for your text so that themes can "read" and style the text properly. For example, it wouldn't matter if you chose Calibri as your Normal font style; if you select the "Madison" theme, for instance, the new Normal font will automatically change to Arial, because that is what comes with the theme. Different themes have different Normal font settings. To see what font a theme uses, you will need to select the theme and see the fonts it uses. Now, let's explore how to apply a theme and why it works so well with styles.

Applying Themes

Let's revisit the different headings of the market trends report we worked on in Formatting Document Content in Microsoft Word. Go to the Design tab and select the drop-down menu called Themes. You'll see that there are over a dozen default themes built into the software (Figure 3.32). As an exercise, choose the "Ion" theme for your document. Selecting "Ion" changes all the available styles in your document. If you want to further change the theme, you can change the color scheme using the Colors menu on the Design tab. There are many different color palettes to choose from. Word offers these preset palettes because designers have determined that the colors work together well to give documents a cohesive, professional appearance.

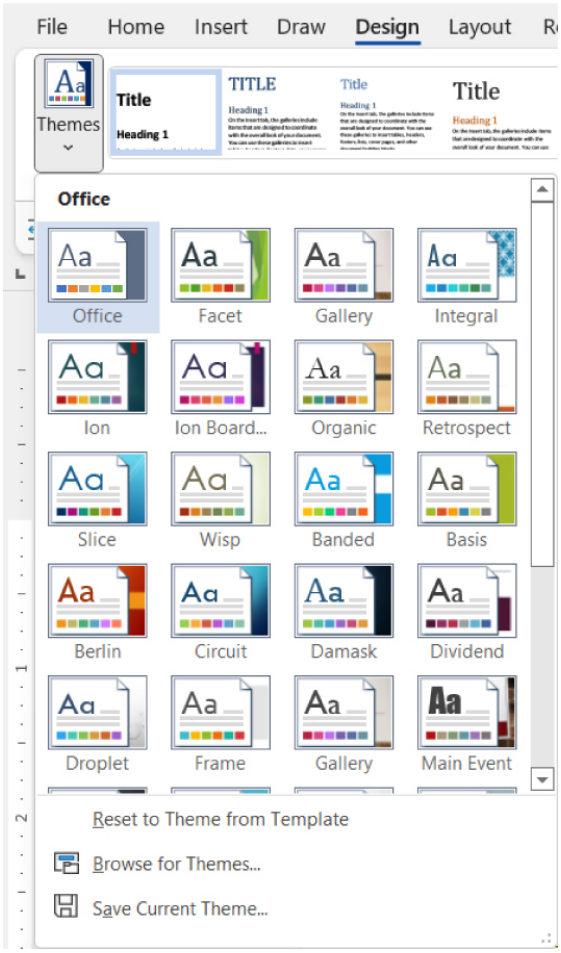
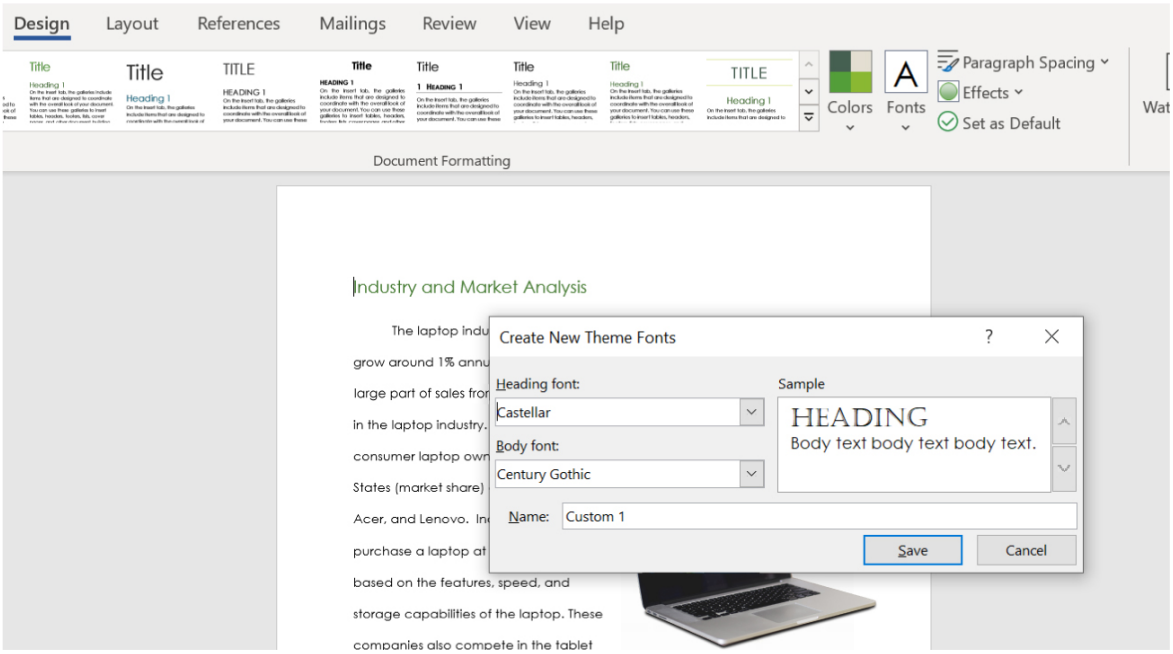


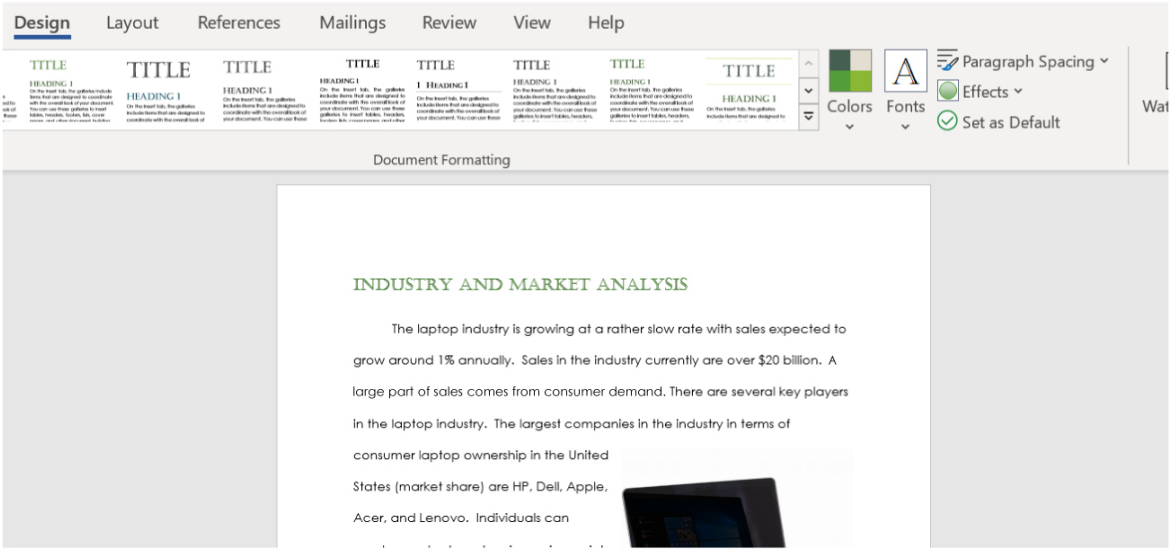
Figure 3.32: Word offers a variety of themes, each with its own set of fonts, colors, and styles. (Used with permission from Microsoft)

You can change the colors and fonts associated with the selected theme by choosing the menus on the Design tab. Choose the Green color group and Arial font and apply it to the report.

When you change the color and font, all headings and titles of the section will change in one step. There is no need to select each heading one by one because you already coded your document with the correct styles before you applied the theme, so the theme knows which text is which type of heading, and so forth. In the template, the current font of the Normal text is Corbel. By selecting the Fonts drop-down menu, you can change all of the Normal text and/or Headings font. Go to the bottom of the drop-down Fonts menu and select Customize Fonts. A new dialog box will appear with all the fonts installed in Office, as seen in Figure 3.33. Choose a new font and select Save and the headings will be changed.



(a)



(b)

Figure 3.33: You can modify the fonts in components of a theme, such as headings, and they will change from (a) the default font associated with that theme to (b) the customized font you select to apply. (Used with permission from Microsoft)

Page Background Command Group

The Page Background command group on the Design tab allows users to apply a page border, page colors, and watermarks. A watermark is a lightly colored image, logo, or text that exists in the background of the document. Like changing the page background color, adding a watermark will apply to the whole document. Some companies choose to use watermarks to indicate the status of a document (e.g., “Draft”) or to imprint their company name on each page of the document. To insert a watermark, select the Watermark icon and choose Custom Watermark, as you can see in Figure 3.34.

As an example, let’s add a watermark to the market trends report to indicate that it is a private, internal document. Type “Confidential” into the Custom Watermark dialog box and have it run diagonally across the page. There are a few options to alter

the text's appearance on the page. For instance, if you want to change the text to be less visible, choose Semitransparent. You can even use an image, like a company logo, as a watermark.

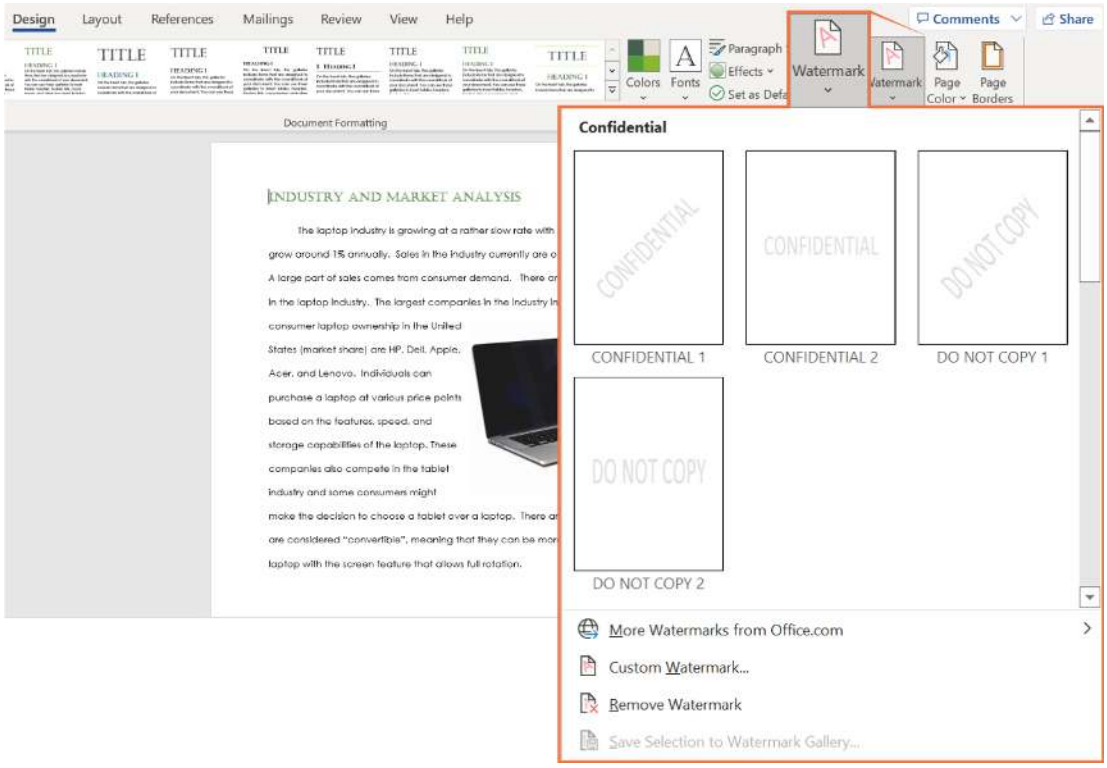


Figure 3.34: You can insert customized watermarks such as company logos using the Custom Watermark option. (Used with permission from Microsoft)



Figure 3.35: Watermarks are used to display letters or images on the page background. (Used with permission from Microsoft)

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2.6: Chapter Review - Review Questions

This page is a draft and is under active development.

Review Questions

1 .
Which tab in the ribbon is the default tab that displays when you open a document file?

a. the Insert tab
b. the View tab
c. the Layout tab
d. the Home tab

2 .
What is one function of the Navigation pane?

a. It helps the user locate web pages.
b. It helps the user access help files.
c. It helps the user find a specific word or phrase in their document.
d. It helps the user find synonyms.

3 .
What is the purpose of the Page Setup command group?

a. It is used to set page margins and the page size.
b. It is used to wrap text and align text.
c. It is used to insert object and pictures.
d. It is used to insert WordArt or a signature line.

4 .
Where is the command for putting a section break located?

a. on the Layout tab, in the Breaks drop-down menu
b. on the Insert tab, in the Page Break drop-down menu
c. on the Insert tab, in the Text Box drop-down menu
d. on the Layout tab, in the Column drop-down menu

5 .
What is the difference between indenting a paragraph and aligning it?

a. aligning a paragraph will center or position it left or right, whereas increasing the indent will add space in that selection
b. increasing the indent will center and indent left or right, whereas aligning will add a tab space in that selection
c. aligning a paragraph can increase the indent when you place it in the center or left or right
d. indenting a paragraph can increase the alignment when you place it in the center or left or right

6 .
What is the default text wrapping when inserting a picture or an object?

a. behind the text, at the point where the cursor is located
b. in front of the text, at the point where the cursor is located
c. in line with the text, at the point where the cursor is located
d. square around the text

7 .
What can Track Changes do?

a. see who made what changes to a document
b. add comments to changes made
c. search for changes to specific words
d. use Smart Lookup to select text in a document

8.
Where are the two places the Editor tool is located?

a. on the Insert tab and on the View tab
b. on the Review tab and on the References tab
c. on the Home tab and on the Review tab
d. on the Home tab and on the Design tab

9 .
A _____ is a cohesive set of fonts, colors, and line spacing that can be applied to an entire document.

a. style
b. watermark
c. theme
d. template

10 .
What is the main use of a watermark?

a. to add a text or an image behind the body text of all pages
b. to insert an image on top of the header on all papers
c. to apply different font formatting throughout the document
d. to delete the page background on every page

11 .
Word count is found in which menu in Docs?

a. Edit
b. File
c. Tools
d. Format

12 .
What do you need to do first before creating a new Doc?

a. Create a template.
b. Click the New plus sign.
c. Go to the File menu.
d. Log in to Drive.

13 .
How does the user apply a new font to an entire paragraph in Docs?

a. Select all of the text, then either go to the Format menu or to the action bar to select a font type from the combo box.
b. Place your cursor anywhere in the paragraph and choose the new font from the action bar.
c. Navigate to the Format menu and select a new font.
d. Select the entire paragraph and choose the font type from the Edit menu.

14 .
Where is the option to view section breaks in a Doc?

a. on the action bar
b. in the View menu
c. in the Tools menu
d. in the Format menu

15 .
Page setup is found in the _____ menu.

a. Edit
b. File
c. Tools
d. Format

16 .

What is the main purpose of Suggesting mode?

a. to request comments from your coworkers
b. to collect feedback on your products
c. to gather voice messages in a chat like interface
d. to keep track of added and edited text by different collaborators

17 .
What are the two ways to access version history in Docs?

a. Go to the File menu, or click on the date link right beside the title bar.
b. Go to the action bar and click on the Style combo box or click on the title bar.
c. Go to the Explore icon on the bottom or click on insert equation on the View menu.
d. Go to the Edit menu and click on Select All, or use Ctrl+A.

18 .
What is the purpose of naming versions?

a. to have a record of the important changes in the progression of the document
b. to download the file’s versions in order to have a hard copy on your computer
c. to email each version to collaborators
d. to have track changes recorded so that the team knows about the changes

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2.7: Chapter Review - Practice Exercises

This page is a draft and is under active development.

Practice Exercises

19 .
Go to Papers & reports templates at Office.com. Choose a report template to download for Word by scrolling down through the list near the bottom of the web page. (Note: Do not choose a “premium” report. These require a subscription to access.) Select a report that is more than one page. Open the report template in Word and change the view of the report on the screen using some of the options on the View tab. What are some advantages/disadvantages of each of the view options?
20 .
Go to Papers & reports templates at Office.com and choose the “Student Paper” template for Word by scrolling down through the list near the bottom of the web page. Open the report template in Word and click on the Navigation pane. Examine the result. How could the Navigation pane be useful if you were using this template to prepare a document report for a class?
21 .
Find an online article that interests you. Copy the information into a new Word document. Save the document using a relevant file name. Change the orientation of the document between portrait and landscape. Adjust the margins and line spacing as needed to give the document a professional appearance.
22 .
Go to the website of a magazine of your choosing and copy the text from an article. Select the entire article, including the article’s images. (You can remove any advertisement images after you paste everything into Word.) Paste it all into a Word document. All the images will be pasted along with the text; they will appear in separate lines. Now, follow the steps you learned in this section to position and align the images in a way that looks pleasing and professional.
23 .
Write out the step-by-step procedure for protecting a document that you will share with other collaborators, whom you do not want changing the document formatting.
24 .
Find an article online and copy and paste the information into a Word document. Access the Editor tool and examine the suggested edits. Go through the edits and determine which suggestions you want to keep.
25 .
Find a recent sports news article online. Copy and paste the text into a new Word document. Choose a style and theme. Make some adjustments to the color scheme of your selected theme.
26 .
Copy and paste the text of an email into a Word document and format the email to appear as a WorldCorp memo. Add a watermark to indicate the memo is a confidential draft.
27 .
Using the two approaches outlined in this section, create a new Docs file for the market trends report. Which approach do you think you will use more often and why?
28 .
Create a new Doc using a template of your choice. Go to the appropriate menu and place a drawing in the template.
29 .
Your supervisor has asked you to complete a two-page newsletter in Docs. The canvas will be landscape. The first page will have single-spaced paragraphs in four columns, and the second page will have one column with paragraphs that have two indent spaces from the left. That hollow area will be occupied with an image. How would you accomplish this, given what you have learned in Formatting Layout and Content in Google Docs?
30 .
Find an article on the internet that is at least three pages long. Copy the entire article and past it into a new Doc. Use the skills from this section to reformat the text to a new font type. Insert section breaks as appropriate. Make section headings bold.
31 .
Your supervisor has assigned you to write a set of company guidelines for making reports. You need to include a section on how to collaborate on documents in Docs. List below the essential items to include in this instructional guide for employees.
32 .
Find a news story online from a news outlet of your choice such as NBC, CNN, etc. Then, select one of today’s top stories. Copy the material into a new Doc. Make some formatting changes to the document such as changing the font style or line spacing as you learned in a previous section. Then, examine the version history. Use the version history to look at the changes you made.
33 .

Select a topic and search for it on Wikipedia. Copy the material into a Word document and save the document in SharePoint or OneDrive. Make some changes to the document such as line spacing, formatting fonts, or adding lists. Close the document and reopen the document. Make additional changes. Using the skills learned in this section, examine the version history. Access the previous version and restore the current document to the previous version.

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2.8: Chapter Review - Written Questions

> This page is a draft and is under active development.

Written Questions

34 .
Describe how the Navigation pane can be used when working with a long document.
35 .
Where are the two places where you can find the margin commands? Explain the steps for each one.
36 .
Why is readability important for business documents?
37 .
Discuss some accessibility options that you should consider when creating a document.
38 .
Explain the difference between serif and sans serif fonts. Provide an example font of each.
39 .
Why are headings useful?
40 .
What does the Editor tool do that extends beyond a typical spell-check?
41 .
Why might you use both comments and Track Changes in a document?
42 .
What is a theme, and why would you use one?
43 .
Explain what the action bar is and how it can help you when creating a document in Docs.
44 .
Explain the process for creating a new Doc.
45 .
How do you modify document section formatting in Docs?
46 .
Why would you insert different sections in a report?
47 .
Describe how the Explore command might be useful when writing a research paper for a class. Provide an example.
48 .
Why would looking at version history be helpful in developing the final version of documents? Explain, giving at least five reasons.

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2.9: Chapter Review - Case Exercises

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Case Exercises

Task 49: Research Proposal (Start the Document)

Prompt: Choose a research topic that impacts your college experience or the experience of students you know, especially related to **cost, access, time, or belonging**.
Example topics: textbook affordability/OER awareness, commuting or parking, campus food pricing/options, tutoring/advising availability for working students, technology access (Wi-Fi, printing, laptops), bilingual communication on campus.

Instructions:

- In Microsoft Word, find and use a **proposal template** (or a clean report template).
- Write a **one-page proposal** that includes:
  - **Title**
  - **Background (2–4 sentences)**
  - **Research Question**
  - **Method (how you will collect information—survey, short interviews, observations, etc.)**
  - **Why it matters (who is impacted and why)**

Deliverable: 1-page proposal in a Word document.

Task 50: Build the Report Framework (Same Document)

Instructions:

- Set margins: **Left/Right = 1”** and **Top/Bottom = 1.25”**
- Add these headings on separate lines:
  - **Introduction**
  - **Research Problem/Question**
  - **Background**
  - **Methods**
  - **Results**
  - **Recommendations**
  - **Conclusion**
- Insert a **section break** between each heading.

Deliverable: Updated Word document showing margins, headings, and section breaks.

Task 51: Plan with Review Tools (Same Document)

Instructions:

- Turn on **Track Changes**.
- Add **one comment under each heading** explaining what you plan to include (1–2 sentences per comment).
- Format the document to **double spacing**.

Deliverable: Updated Word document with Track Changes enabled, comments added, and double spacing applied.

Task 52: Apply Document Design (Same Document)

Instructions:

- Apply a **Theme** to the document.
- Change the **Theme Colors**.
- Add a **2–3 sentence note at the top** explaining how your design choices support your audience (students, faculty, or administrators) and improve readability.

Deliverable: Final Word document (1–2 pages) with theme + color changes and your design note.

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CHAPTER OVERVIEW

3: Word Formatting

> This page is a draft and is under active development.

3.1: Chapter Scenario
3.2: Tables and Formatting
3.3: Microsoft Word- Advanced Formatting Features
3.4: Managing Long Documents in Microsoft Word
3.5: Chapter Review - Review Questions
3.6: Chapter Review - Practice Exercises
3.7: Chapter Review - Written Questions
3.8: Chapter Review - Case Exercises

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3.1: Chapter Scenario

This page is a draft and is under active development.

Your supervisor has read the first pages of the WorldCorp market trends report, which you have written with the collaboration of your coworkers. Your supervisor adds some edits and comments, and is ready for you to finalize it. This means inserting final art, updating charts and graphs, adding navigational tools such as bookmarks and headings, tidying up the organization and appearance of the document using lists, and formatting the bibliography.



Figure 4.1: Learning how to properly format a document can make your documents look more polished and professional. (credit: "wocubtech (microsoft) - 114" by WOCinTech Chat/Flickr, CC BY 2.0)

Using the advanced formatting tools in Microsoft Word means understanding these programs and their features in more detail. These tools enable the user to go beyond writing and formatting a basic text document and will lead to the production of documents and reports that look and feel professional.

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3.2: Tables and Formatting

> This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Insert a table in Microsoft Word using multiple methods.
- Enter and edit data inside a table (add/remove rows and columns).
- Apply basic table formatting to improve readability (alignment, borders, shading, and style).
- Adjust table size and layout using Word's Table Design and Layout tools.

Why Tables Matter in Business Reporting

Tables are one of the most common tools used in business documents because they organize information in a way that is quick to scan and easy to compare. In professional settings, tables are often used to summarize results, track progress, present schedules, list budgets, and display key metrics. A well-formatted table can make a report look more credible and help the reader understand information faster.

In Word, tables are especially useful because they allow you to combine structured data with written narrative in the same document. This is important for business reporting, where you often need to explain a result and then present evidence in a clean, organized format.

Inserting Tables in Microsoft Word

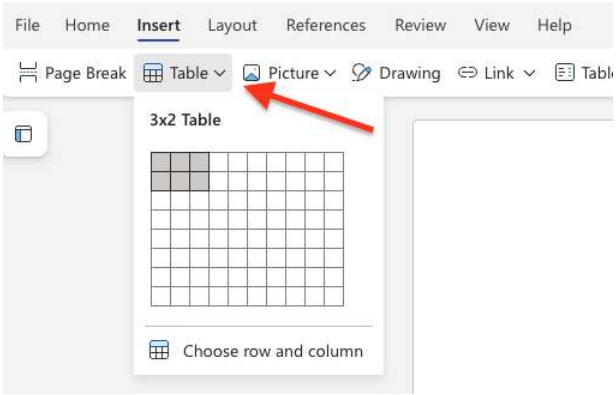
Microsoft Word provides multiple ways to insert tables. The method you choose depends on how much control you need and how your information is currently formatted.

Method 1: Insert Table Using the Grid

This method is best when you need a small table quickly.

1. Go to **Insert** tab.
2. Select **Table**.
3. Drag across the grid to choose the number of columns and rows.
4. Click to insert the table into your document.

Best for: quick tables such as short summaries, simple lists, or mini dashboards.

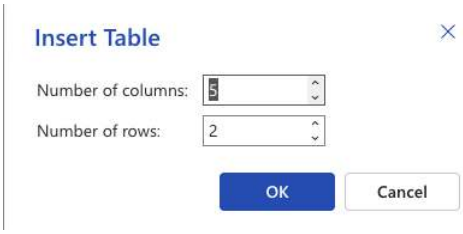


Method 2: Insert Table Using the Dialog Box

This method is best when you know the exact structure you need.

1. Go to **Insert > Table**.
2. Select **Insert Table…**
3. Enter the number of **columns** and **rows**.
4. Choose an AutoFit option:
   - **Fixed column width** (manual control)
   - **AutoFit to contents** (shrinks or expands based on text)
   - **AutoFit to window** (stretches to page width)

Best for: reports where you want consistency and planning before typing.

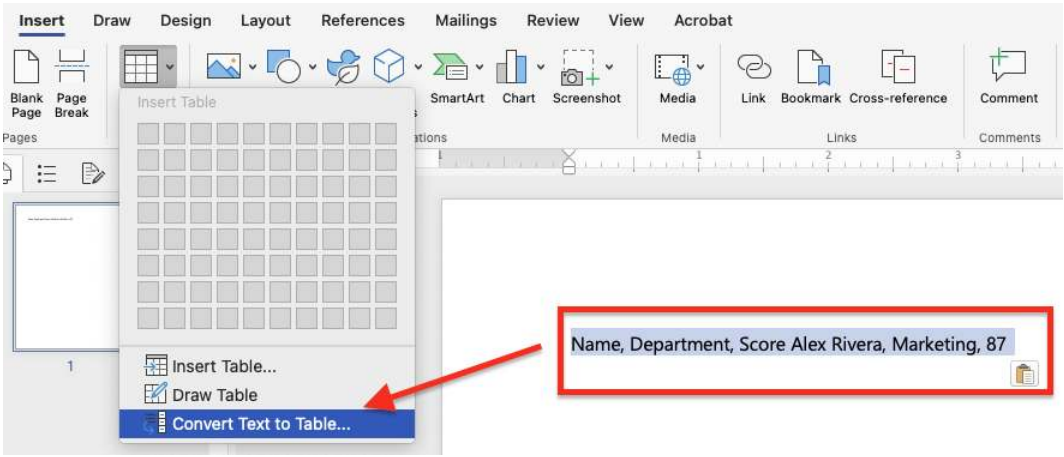


Method 3: Convert Text to Table

This method is best when you already have information typed as a list.

1. Type your content using separators such as **tabs** or **commas**.
2. Highlight the text.
3. Go to **Insert > Table > Convert Text to Table**.
4. Confirm the number of columns and choose the separator type.

Best for: turning checklists, copied data, or structured notes into a table without retyping.



Entering and Editing Table Data

Once a table is inserted, you can click into any cell and type. Tables behave like a grid-based layout, so Word provides built-in navigation and editing tools:

Moving Within a Table

- Press **Tab** to move right to the next cell.
- Press **Shift + Tab** to move left.
- Press **Arrow keys** for precise movement.
- Press **Tab in the last cell** to create a new row automatically (helpful for expanding tables).

Adding and Deleting Rows/Columns

To add:

- Click inside the table.
- Go to the **Layout** tab (under Table Tools).
- Use **Insert Above, Insert Below, Insert Left, Insert Right**.

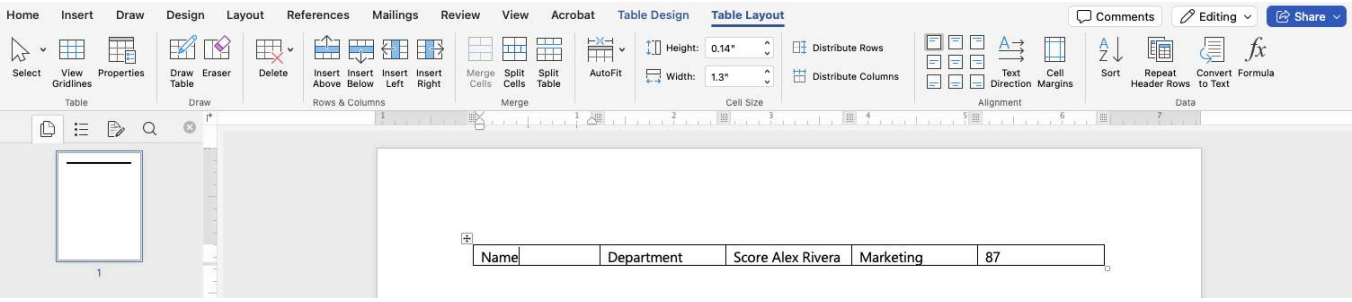
To delete:

- Select the row/column or cells.
- Go to **Layout > Delete** and choose what to remove.

Merging and Splitting Cells (Common Reporting Need)

- **Merge Cells** combines multiple cells into one (useful for section headers).
- **Split Cells** breaks a cell into multiple rows/columns (useful when a category needs sub-labels).

These tools are found under **Layout > Merge**.



Basic Table Formatting for Professional Documents

A table should not only contain correct information—it should be easy to read. Formatting helps the reader interpret the table quickly and reduces confusion.

When you click inside a table, Word displays two special tabs:

- **Table Design** (visual formatting)
- **Layout** (structure and spacing)

1) Applying Table Styles

Table Styles automatically apply coordinated formatting such as borders, shading, and header emphasis.

1. Click anywhere inside the table.
2. Go to **Table Design**.
3. In **Table Styles**, choose a style that looks clean and readable.

Best practice: Choose styles that use light shading and clear borders (avoid overly dark colors unless your organization requires it).

2) Formatting a Header Row

A header row makes the table easier to understand by clearly labeling columns.

- Select the top row.
- Apply **Bold** and optional shading.
- In **Table Design**, check **Header Row** (in Table Style Options).

Best practice: Keep headings short and consistent, like “Category,” “Cost,” “Owner,” “Date,” “Status.”

3) Borders and Shading

Borders separate values and improve scanning. Shading helps highlight categories or totals.

- Go to **Table Design > Borders** to choose:
  - All Borders
  - Outside Borders
  - Inside Horizontal Borders (often enough for simple tables)
- Use **Shading** to lightly highlight:
  - Header row
  - Total row
  - Key categories

Best practice: Use shading sparingly. Too much color makes the table harder to read.

4) Alignment

Alignment makes tables look clean and improves comparison.

- Text labels are typically **left-aligned**.
- Numbers are often **right-aligned** so decimals line up.
- Titles or small category labels may be **center-aligned**.

To adjust alignment:

1. Select cells.
2. Go to **Layout**.
3. Use the alignment grid (top/middle/bottom + left/center/right).

Best practice: Be consistent—tables look unprofessional when alignment changes randomly.

5) Adjusting Column Width and Row Height

Crowded tables are the #1 reason Word tables look messy.
To adjust:

- Drag column borders manually, or
- Use **Layout > Cell Size** to set exact width/height, or
- Use **Layout > AutoFit**:
  - AutoFit to Contents
  - AutoFit to Window

Best practice: Avoid columns that are too narrow—wrapping text in multiple lines makes the table hard to scan.

6) Controlling Text Wrapping Around Tables

Tables can either sit inline with text or be positioned like an image.

1. Click the table.
2. Select the **Layout Options** icon (near the table) or use table properties.
3. Choose:
   - **In line with text** (most common for reports)
   - **Wrap text** (useful for newsletters or side-by-side layouts)

Best practice: Use “In line with text” for reports unless you have a specific layout reason.

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3.3: Microsoft Word- Advanced Formatting Features

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Use advanced configuration tools in Word
- Insert and format page numbers in a document
- Insert and format headers and footers in a document
- Insert and format a list

Your supervisor at WorldCorp has asked you to revisit the market trends report that you started in the Creating and Working in Documents chapter. The report needs to have multiple sections that may need different types of formatting based on the content in the section. You may need to update the headers and page numbers, as well as add numbered or bulleted lists to summarize main points. You will also need to insert graphics and charts to enhance the report.

This chapter covers how to take the market trends report to the next level by learning to insert visuals and formatting items, such as a table of contents, as you would expect to see in a professional report. First, you will work on the Industry and Market Analysis section from the previous chapter. Then, you will build content for the other important sections.

To get started, revisit the market trends report you created in the Creating and Working in Documents chapter. Using the skills from that chapter, format the headings for the document as shown below, using a theme you find professionally appealing. Use the following section headings for the document:

- Introduction/Executive Summary
- Industry and Market Analysis
- Competition
- SWOT
- Recommendations/Key Findings
- Summary

You created the Industry and Market Analysis section in the last chapter. You can use that document as the starting point. See Figure 4.2. The chosen theme is “Berlin,” with the colors changed to Blue II, but you can choose a different theme for your document if you prefer.

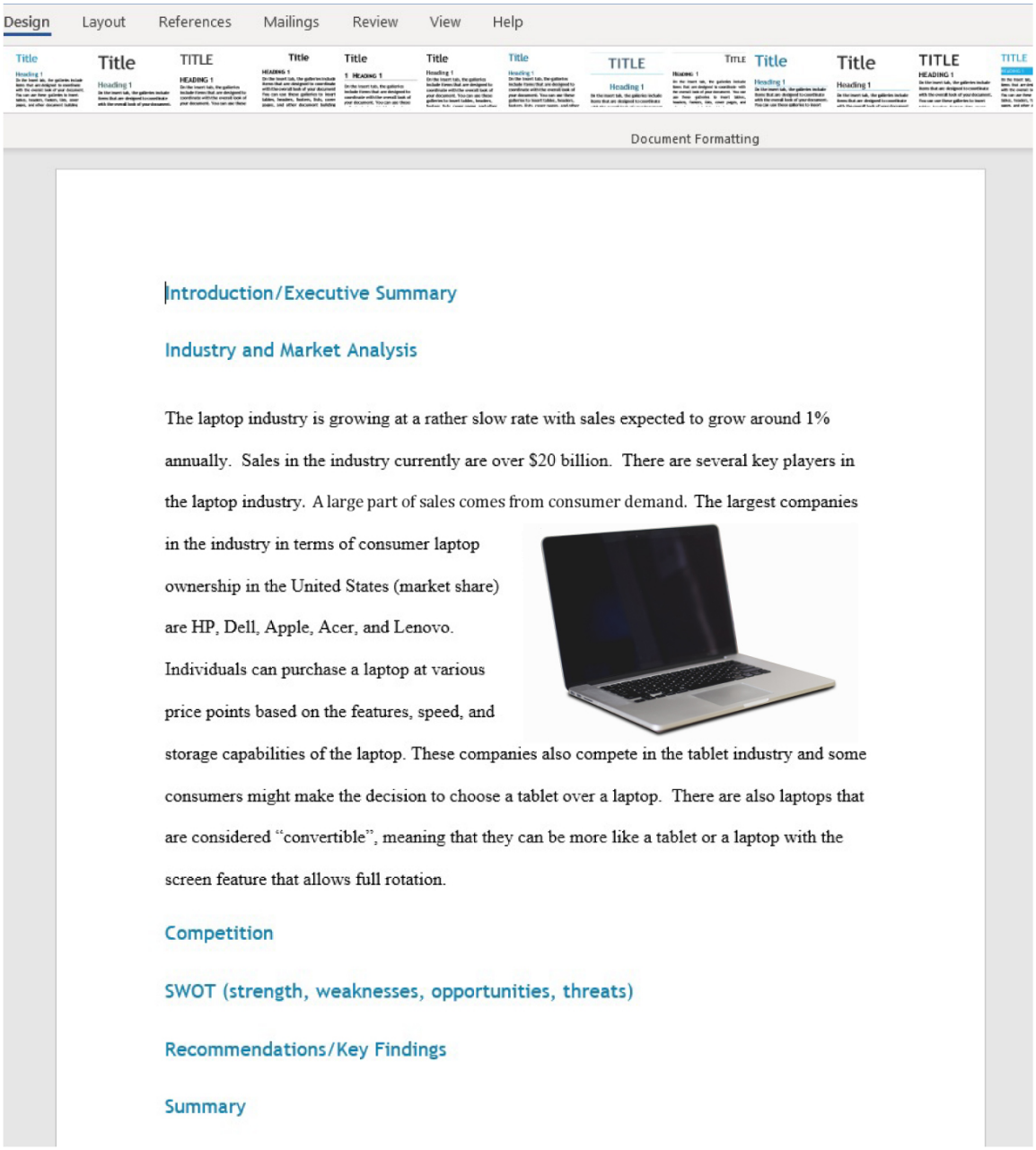


Figure 4.2: The first draft of the report has its major headings, under which you can add body text. (Used with permission from Microsoft)

Advanced Configuration

As you learned in the previous chapter, the File tab contains the configuration options for Word. As the market trends report evolves, you will be collaborating with others to produce the final report. You want to make sure the document options are set so that you can keep track of the contributors to the document. Recall that you can enter Word's settings by choosing Options from the very bottom of the File menu. The Word Options dialog box shown in Figure 4.3 shows eleven different sets of settings tabs, from General to Trust Center. It is helpful to learn about these settings because the settings in Options allow you to adjust the editing options, save options, and sharing options for the program. The options can be adjusted to your personal preferences as you work through the document on your own and collaborate with others.

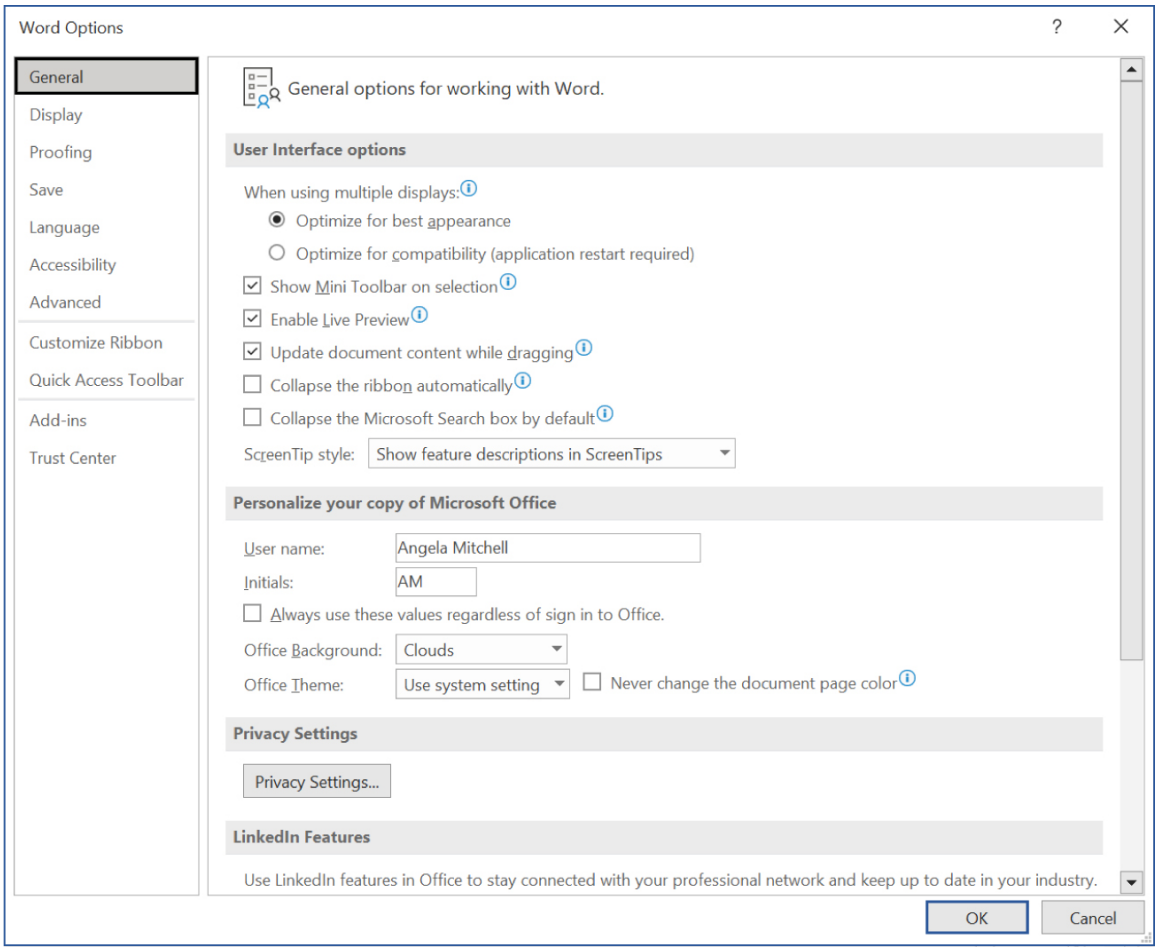


Figure 4.3: The Word Options dialog box offers many different choices for configuring your settings. (Used with permission from Microsoft)

Mac Tip

To view the same General options in Word, click the Word tab and choose the Preferences tab. That is where you will find many of the options discussed here.

First, the General tab lists information about the user. This will auto-populate based on the software registration and computer settings. You can change the document's username, which means that all of your comments and tracked changes will have your name associated with them. You also have the option of turning on "Real-time collaboration," in which your changes to the document will be broadcast to the document's collaborators. (This feature is similar to Google Docs's concurrent editing notification of documents.) This is available to users who are working on a shared file through Microsoft 365. The document must have already been shared with the collaborators, and they need to have been permitted to edit the document.

The second tab is Display. This tab includes options for adjusting how the text is seen on-screen. One of the more important options is the ability to turn the formatting marks on and off because it enables you to see if you have line breaks or extra spaces, as well as formatting settings in your text. Hidden characters that direct how text is displayed but that don't show when the document prints are called formatting marks. They have their roots in the paper-and-pencil editing process in which editors used standard markings or symbols to indicate different things. For example, the ¶ is used to represent a hard return (i.e., a new line). These formatting marks might be similar to the editing and revision marks that you may have seen when getting a graded paper back in an English class.

The third tab, Proofing, contains powerful tools for reviewing document edits. From this tab, you can turn various auto-corrections on or off. Word provides the user with several convenient auto-corrections, such as correcting for two capital letters at the beginning of a sentence, capitalizing a sentence that starts with a noncapitalized word, and correcting commonly misspelled words.

You can also access the number of custom dictionaries that you have saved. A custom dictionary is essentially a collection of defined words that you provide to Microsoft. When you are typing in Word and use a word that is not in the default dictionary, you can choose to have the word added to the dictionary in the program. For example, when you type “WorldCorp” in Word, it will be identified as spelled incorrectly (see Figure 4.4). If you right-click on the misspelled word, Word gives you suggestions, or you can choose to have the term added to the dictionary. This will create a custom dictionary by default that can be added to each time you choose to Add to Dictionary.

The key benefit of making a custom dictionary is that you can populate it with appropriate words and terminology for documents that you work with frequently. This way, they will not come up as a spelling mistake or a term used incorrectly when using spell check. A word of caution: When you add words to the dictionary, they are added in exactly as you spell them, even if you accidentally misspell them. You should make sure that when you are adding words to the dictionary, they are indeed spelled correctly.

To look at the custom dictionaries that are currently saved, click on Custom Dictionaries. You can also review and edit the word list in the dictionaries. This can be useful when you are writing different types of documents. For example, in legal documents, you might use one custom dictionary, and in economics research documents, you might use another.

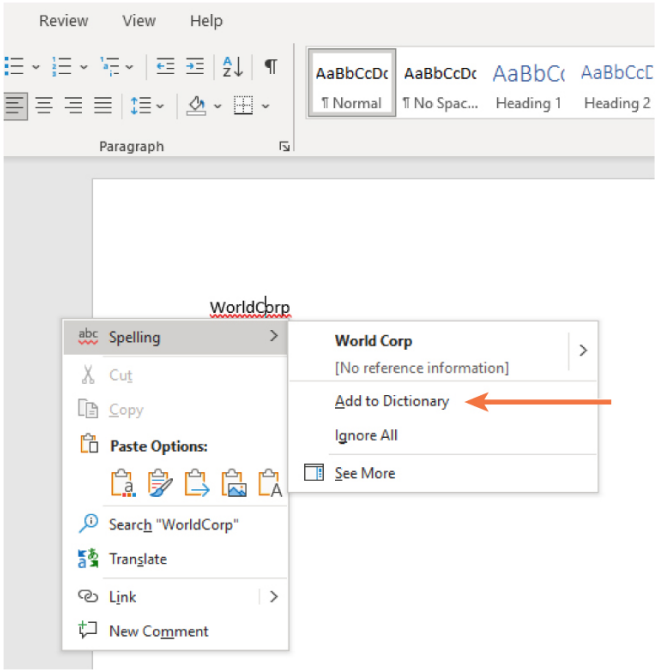


Figure 4.4: Adding words to the custom dictionary can be helpful if you use noncommon words or acronyms regularly. (Used with permission from Microsoft)

Another important tab is the Advanced tab. This one is the most versatile of the tabs, as it contains options for formatting, auto-correct, cut and paste, sizing of images, document viewing and display, and printing. These settings are considered more advanced because they go beyond basic settings. You might find some helpful settings in Advanced that you did not know you could change that could improve your efficiency with the program. The additional settings are separated into several major groupings:

- Editing
- Cut, Copy, Paste
- Link Handling
- Pen
- Image Size and Quality
- Chart
- Show Document Content
- Display
- Print

- When Printing This Document
- Save
- Preserve Fidelity
- General
- Layout Options
- Compatibility Options

As you can see, the list of settings is quite extensive. Spend a little time browsing through all the items that you can change or add to Word documents. You might also enable some commands or settings to see how they work for you as you construct the market trends report.

There are instances in which you might want easy access to some frequently used tools. You can add those to the Quick Access Toolbar, as the chapter on Essentials of Software Applications for Business discussed. By default, the Quick Access Toolbar is located in the upper left of the Word window above the ribbon, and it has three default commands: Save, Undo, and Redo. By customizing the Quick Access Toolbar, you could easily access heavily used commands, such as Word Count or Insert Comment.

The last tab to discuss is the Trust Center (Figure 4.5).

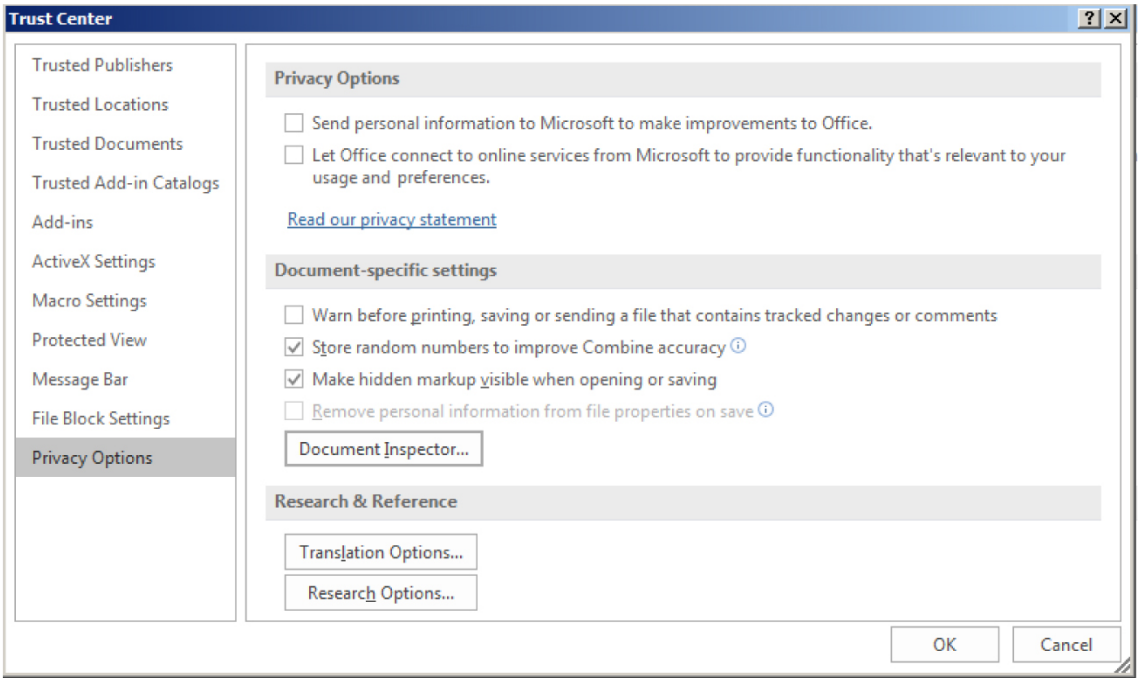


Figure 4.5: The Trust Center shows privacy settings that you can customize in Word. (Used with permission from Microsoft)

As you select that tab, you'll see a button that says Trust Center Settings; select that next. Then, you'll see the many tabs of the Trust Center. Under Privacy Options, you will find Document Inspector. If you select Document Inspector, you will be prompted with a list of items the inspector will scan for. Make sure the Document Properties and Personal Information option is selected. Click Inspect and the tool will scan the document for hidden information in the file, such as your personal information or comments that are linked to your name. After scanning, a results window will appear, often with a warning that all of your personal information will be removed if you continue with this process, as shown in Figure 4.6. Sometimes, for example, you may need to send the document to a third party, and you don't want to send all the versioning of the track changes or comments.

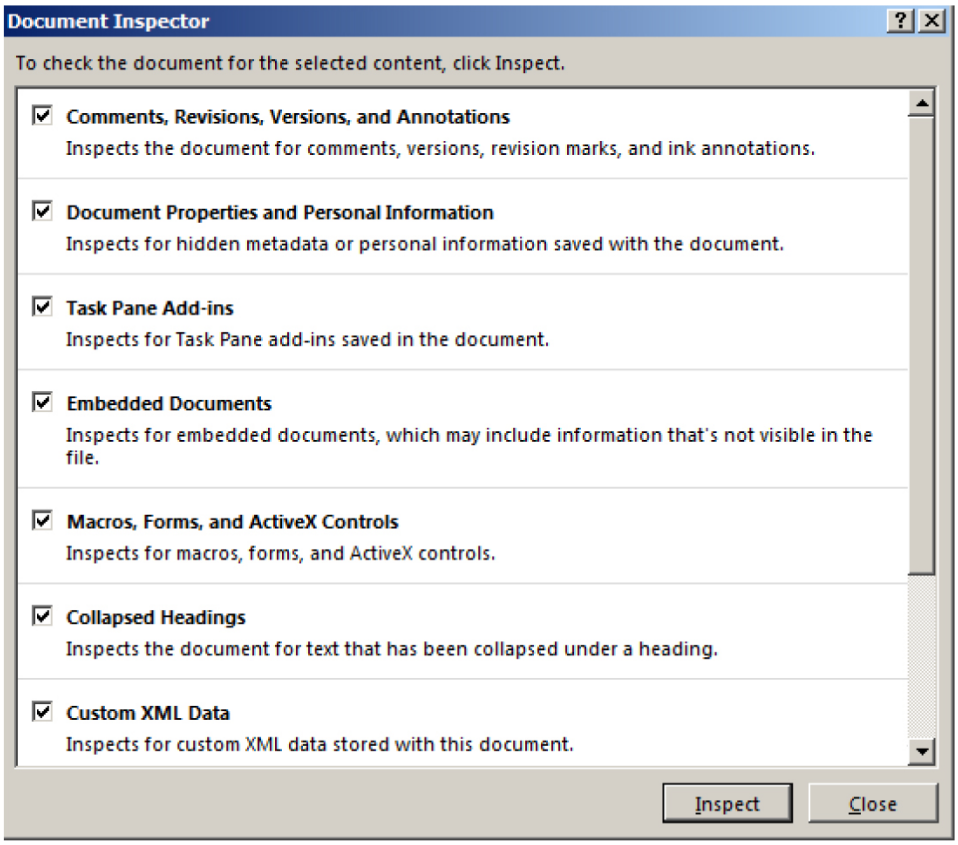


Figure 4.6: Word has many configurable settings that can help the user customize the program and make creating and editing documents as easy as possible. Selecting Document Inspector allows you to remove your personal information from a file. (Used with permission from Microsoft)

Page Numbers

Most professional documents need page numbers. You will likely see page numbers on business plans, marketing plans, strategic plans, or any kind of business report. The process of adding page numbers to your document so that they automatically update as you build the document is called page numbering. Recall from the Creating and Working in Documents chapter that to insert a page number, you go to the Insert tab and then find the Page Number drop-down menu. You can choose to place the page number in four different places: top, bottom, margins, or current position. Normally, business reports have the page numbers at the bottom of the page, and you can choose to have your page numbers on the left, center, or right. You can also format the page number field with various fonts and styles, as you can see in Figure 4.7.

Let's add page numbers to the market trends report. To begin, go to the Insert tab and then go to the Header & Footer command group. Choose the drop-down arrow at Page Number and choose Bottom of Page. For this example, choose Accent Bar 2, which adds the page number on the bottom right of the page with some nice formatting. Notice that when you add page numbers, you get a Header & Footer tab that allows you to make additional changes to the page numbers if desired.

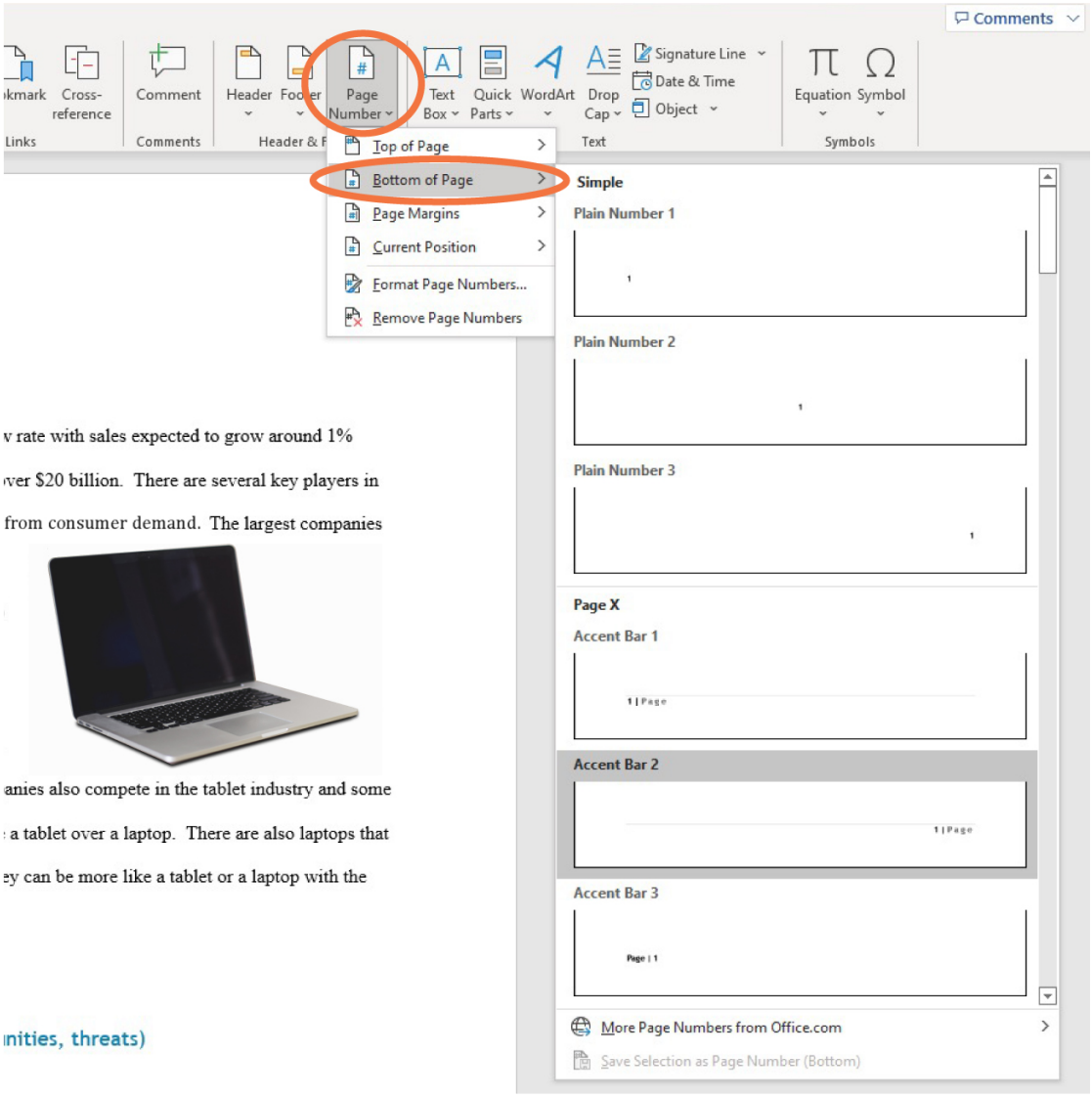


Figure 4.7: The Accent Bar 2 page numbering style automatically chooses a font and style for your page numbers. (Used with permission from Microsoft)

You can tailor your page numbers to your differing document sections. You can choose to start your numbering in a different place than the beginning of the document, as seen on the Header & Footer tab options. For example, if you have a cover page, you generally do not include a page number on that page. It is also possible to only number the pages in one particular section. You may choose the number format (Roman, alphabetic, or Arabic numerals). You could choose to have the pages numbered per section rather than numbering the document in its entirety, starting from one. This is rare, however. You will most likely see a business document numbered from the beginning and continuing on in each section rather than starting over.

Headers and Footers

Have you ever opened a book and seen the title at the top of every page? This area of the page is called the header, in which you can put essential information about the document, such as the name, chapter name, author, and page numbers. The header will appear on every page of your file by default, but you can change this if desired, as will be discussed later in this section. If you glance at the bottom of a page, you may see the text “Page x,”; this is part of the area of the page called the footer. Many documents simply use the footer for page numbers, but you may also add your contact information, the document file name, or the contact information and logo of your company.

For the WorldCorp market trends report, we want a header that indicates the title of the report, along with the year. To insert a header, go to the Insert tab and look for the Header icon drop-down menu. As with page numbers, headers come in a few different

formats. Choose the Banded format, as Figure 4.8 shows.

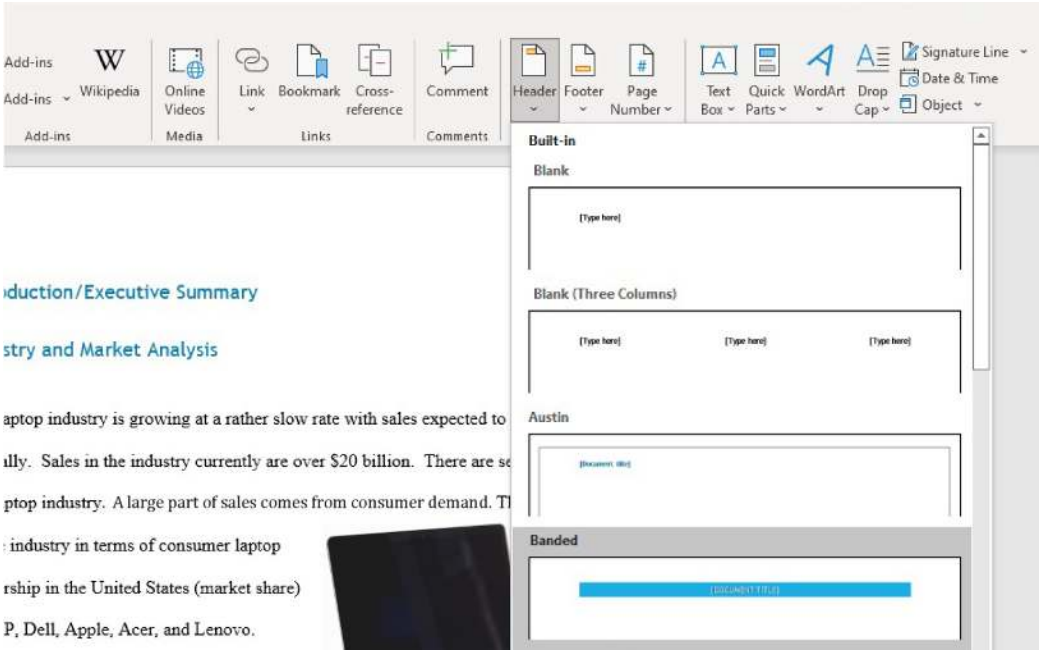


Figure 4.8: Just like the page numbers, the headers can be plain text, or formatted with designs. (Used with permission from Microsoft)

To insert the desired header information, simply click on the header itself to add the header text. From here, there are additional options to edit the header using the commands in the Header & Footer command group, as shown in Figure 4.9. The Document Info and the Quick Parts commands on the Insert tab can also help you add your document information or company information.

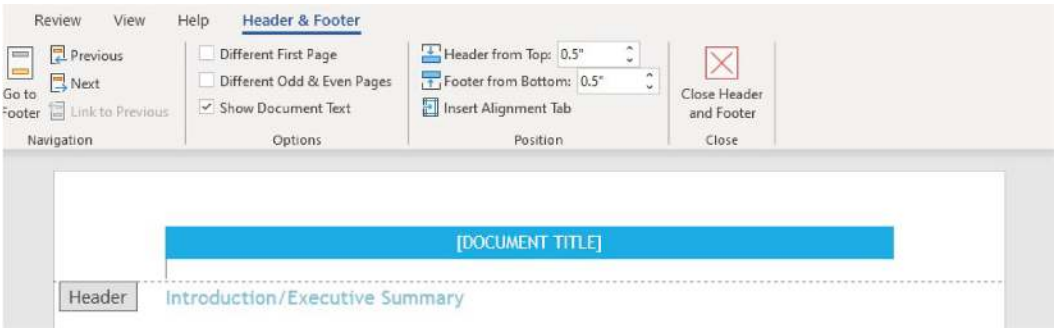


Figure 4.9: When you insert a header, the Header & Footer tab appears, where you can make further adjustments as desired. (Used with permission from Microsoft)

In Figure 4.11, you can see all the data available to the header. Select Company Address, for example, note that the information contained in these fields is in the document properties as covered in Essentials of Software Applications for Business. If these fields have not been filled out in document properties, the tool will simply insert “Company Address” into the header. You will have to enter the required information there.

The header is fully viewable by default, but sometimes you may want to hide it when writing the document, rather than seeing the white space dedicated to the header. To toggle off the header, go to the View tab, and select either Read Mode, Web Layout, Outline, or Draft. The only view mode in which the header can be seen is Print Layout.

Some business reports do not have a header on all pages or have different headers on odd versus even pages; this is called an alternating header. For example, you might want to include the report title on the even pages and the section title on the odd pages. To accomplish this effect in your document, just click on Different Odd & Even Pages. This way, one page will not have the header, and one page will.

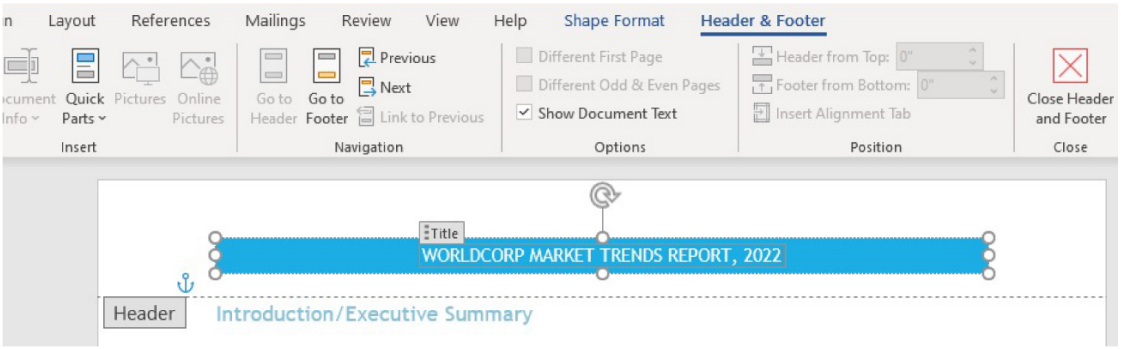


Figure 4.10: You can type directly into the header area, just as you would in the main page area. (Used with permission from Microsoft)

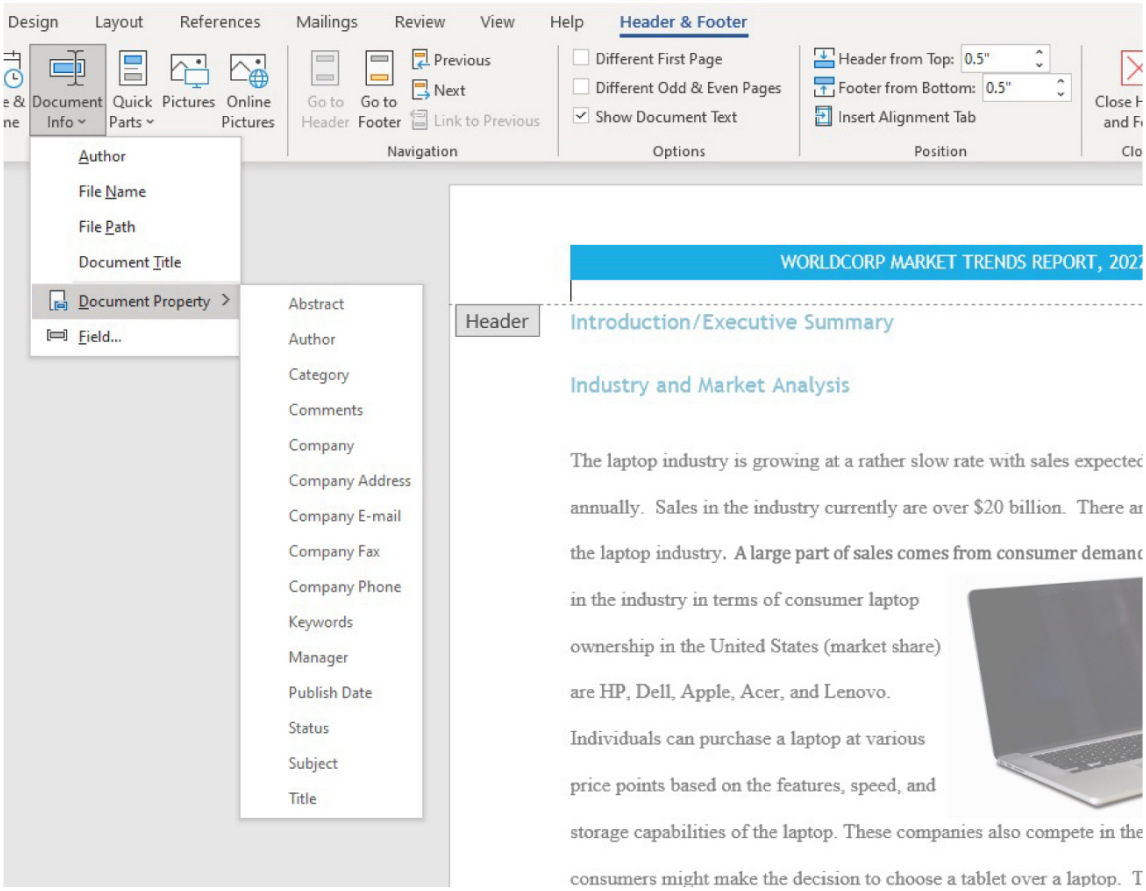


Figure 4.11: You can set up the document to include useful, company-specific properties that can quickly be added to the header. (Used with permission from Microsoft)

The steps to insert a footer are exactly the same as inserting a header: Select the drop-down menu Footer. The header, footer, and page numbers should have similar designs so that your document has a cohesive feel.

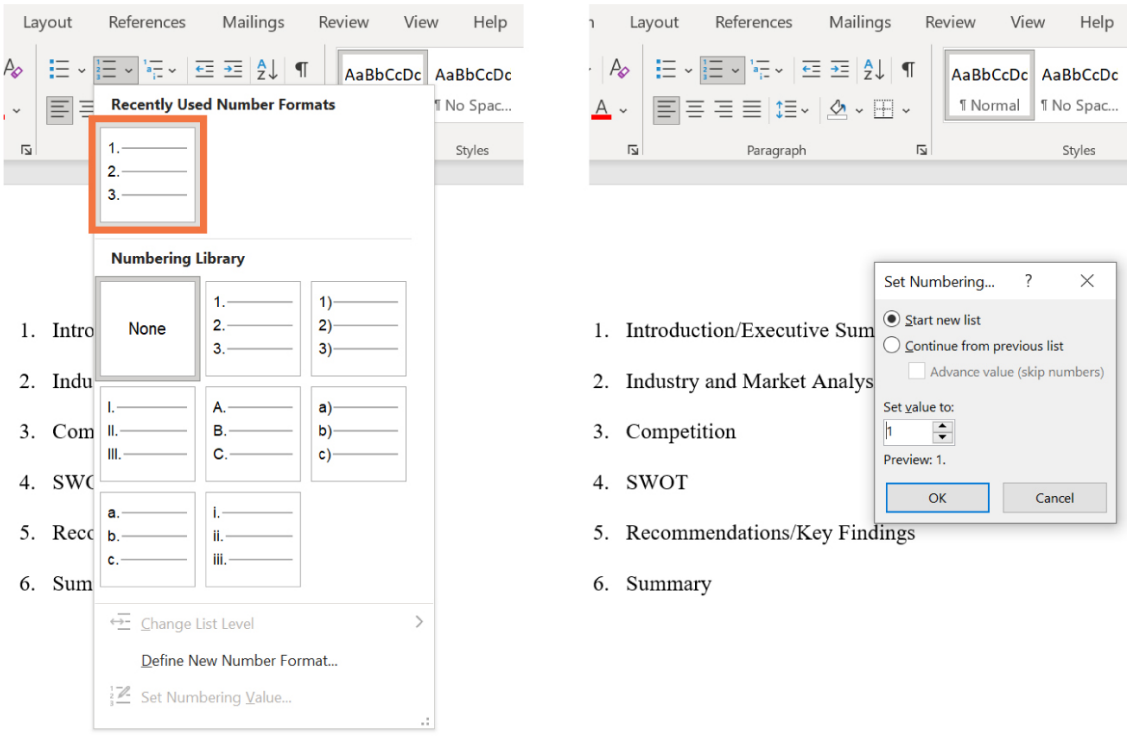
Lists

As you are crafting documents, you may find that some information is better suited to a list, rather than a paragraph of text. You learned about lists in the chapter on Creating and Working in Documents, but here you will go into more depth. Lists are useful for summarizing a long topic. The market trends report will certainly include lists, such as a list of competitors, major markets, and major product lines. Pulling information into a list can bring it to the reader's attention and help the flow of the document by preventing it from getting bogged down in page after page of paragraphs. You can choose to put text into a list after typing into the document, or you can select your list type before beginning to compose the text.

There are four types of lists in Word: bulleted, numbered, lettered, and multilevel. A multilevel list has two or more different levels, and often combines different types of lists, such as numbers and letters, or bullets and Roman numerals. Different types of lists are appropriate for different purposes. For example, numbered lists are useful for indicating a sequence or order, while bulleted lists can be good for summarizing. Any type of list—numbered, lettered, or bulleted—can be made into a multilevel list.

Numbered and Lettered Lists

To create a numbered or lettered list from text already in the document, select the lines of text you want to create a list from and choose the Numbering drop-down menu from the Home tab. In Figure 4.12, you can see the list format we chose: a number with a period after it. You can further customize your list by choosing a different starting number or letter, or by continuing your list from a previous page or list. This can be useful if, for example, you start a numbered list on one page, have a paragraph or two of text, and then want to continue with the same numbering sequence. Select the entire list, go to the Numbering drop-down menu, and select Set Numbering Value.



(a) **(b)**

Figure 4.12: (a) Both numbered lists and lettered lists are available in the same drop-down menu. (b) You can choose to start your list at any number, or continue from a previous list. (Used with permission from Microsoft)

You can also change the indentation in the list. Select the entire list and go to the Layout tab. In the Paragraph command group, you will see fields for typing in custom indents. In the Left box, type in your desired indent amount; 0.5 inches is a standard amount.

Bulleted Lists

Creating a bulleted list is a similar process. But unlike a numbered list, a bulleted list does not create a hierarchy. Instead of selecting the Numbering drop-down list, choose the Bullet drop-down list, and select the type of bullet you want to use for your list, as shown in Figure 4.13. You can either create your bulleted list from regular body text, or you can convert an existing numbered or lettered list to a bulleted list. To change from numbered to bulleted format, just reselect the list and go back to the Bullet drop-down menu and select the new format.

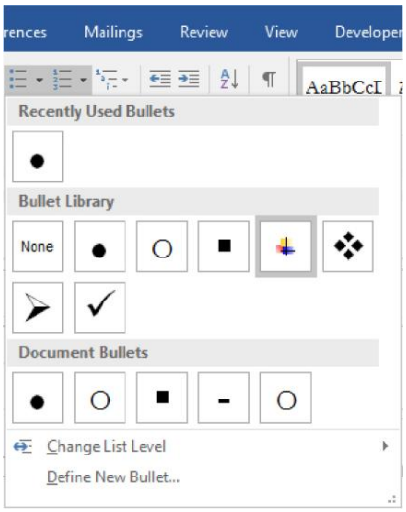


Figure 4.13: Different bullet designs may indicate different things. A checkmark list, for example, might be useful for a to-do list. (Used with permission from Microsoft)

Multilevel Lists

Suppose you need to make an outline of the market trends report using the headings for the sections of the report. Because the report is so long and detailed, it is too complex for a simple numbered or bulleted list; you will need to use a multilevel list. A multilevel list will help indicate different levels of importance and hierarchies within the report. Type the list of headings below into a blank document to start the outline for the market trends report.

Introduction/Executive Summary

Industry and Market Analysis

Industry Type

Industry Category

Industry Characteristics

Trends

Stability

Market Segmentation

Total Available Market

Target Market

Market Segments

Competition

Direct Competitors

Uniqueness

SWOT

Strengths

Weaknesses

Opportunities

Threats

Recommendations/Key Findings

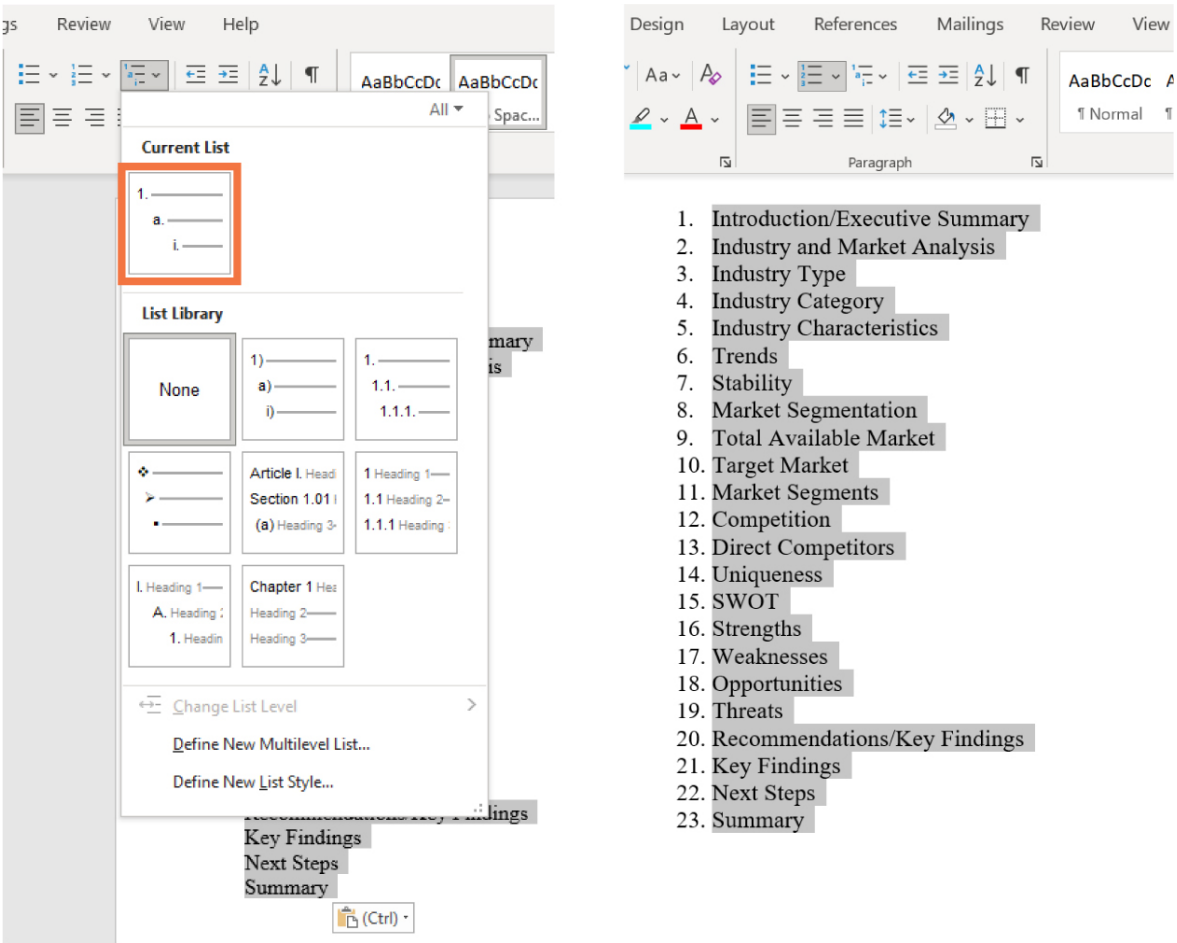
Key Findings

Next Steps

Summary

As they are listed now, there is no indication of what headings go with other headings. It is just a list of words and phrases.

To make this list of headings a multilevel list, first select the whole list with your cursor. Then, choose the Multilevel List drop-down menu from the Paragraph command group on the Home tab. Choose the Current List from the menu. But as you can see in Figure 4.14, you have other options for formatting your multilevel list. You can also define a new list style if you do not want to use any of the available options by choosing Define New List Style. Your list should now be numbered chronologically. You won't see any changes right away, but when you add indents, the different levels in the list will appear.



(a) **(b)**

Figure 4.14: (a) Some of the multilevel list formats include text and symbols. (b) The multilevel lists will appear to be a typical, one-level numbered list until you indent the subheadings. (Used with permission from Microsoft)

You add the indents with the Tab key on your keyboard. You can also add indentations using the Increase Indent tool on the Home tab in the Paragraph command group. Place your cursor at the start of a sentence in the list and press the Tab key or click the Increase Indent button, as shown in Figure 4.15. You can see that once you add the indent, the type of list changes. There are

numbers at the top level, lowercase letters at the middle level, and Roman numerals at the third level. You can change the format of your multilevel list by selecting your list and going back to the Multilevel List drop-down menu. This process can be done with lettered or bulleted lists, too.

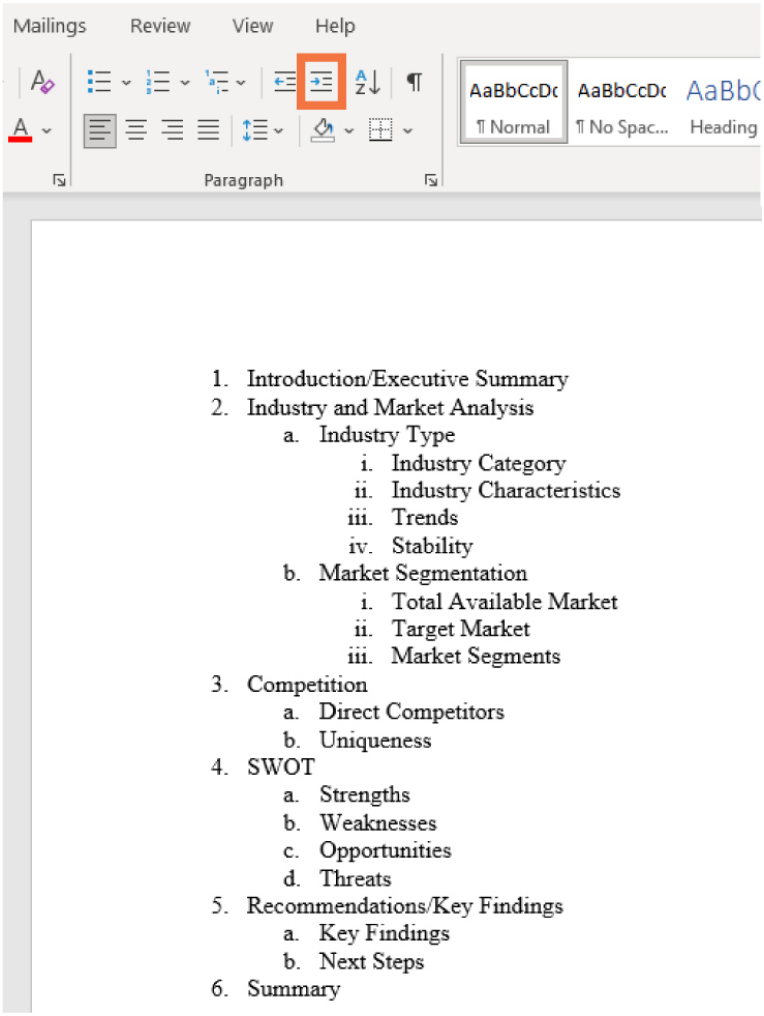


Figure 4.15: More levels can be added to any level of the list by increasing the indent. (Used with permission from Microsoft)

As a final activity for this section, let's add these new subheadings to the market trends report (because it is easier to insert them at the beginning rather than going back later when creating a table of contents). Insert the additional headings not in your current draft into the market trends report. Format the headings as Heading 3 and Heading 4, as you learned in Creating and Working in Documents, based on the outline just created. For example, Industry and Market Analysis is Heading 2, Industry Type would be Heading 3, and Industry Category would be Heading 4. This will help as we build out the rest of the document toward a final draft (Figure 4.16).

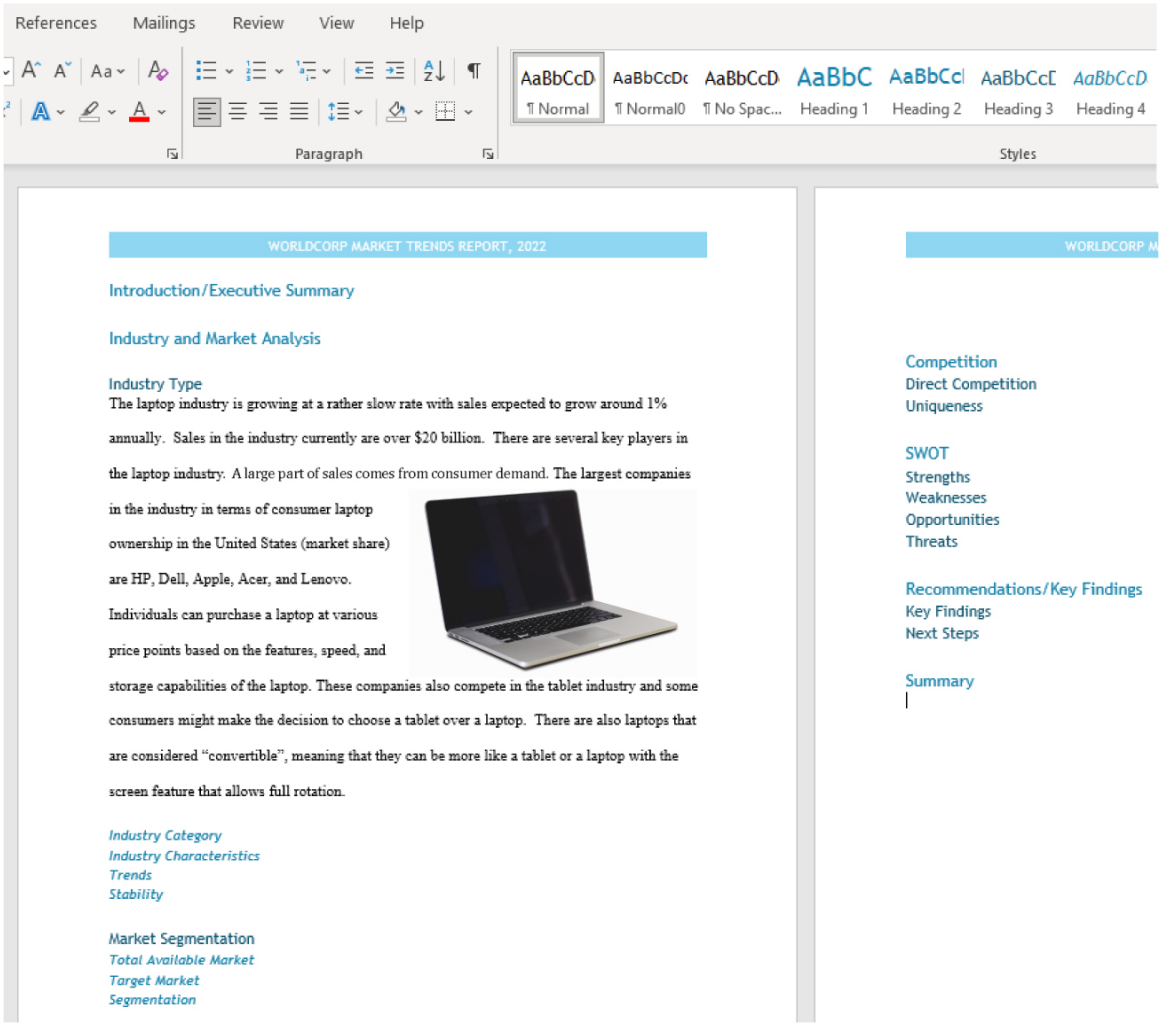


Figure 4.16: Notice the various levels of headings have a slightly different font color and style. (Used with permission from Microsoft)

Link to Learning

As you continue to become familiar with Word and grow more comfortable with its different tools and buttons, you will want to hone your own lifelong learning skills. This textbook covers a great deal of all that is available in Word; however, programs are always changing and being upgraded. Microsoft offers excellent support and tutorials about its various products, and these support pages are invaluable in keeping current with not only Word, but all Microsoft products. Visit Microsoft's support page on the Advanced tab(opens in new window) to learn more and become familiar with Microsoft support pages.

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3.4: Managing Long Documents in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Use the tools in the Pages command group
- Utilize Format Painter to apply formatting in a long document
- Use some of the tools on the References tab
- Create bookmarks for document navigation

Long documents underscore the importance of good navigation tools. Imagine working through a 200-page report, only to have to scroll endlessly through chapter headings to find what you are looking for. This is why tools like cross-references, bookmarks, tables of contents, and tables of figures are so important. They allow you to quickly access different parts of your document, as does the document outline, available in the Navigation pane.

In a business setting, these navigation tools are especially important. Think about your market trends report for WorldCorp. The high-level executives reading your report will need to be able to quickly glance at the table of contents and read a few pages of the report, without having to scroll or flip through many pages of text. In fact, they likely don't need to read the whole report; they will read the executive summary and skip around the report to graphs that interest them. (The executive summary is a short overview at the beginning of the report that highlights the main points of a long report.)

This section discusses the different command groups and tools that make long documents more user-friendly.

The Pages Command Group

The Pages command group is on the Insert tab, and it contains three commands. The most used one is Page Break; this command allows the user to finish writing on the current page and start writing on a new page. (You can also access many of these same tools on the Layout tab in the Page Setup command group.) Adding a page break can be particularly useful at the end of a chapter or section. To insert a page break, place the cursor where the break will be (the start of the new page), and select the Page Break option. You may also just use the keyboard shortcut Ctrl+Enter to place a page break. If you turn on the ability to view hidden characters, you can see exactly where the page break is on your page (see Figure 4.48). You can also view it easily in the Print layout option on the View tab. Here, we can add a page break at the end of each major section of the market trends report.

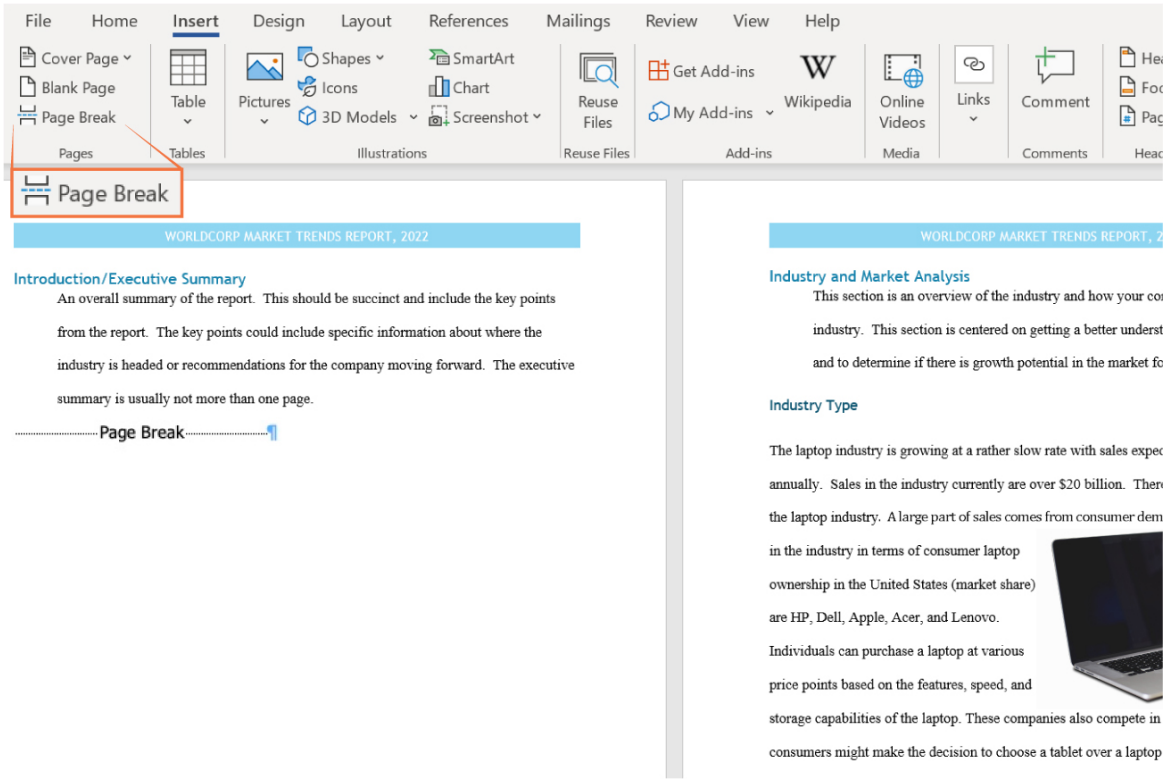


Figure 4.48: Page breaks make the subsequent text start on the next page. Here, it was placed at the end of the Introduction/Executive Summary, so that the Industry and Market Analysis section started on a new page. (Used with permission from Microsoft)

There is another command, Blank Page, which is not as commonly used as Page Break, but can be impactful in long documents such as reports and textbooks. These intentionally blank pages are added to provide a sense of closure or finality before a new chapter or section begins; they make a bigger impact than just a page break because they leave a full page empty. This convention is more often used in the publishing world when needing to, say, start a new chapter on a right-hand page.

To insert a blank page, go through the same steps as inserting a page break: Put the cursor where you want the blank page to be, and select the Blank Page icon.

The last command to discuss in the Pages group is Cover Page. Adding a cover page, or title page, is a common practice for long documents. It is an informative page that contains basic information about the report, such as the title, authors, publishing date, and the department or/and division. Some companies or organizations follow specific guidelines about title pages; formally written reports that follow the *Chicago Manual of Style*, for instance, do not include any graphics, and the components must follow a set alignment and format. Yet many business reports do not strictly follow any set manual of style, or may simply follow their company's brand guidelines. It is appropriate in many business settings to use graphics, such as a logo or photograph, on a title page, as in Figure 4.49.

Insert a title page to your market trends report. To insert a title page, select the drop-down menu of the Cover Page command and choose a design. Word offers many different options for layouts, fonts, colors, and styles. Just update the text and add an image, if applicable.

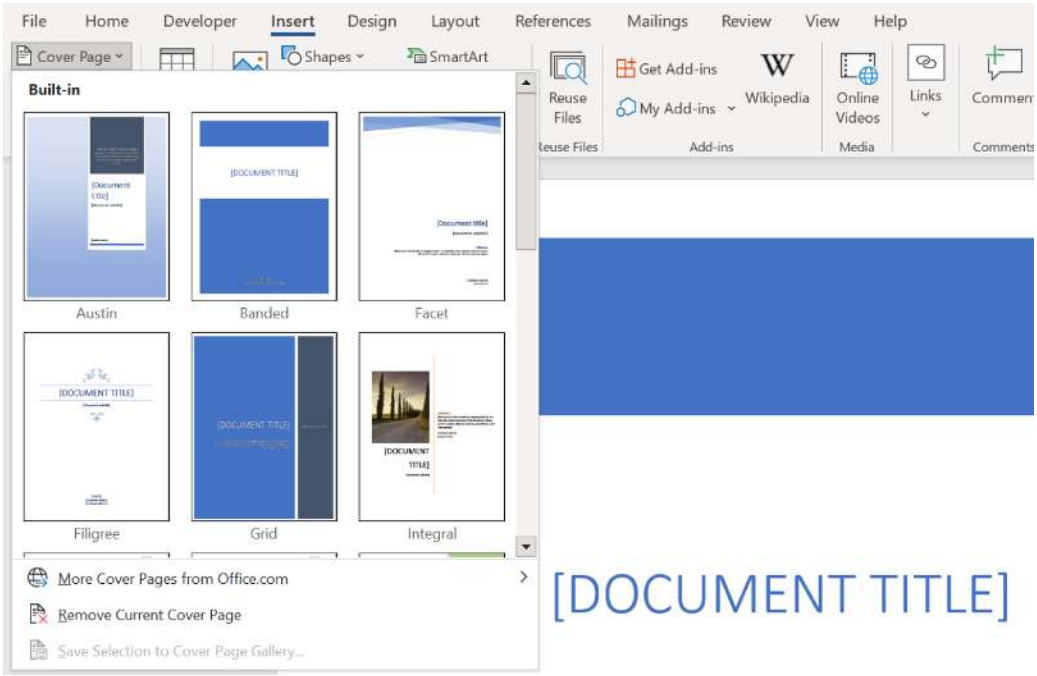


Figure 4.49: Word comes with some built-in styles and layouts for cover pages, some of which include spaces for graphics. (Used with permission from Microsoft)

Format Painter

Another tool in Word that helps manage long documents is the Format Painter. Format Painter is a command on the Home tab. It is used to copy formatting from another document or section of the same document. This can be useful when you have formatting in one section of the document that you want to copy over to another section, saving you the time and effort of having to format the new document or section again manually.

To use the Format Painter, select the area of the document from which you want to copy the formatting, then choose the Format Painter command. If you single-click the Format Painter, it will only allow it to be used once. To use it multiple times, double-click the Format Painter. It can then be used until you click the Format Painter icon again or press the Esc key. The mouse pointer will change to a little brush, then, with the brush, you select all the areas you want to apply the formatting to. Word will automatically mirror and apply the new formatting. If the document has a lot of chapters, if the document outline is multilevel, or if there are a lot of different elements in the previous document, then the Format Painter will not work perfectly. You might need to fix some pages or areas of the newer document. For example, when you have bullets, the Format Painter will not copy over the bullets, but instead will only copy the formatting of the text.

Format Painter is a useful tool for when you want a whole document to have the same formatting, particularly if that document contains copied and pasted text from multiple sources or collaborators. In Figure 4.50, we selected a phrase from the first paragraph, then chose Format Painter and used the brush to select the entire target paragraph. As you can see, the selected text now has matching formatting to the header.

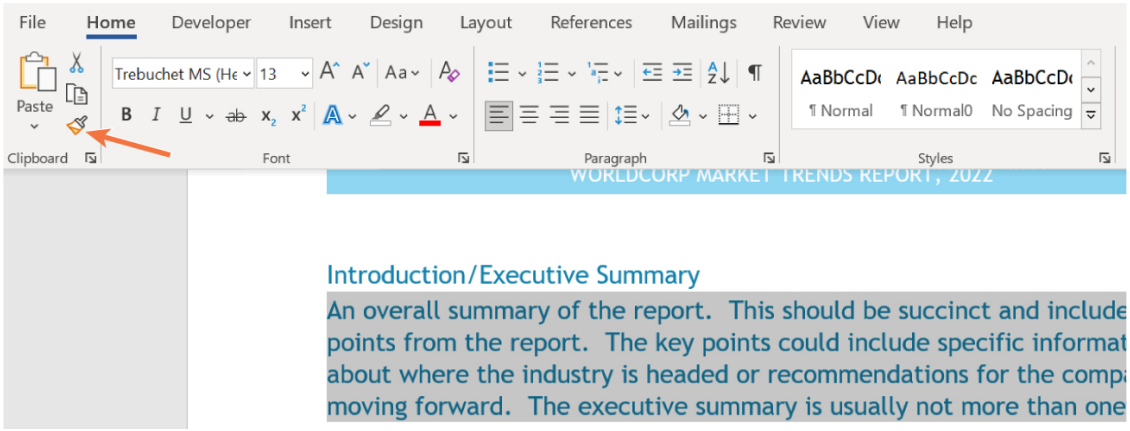


Figure 4.50: The Format Painter is useful for applying multiple types of formatting to a single chunk of text. (Used with permission from Microsoft)

References Tab

The References tab is for working with citations and the front/back matter of books. This is an important tab for anyone who is creating a document with many sources, such as a journal article or an economic report. It is also helpful when dealing with long documents that include many sections, such as the market trends report. Managing a table of contents, a citation list, or a bibliography manually can be unwieldy, and, fortunately, Word provides lots of tools to help users keep these organized and looking professional.

Let's review the different command groups on this tab. The first command group is the Table of Contents group. This contains tools for helping the user insert or modify a table of contents. The Footnotes command group is for managing and inserting footnotes and endnotes. The Research command group has two useful tools. The Search tool can be used to find information, definitions, and images online. The Researcher tool allows you to search for sources for information contained in the document. You can then insert the citation or link to the source using the tool. You simply click on the Research tool and type the search term or phrase into the navigation window. The Citations & Bibliography command group is for inserting, formatting, and managing your references. The Captions command group is for when you are working with figures and tables and want to add captions to later create a summary of the figures in your document. The Index command group is for building an index, like what you would find at the end of a textbook. The Table of Authorities is a command group that lawyers use when they need to cite cases and statutes. This next section walks through some of the commands you might find most helpful in this tab.

Table of Contents

If your document is formatted properly, Word will automatically generate a table of contents for you. You can select from a few different styles, which is useful for ensuring that your table of contents matches the look and feel of the rest of your document. Let's examine the requirements for a table of contents and what you need to have in your document to create a good one.

Headings for Tables of Contents

In the previous chapter, we discussed how to insert headings and why these are important for navigating long documents. We also mentioned how to access your document outline in the Navigation Pane. Recall that as you insert different levels of headings (H1, H2, H3, etc.), the Navigation Pane will read the document automatically and display them for you in the form of a document outline. This is particularly useful for long documents, as you can see the outline of the entire document without having to scroll all the way through hundreds of pages of text.

The reason these headings are relevant to generating a table of contents is that the table of contents uses the headings in the same way as the document outline. When you set up your H1s, H2s, and H3s, Word will automatically use those to generate a multilevel table of contents.

Section Breaks for Tables of Contents

In the chapter on Creating and Working in Documents, we also briefly reviewed how to insert section breaks and why they are important. Recall that there are two types of section breaks: continuous section breaks and page breaks. Continuous section breaks

are used when you want a new section but want to remain on the same page. They can also be used if you want to have different margins on two different areas of the same page, or to add columns for one section of the text. Page breaks, however, begin a new section on the next page. These do everything the continuous section break does, but simply add a new page. These are useful for when you want to start a new chapter, for example.

Both types of section breaks are important for generating your table of contents. When you create a table of contents in Word, the program automatically generates page numbers based on the page numbers in your sections. You may have continuous page numbering throughout your document, and so in this case, the table of contents will not be concerned with your sections. However, if there is different page numbering in different sections, the table of contents will reflect this.

Inserting a Table of Contents

You need to have added your headings and sections for the table of contents to work. In the market trends report, we formatted the headings for each major section and the subsections in those sections. Recall that the headings were formatted using the Style command group on the Home tab. To insert a table of contents using the headings we have defined, go to the first page of the first section. For the report, we want to include the table of contents after the cover page. So we will go to the Introduction/Executive Summary heading. Leave a blank line before the section heading by pressing Enter to move the first section downward at least one line, as shown in Figure 4.51. This will determine the placement of the table of contents. It should appear before the actual report starts, so before the first section of the document. Now, go to the References tab, choose the drop-down menu called Table of Contents, and choose any of the preset formats. Choose Automatic Table 2 for the market trends report; it will look like Figure 4.52. Conveniently, the table of contents has clickable hyperlinks by default, meaning that you can press Ctrl on the keyboard while clicking the mouse on any part of the table of contents, and it will take you to that part of the document.

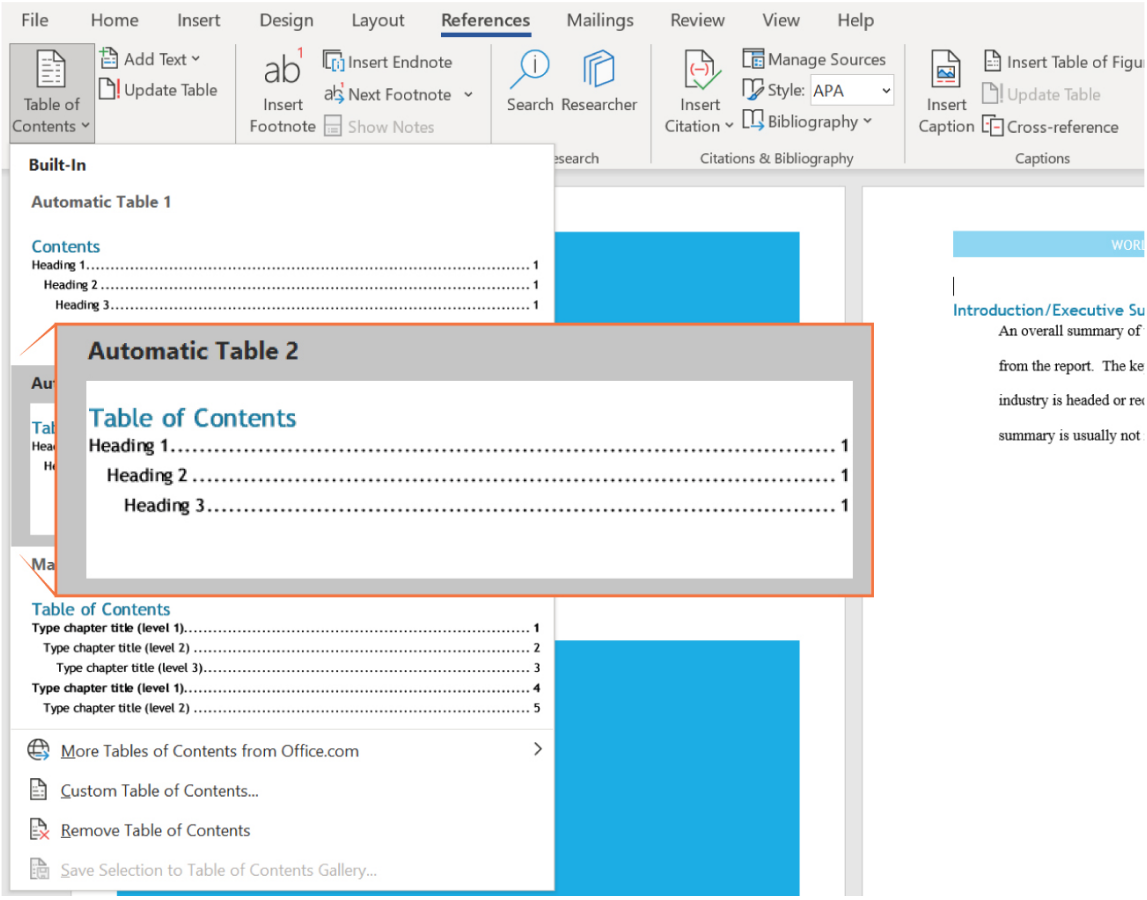


Figure 4.51: Creating a hyperlinked table of contents in Word allows the reader to click right to each section, directly from the table of contents. (Used with permission from Microsoft)

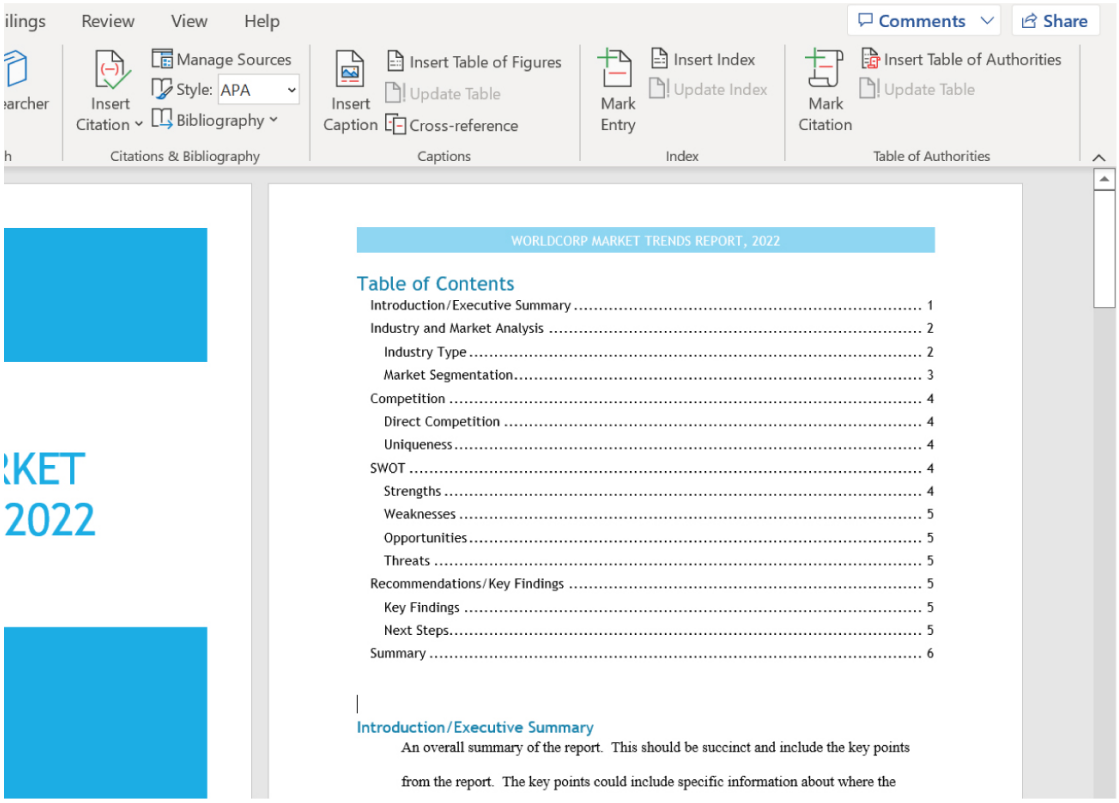


Figure 4.52: The table of contents is arranged using the headings we defined when composing the document. (Used with permission from Microsoft)

Note that any time you update your document and add or delete any headings, you will also need to update your table of contents. You can do this simply by putting your cursor anywhere on the table of contents and selecting the Update Table button. This will automatically update your headings and page numbers.

Footnotes and Endnotes

A footnote is a way to add notes to a document, and/or a way to cite a reference. A footnote appears at the bottom of the page where the reference occurs. When you add a footnote, a small superscript number or symbol will appear above your text, and then the footnote will automatically be added to the bottom of the page. This is an easy way to add a reference to a source or other general notes. For example, the author may want to add a related thought or comment about the text and have it appear at the bottom of the page in the form of a footnote, so that the reader can quickly and easily read it.

An endnote is similar to a footnote, except that the note appears on a page at the end of the document. Endnotes are typically part of the back matter. They are useful when you want to have all of your references and comments in one place. However, having them at the end of the document makes it harder for the reader to read them in the moment.

To insert a footnote or endnote, place your cursor at the end of a sentence, and choose the Insert Footnote or Insert Endnote command on the References tab. Word will automatically take you to the bottom of the page (for a footnote) or the end of the document (for an endnote) and add a short line to indicate where the footnote/endnote space will be.

For the market trends report, we need to add a footnote to provide the reference for the information about laptop sales in the industry. We will place the cursor at the end of the sentence (at the end of the word “billion”) as the place where the footnote notation will be inserted (Figure 4.53). The actual footnote will be inserted at the bottom of the page as a blank footnote. You can then insert the appropriate citation for the footnote. In this case, the website for the reference was copied and pasted into the footnote (Figure 4.54). To format the text in the footnote, click on it twice, and the whole line will be selected, then right-click on it and select Style. You can change the font type if you click on Modify. You can further change the footnote type, as there are many standard layouts of how to present a footnote, as Figure 4.55 shows. Enter the citation/text for the footnote.

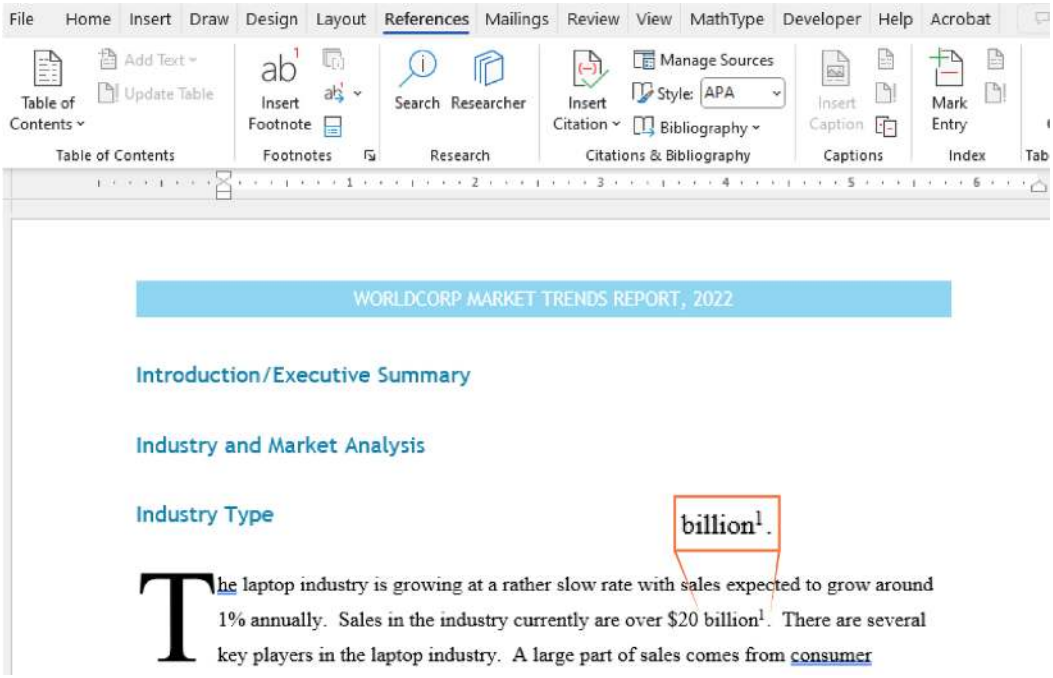


Figure 4.53: The superscript "1" indicates that there is a footnote at the bottom of the page. (Used with permission from Microsoft)

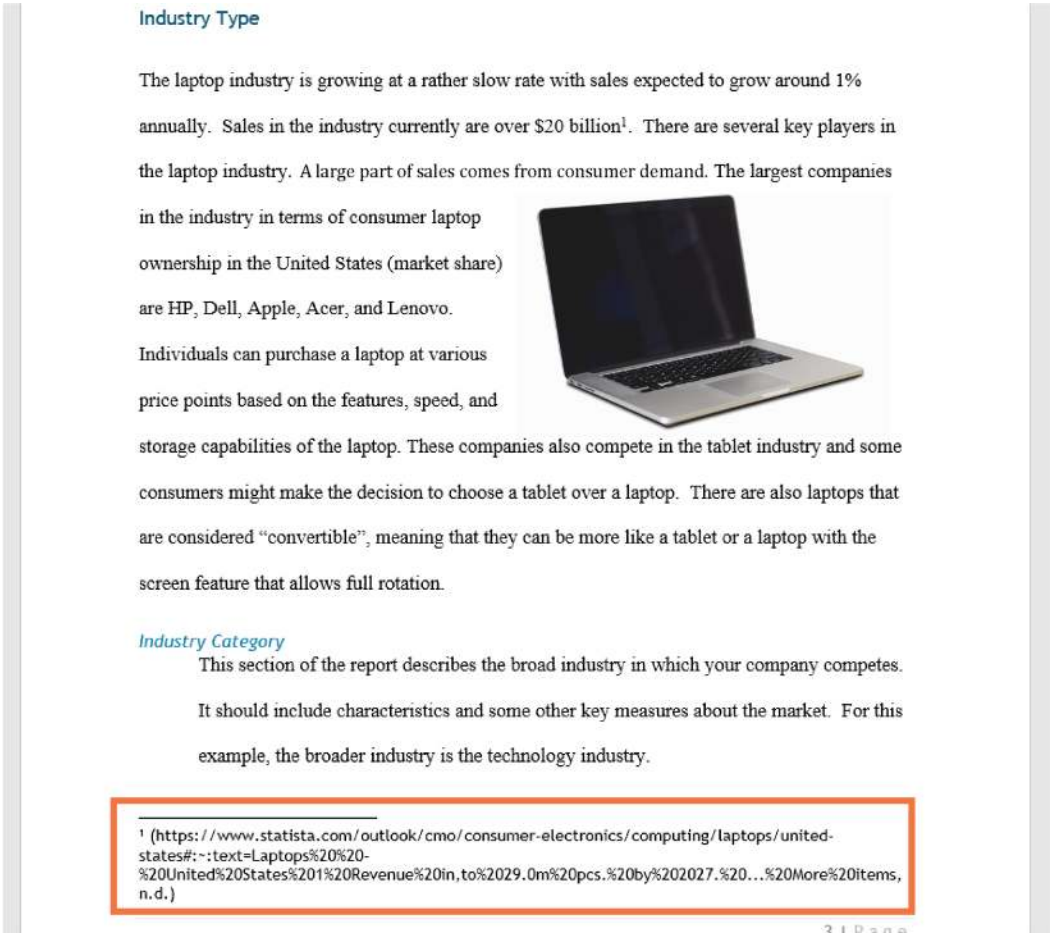


Figure 4.54: Footnotes will be numbered in the body of the document and numbered at the bottom of the page where the footnote is inserted. Include the citation for the reference in the footnote. (Used with permission from Microsoft)

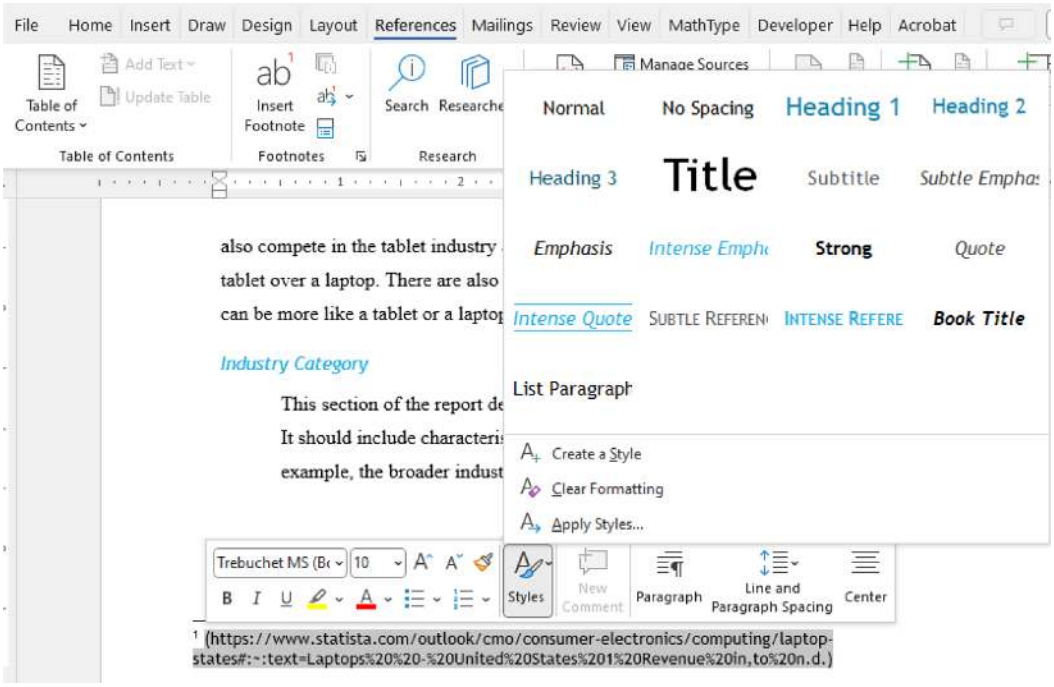


Figure 4.55: The style of the footnote font can be formatted using a wide variety of built-in styles. (Used with permission from Microsoft)

An endnote will look the same as a footnote. The only difference is that it is at the end of the document instead of at the bottom of the page. For the market trends report, we could use endnotes to identify the departments that contributed the specific information in the sections or to add additional context to a statement in the report.

For both footnotes and endnotes, you have the option of changing the numbering system. Word will automatically use numbers (for footnotes) or Roman numerals (for endnotes), but you can change this. Double-click to select the endnote or footnote, then right-click it to activate the context menu, and select Note Options, where you can change the numbering format. If you want to change the font or layout, select Style from the context menu.

Table of Figures

A table of figures is similar to a table of contents, except that instead of listing your document's headings and section breaks, it lists the captioned figures, such as tables and images. This is useful in documents with a lot of statistical analyses, for instance, in which readers will need to easily and quickly find specific graphs or charts. It can also be useful in documents like business reports, where you might want to have a list of the different data tables. Like a table of contents, there are a few requirements that must be met before the table of figures can be generated.

Captions

For Word to automatically generate your table of figures, you need to insert captions for each of them. Let's first insert a summary chart of data using the skills learned earlier in the chapter into the market trends report. To "caption" a figure, select the entire figure, then choose Insert Caption (see Figure 4.56). In the dialog box that appears (see Figure 4.57), the caption is automatically generated to be "Figure 1," but you can rename it to whatever you like. There are also options where you can choose the placement of the caption. Do the same for all the figures in your document. Once all your figures are captioned, then you can insert your table of figures.

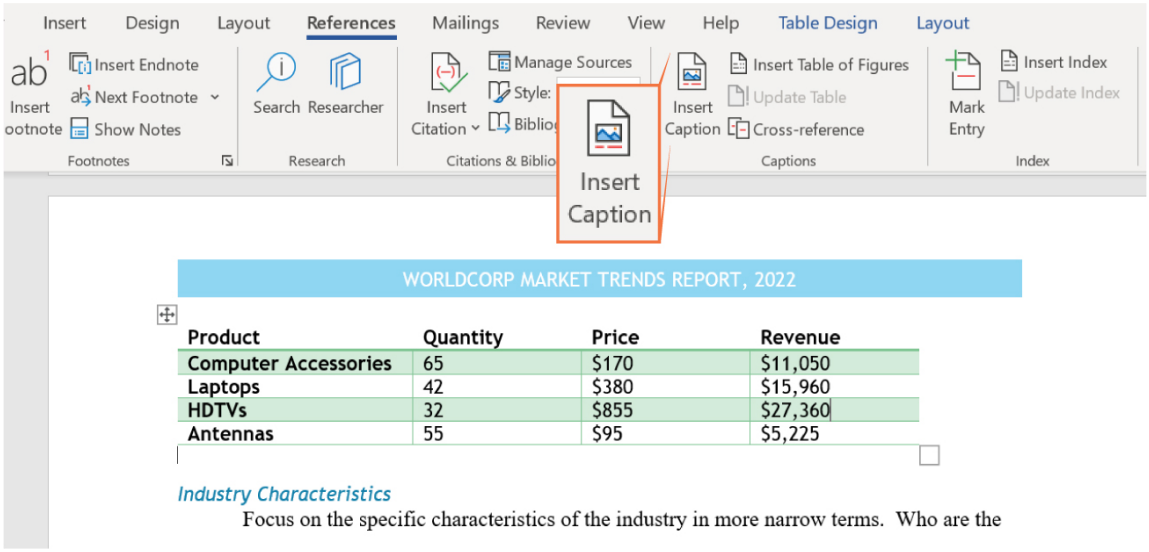
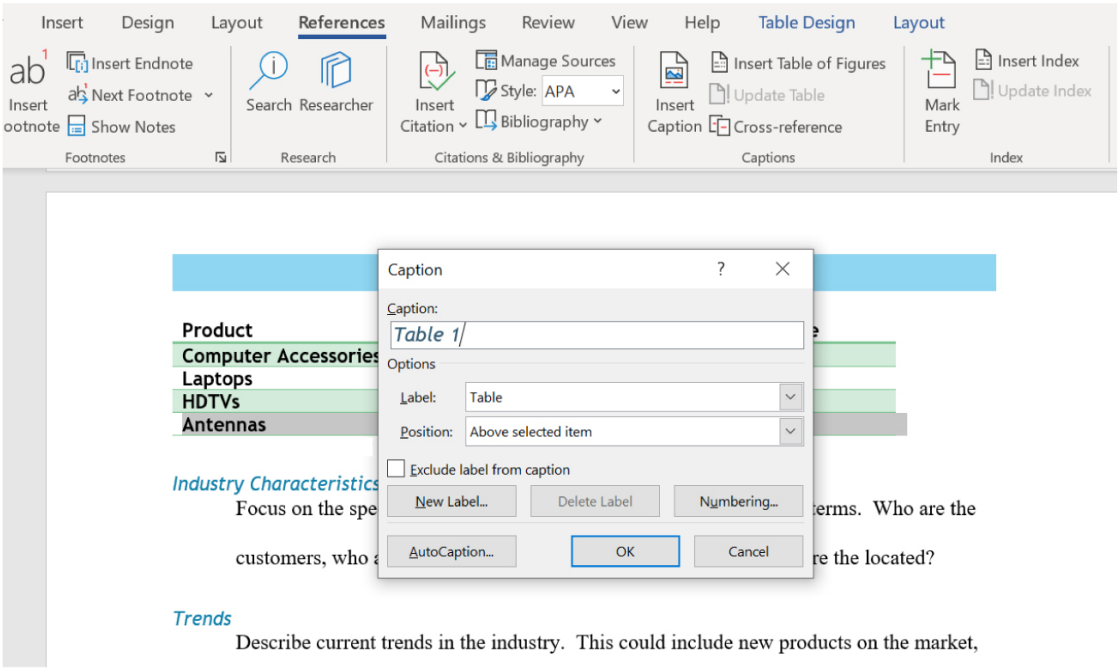


Figure 4.56: You must use the Insert Caption tool to make sure all of your captions will appear in the table of figures. (Used with permission from Microsoft)

https://biz.libretexts.org/@go/page/150543



(a)



(b)

Figure 4.57: (a) You can use the default text for captions or type in your own information. (b) The caption is placed below the table in this example, and is formatted according to the Style formatting used for the rest of the document. (Used with permission from Microsoft)

Inserting a Table of Figures

As with inserting a table of contents, first go to the top of your document where you will want your table of figures to appear. Typically, a table of figures is placed right below the table of contents. Now that we have labeled our table with a caption, we can create a table of figures to see how it works. As seen in Figure 4.58, insert a page break, and choose the Insert a Table of Figures command from the References tab. Word will automatically "read" the existing captions, and a table of figures will be generated.

To make your document neat and organized, add the title Table of Figures on top, and insert another page break to separate the Table of Figures page from the beginning of the document.

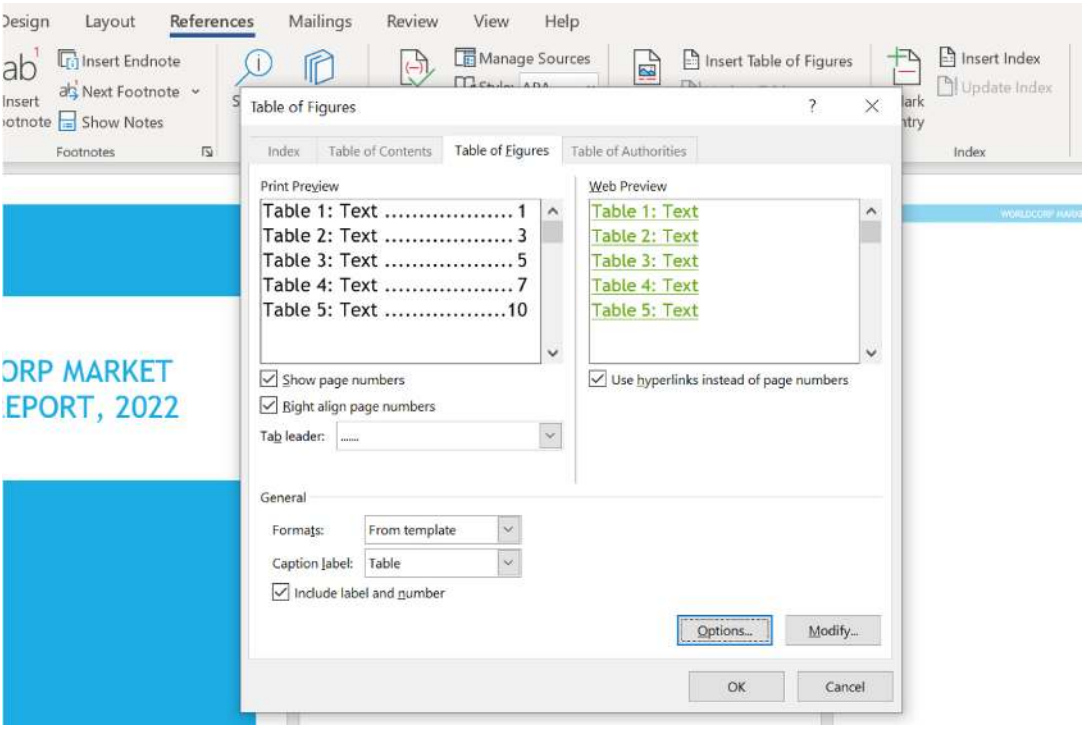


Figure 4.58: You can change some formatting options when you choose Insert Table of Figures. (Used with permission from Microsoft)

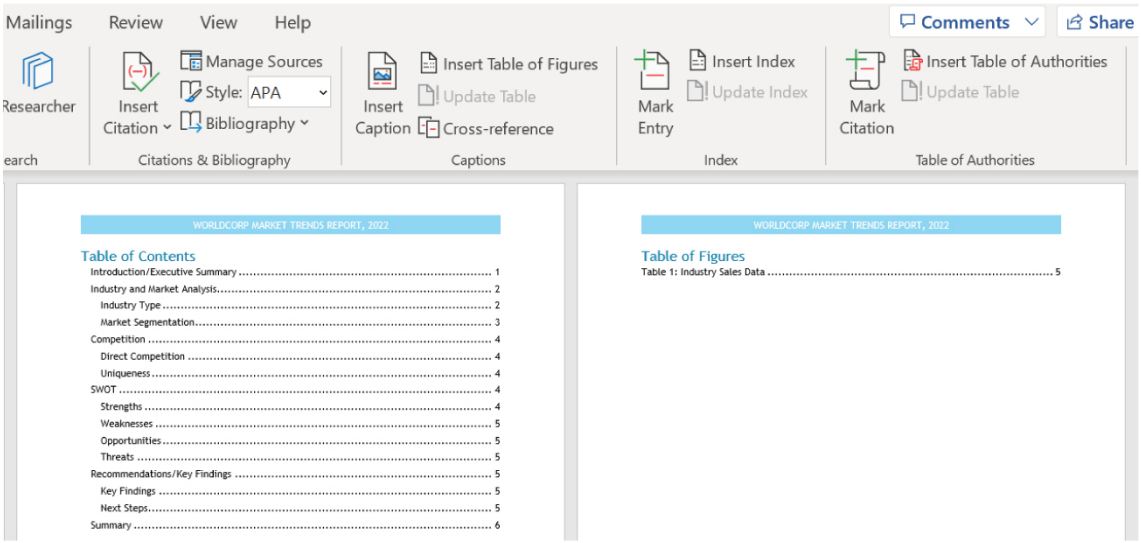


Figure 4.59: The table of figures should look similar to a table of contents, but without the multilevel tiers. (Used with permission from Microsoft)

Linked Bookmarks

Another helpful tool for navigating long documents is the bookmark. You can add bookmark links throughout your document for better navigation. Place the cursor where you want the bookmark to link up to—a section header, for example, or the beginning of an important paragraph—and go to the Insert tab and click Bookmark. In the dialog box, type a name for your bookmark Figure 4.60. In this case, we chose to bookmark the start of the body text. Now, select a word that will link up to the bookmark, right-click on it, and select Hyperlink from the context menu. The same hyperlink dialog box will appear, but this time select Place in This Document. Click on the bookmark you just made, and then click OK; the link will be set Figure 4.61. Conversely, if you want to remove a bookmark from Word, click the Bookmark command in the Insert menu, locate it, and then select Delete.

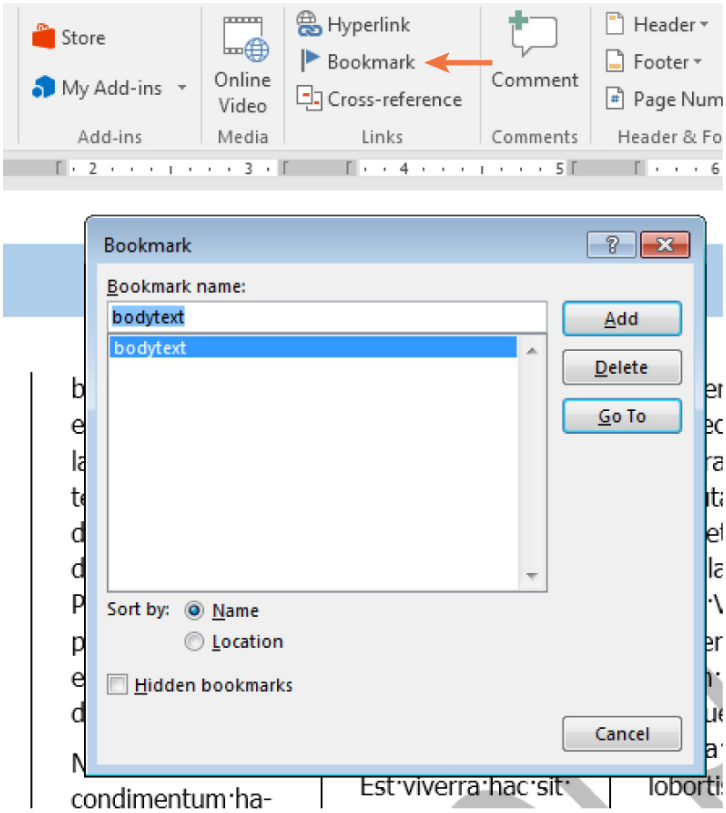


Figure 4.60: When creating Bookmarks, make sure to choose a descriptor word that has meaning to the content you are designating. (Used with permission from Microsoft)

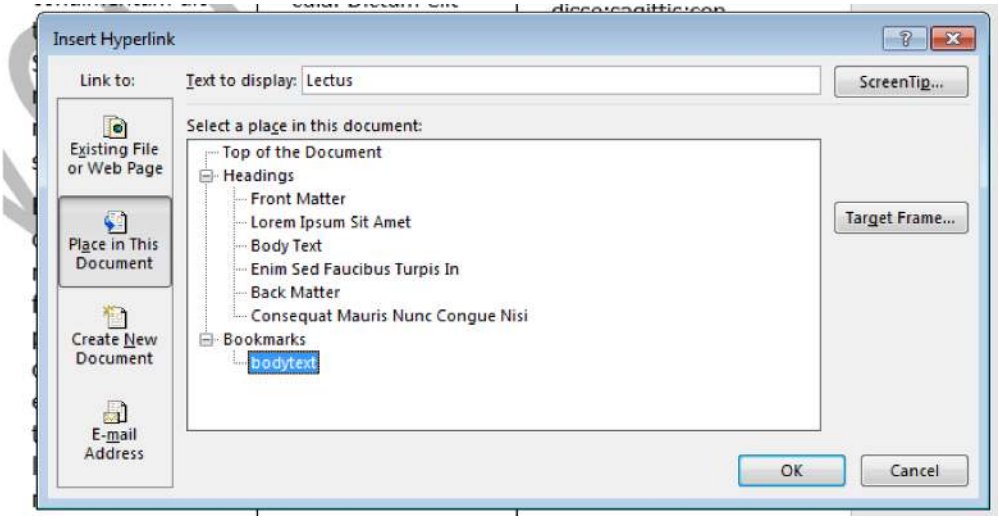


Figure 4.61: The bookmark is now set. Linking a section of text to a bookmark eases navigation through a long document. (Used with permission from Microsoft)

Another reason to use bookmarks is to help digital readers of your document navigate back to important sections of the document while they read. For example, you can add a link at the end of each chapter that says, “Go to Table of Contents.” To do this, first place a bookmark in front of the table of contents as Figure 4.62 shows. To locate the roster of bookmarks, click the Bookmark command on the Insert tab, and then click Go to. If you want to relocate the bookmark, place the cursor where you want the bookmark to be relocated to, then open the Bookmark dialog box, click the original bookmark’s name, and then click Add. This will update the new location.

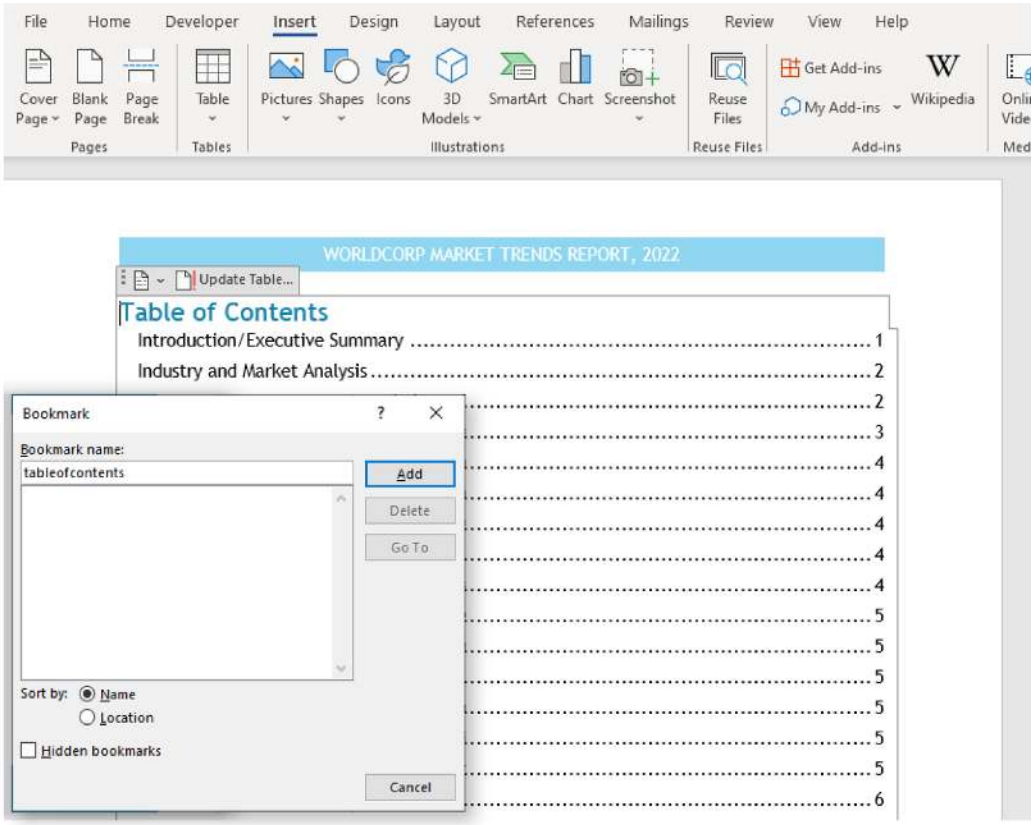


Figure 4.62: When you create the bookmark at the table of contents, you will be able to see it in your roster of bookmarks. (Used with permission from Microsoft)

Next, move to the area of the document where you want to link the table of contents. Go to the Insert tab and select Link. From the Insert Link window, choose the bookmark you just created. In the text box that appears, write the text you want readers to see ("Go to Table of Contents"), then choose Place in this Document as shown in Figure 4.63 and Figure 4.64. Choose the placement in the document and click OK.

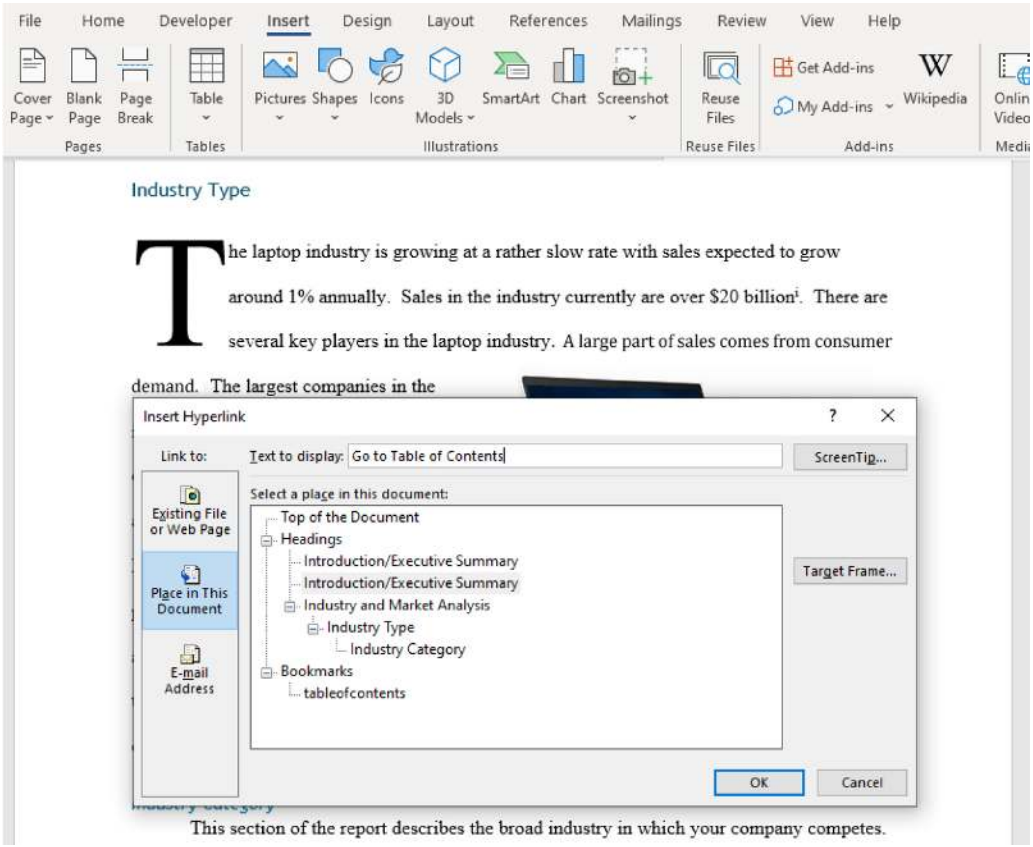


Figure 4.63: Remember to name your hyperlink something that will be helpful to the reader. (Used with permission from Microsoft)

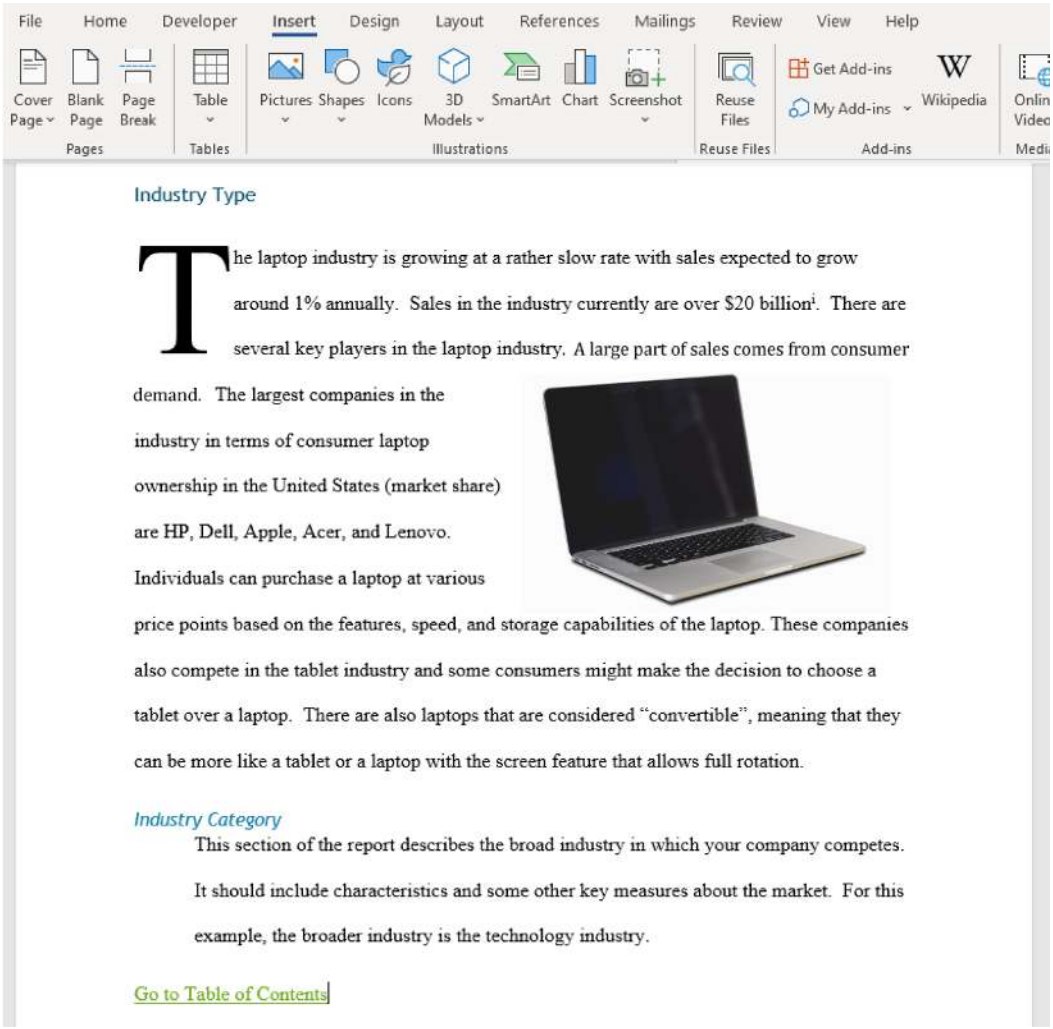


Figure 4.64: Readers can simply click on the inserted hyperlink to go straight to the table of contents. (Used with permission from Microsoft)

Spotlight on Ethics: Academic Integrity

When you are creating documents, especially long documents that might include research or data that has been created by others, it is essential that you give proper credit. You might have encountered citing sources when completing a research report for a class. We have an ethical obligation to cite sources to acknowledge the work of researchers and their findings from the studies. If a proper citation is not given to material that is not your own, this is called plagiarism. Plagiarism is part of a broader category called "academic integrity." Academic integrity goes beyond giving credit for work that is not your own, but it also covers issues such as cheating on a test or paying to have someone create a research report for you.

This is not to say that we cannot use information from others to support our thoughts or to help us develop a new understanding of the material. Instead, it means we have to acknowledge that the information came from another source and we are using their research in our work. From the researcher's standpoint, a measure of the quality of the research is the number of times the work is cited by others. This is similar to a product online having a large number of five-star reviews. The more the research is cited by others, the higher the credibility of the information.

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3.5: Chapter Review - Review Questions

This page is a draft and is under active development.

Review Questions

1 .
How do you add a level to a multilevel list?

a. Go to the Insert tab and choose bulleted list.
b. Use the Tab key or use the Increase Indent tool.
c. Highlight the text and choose multilevel lists from the Layout tab.
d. Insert a numbered list from the Home tab and press Enter after each line.

2 .
In the Word Options dialog box, where can you add paragraph marks?

a. the General tab
b. the Proofing tab
c. the Advanced tab
d. the Display tab

3 .
Where would you go to remove your personal information when sending a file to someone else?

a. the General tab in Options
b. the Accessibility tab
c. The Trust Center tab in Options
d. the Display tab

4 .
How would you quickly insert a special character to indicate something is copyrighted (©)?

a. using SmartArt
b. using symbols
c. changing the font
d. inserting a header

5 .
What is the main purpose of SmartArt?

a. to create flow and process charts
b. to create a column chart of data
c. to add visual interest to text with shading and shadows
d. to add a screenshot to a Word file

6 .
Where would you go to insert a signature line?

a. the Symbols command group
b. the Tables command group
c. the Text command group
d. the Illustrations command group

7 .
How can Format Painter be used in long documents?

a. to add section breaks to the document
b. to set up the headings for the table of contents
c. to quickly copy formats from one section of a document to other sections
d. to add bookmarks, hyperlinks, and captions

8 .
What do you need to do before you can insert a table of contents?

a. Add page breaks, section breaks, and cross-references.
b. Add section breaks and headings.
c. Add headings, page breaks, and page numbers.
d. Add bookmarks, hyperlinks, and captions.

9 .
What is the function of the Caption tool?

a. It inserts autogenerated text to footnotes.
b. It labels all figures, which then can be used to build a table of figures.
c. It labels headings, which can then be used to build a table of contents.
d. It inserts a reference for the image or table.

10 .
What are the two ways to create sublevels in a multilevel list?

a. the Tab key and the Increase indent command in the action bar
b. the Enter key and the Increase indent command in the action bar
c. the Alt key and the Decrease indent command in the action bar
d. the Ctrl key and the Decrease indent command in the action bar

11 .
Where do you find headers in Docs?

a. on the Insert menu
b. on the action bar
c. on the Tools menu
d. on the Edit menu

12 .
What are the two default page number styles in Docs?

a. bottom left and top right
b. bottom left and top left
c. bottom center and top center
d. bottom right and top right

13 .
What is one way to insert a drawing into a Doc?

a. You can upload the drawing directly from your desktop.
b. You can drag-and-drop a drawing from your desktop.
c. You can upload or link to an existing file in Drive.
d. You can create a new one from a vector-graphics tool within Docs.

14 .
How would you insert the copyright symbol (©) into a Doc?

a. Go to the Insert menu and choose Special characters.
b. Find the copyright symbol online and copy and paste it into the document.
c. Insert it as a drawing.
d. Go the Insert menu and chose Image.

15 .
Which menu do you need to access to add a table of contents to a Doc?

a. the Insert menu
b. the Format menu
c. the Tools menu
d. the action bar

16 .

How do you link to a table in another part of a Doc?

a. Use the Link tool on the Insert menu and copy the link.
b. Create a bookmark to the table and copy the link.
c. Choose the Link Objects option from the Insert menu.
d. Add a heading to the table, and then link to the heading.

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3.6: Chapter Review - Practice Exercises

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Practice Exercises

17 .
Find and read a business article or report of at least 4,000 words. As you are reading it, make a detailed multilevel outline of the contents. The outline should be at least one full page long. Apply headers and page numbers. Use single-space and a 12-point font.
18 .
Using the skills learned in this section, customize the Quick Access Toolbar to include the following commands: New document, Print, Copy, and Paste. Describe the steps you took to accomplish this.
19 .
Using SmartArt, create a detailed flowchart of the processes involved in a typical household task, such as making a sandwich or doing laundry. Choose an appropriate graphic to show the flow of the task to be completed.
20 .
Using the tools in the Text command group, compose an offer letter for a job opportunity. The letter should include today's date, a signature line, and company information. You can create a company name and address or use an actual company and its information.
21 .

Go to Papers & reports templates and download a report template. Using the template, insert both a footnote and an endnote into the document. Add some text to each and modify the text using the skills used in this section.

22 .
Go to Papers & reports templates and download a report template that has section headings already formatted. Using the template, insert a table of contents into the document.
23 .
Go to Papers & reports templates and download a report template that has a table of contents already formatted. Using the template, insert a bookmark several pages into the document that will take you back to the table of contents in the report.
24 .
Create a multilevel to-do list for your weekly tasks. You can decide the level of detail needed in the list and you can combine both home activities, recreational items, and school-related work in the list. Add and center the page numbers, and add a relevant header.
25 .
Find a report template from the template gallery in Docs. Use the template to insert page numbers (or change the location if the template already contains page numbers) and insert a multilevel outline into the report.
26 .
Search the internet and find a picture of an organizational chart for a company. Using that as a guide, create the chart in a new Doc using the techniques covered in this section.
27 .
Create a table using the list of weekly tasks you created a checklist for in Google Docs: Enhanced Formatting Features. Use the tools and skills you learned in this section to create an easy-to-read table that outlines at least two different categories of tasks (e.g., Work Tasks, Recreational Tasks). Your table should have at least one merged cell and at least two different fill colors.
28 .
Using a longer business article with headings, add section breaks as appropriate. Format the headings to use in the table of contents. Add page numbers with the finished section breaks. Then, on the first page, insert a table of contents.

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3.7: Chapter Review - Written Questions

> This page is a draft and is under active development.

Written Questions

29 .
What are a few advantages of adding headers to a document?
30 .
Describe the process of adding page numbers to a document. What things should you consider as you are adding page numbers?
31 .
How can you format a table without manually changing the borders and colors?
32 .
How would you insert a special character into a document? Also, if you use this special character frequently, what might make the process faster in the future?
33 .
What is the difference between a table of figures and a table of contents?
34 .
Why would you use a page break or insert a blank page in a business report?
35 .
Explain how the Format Painter can be used in long documents.
36 .
How can you change the position of the page numbers in Docs?
37 .
Why is a checklist useful?
38 .
How does Google's automatic substitution feature work, and how do you use it?
39 .
How does Docs's process for inserting an image offer more options for personalization than Word?
40 .
Why would you change the Normal font type in a document? Why would this be helpful when working with a large document?
41 .
What are some of the advantages of using section breaks in a table of contents?

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3.8: Chapter Review - Case Exercises

> This page is a draft and is under active development.

Case Exercises

Assignment A

Scenario: You work for a campus or community organization (student center, food pantry, tutoring program, cultural club, or nonprofit partner). Your supervisor wants a **professional 1–2 page report** that can be shared with students, staff, and community members.

Prompt: Create a "Program Update" report that highlights an issue that affects students (cost, access, time, or belonging). Examples: extended tutoring hours, textbook affordability/OER awareness, food pantry usage, commuter support, bilingual outreach.

Instructions (Microsoft Word):

1. Create a **1–2 page document** with a clear title and 2–3 short sections (ex: Overview, What We Learned, Next Steps).
2. Insert a **Header** that includes: *Organization name* + *Report title* (example: "ELAC Student Support – Program Update").
3. Insert a **Footer** that includes: **page numbers** (Page X of Y).
4. Create **one multilevel list** (at least 2 levels) to organize action steps or recommendations.
    - Example:
        - 1. Outreach
            - a. Flyers in multiple languages
5. Use **at least one advanced element** to improve clarity (choose one):
    - **SmartArt** to summarize a process (ex: "How students access support")
    - **Signature line** for an approving manager
    - **Special characters** where appropriate (ex: ©, ™, or accented names)

Deliverable: Submit **one Word document (1–2 pages)** showing header + footer with page numbers, a multilevel list, and one advanced element.
File name: `Lastname_3.2_AdvancedFormatting.docx`

Assignment B

Scenario: Your report is expanding into a resource that students will refer back to throughout the semester. To make it easy to navigate and consistent, you will set it up like a "mini long document."

Prompt: Create a **1–2 page "Student Resource Guide"** for a campus/community topic that supports student success (examples: "How to access tutoring," "Campus food resources," "Commuter support checklist," "OER & low-cost textbook options," "How to request accommodations," "Where to get tech help").

Instructions (Microsoft Word):

1. Create a **1–2 page guide** with at least **3 headings** using built-in **Styles** (Heading 1 and Heading 2).
2. Insert an **automatic Table of Contents** at the top of the document.
3. Add **one bookmark** to a key section (ex: "Emergency Contacts" or "Steps to Get Help").

4. Add **one cross-reference** that points the reader to another heading or section (ex: “See ‘Support Options’ on page…”).
5. Insert **one captioned visual** (choose one):
    - an image, screenshot, or SmartArt
    - then add a **Caption** (ex: “Figure 1: Support Request Process”)
6. Add **one citation note** using **Footnote** or **Endnote** (example: cite a campus webpage, brochure, or policy).

Deliverable: Submit **one Word document (1–2 pages)** with a Table of Contents, headings using Styles, a bookmark, a cross-reference, one captioned visual, and one footnote/endnote.
File name: `Lastname_3.3_LongDocumentTools.docx`

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CHAPTER OVERVIEW

4: Advanced Document Preparation

> This page is a draft and is under active development.

4.1: Chapter Scenario
4.2: Creating Different Document Types in Microsoft Word
4.3: Working with Graphics and Text Tools in Microsoft Word
4.4: Collaborative Editing and Reviewing in Microsoft Word
4.5: Versions and Version History
4.6: Mail Merge in Microsoft Word
4.7: Creating Forms in Microsoft Word
4.8: Chapter Review - Review Questions
4.9: Chapter Review - Practice Exercises
4.10: Chapter Review - Written Questions
4.11: Chapter Review - Case Exercises

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4.1: Chapter Scenario

This page is a draft and is under active development.

Microsoft Word includes some specialized features that can be used in a variety of ways, for both business and personal use. These features are designed to save you time. For your WorldCorp market trends report, you can use these features to gather information from employees in different departments, communicate with vendors and customers, and even create forms to be used for human resources purposes.



Figure 5.1: Advanced word processing features allow you to create complex documents such as invoices, custom envelopes, business cards, and much more. (credit: modification of “Please pay this amount” by miguelb/Flickr, CC BY 2.0)

The chapters on Word Interface and Basics focused on the basic functions of constructing effective documents in Microsoft Word. In this chapter, you will learn enhanced capabilities in Word that go beyond simply creating a document. You will also spend some time reviewing additional types of documents you might encounter in business, such as invoices and cover letters.

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4.2: Creating Different Document Types in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Create a template
- Create a business memo
- Create a letterhead and an envelope
- Create a business card
- Create a brochure and a flyer
- Create an invoice
- Create a business plan
- Create a resume and a cover letter

Having different document types ready to go can be useful in both everyday life and your professional life. When it comes to something like applying to jobs or schools—a task that requires writing a similar document, multiple times—you don't want to waste time by starting from scratch for each application. You can do this by using a template, which we learned about in Creating and Working in Documents. This section will show you how to create your own template for a few different document types, including memos, letters, envelopes, business cards, brochures, flyers, and invoices.

Templates

In Creating and Working in Documents, we defined what templates are and where to find them in Microsoft Word. There are also several templates available on the internet. Word has a web search capability so that you can look for additional templates on templates.office.com, as you can see in Figure 5.2. On the Office template website, thousands of templates can help entrepreneurs and small businesses start making their business more systematic. You can find Word templates for email advertisements, calendars, brochures, memos, business cards, invoices, business plans, warehouse receipts, and more. Once you download the template, you can populate it with data and further modify its appearance.

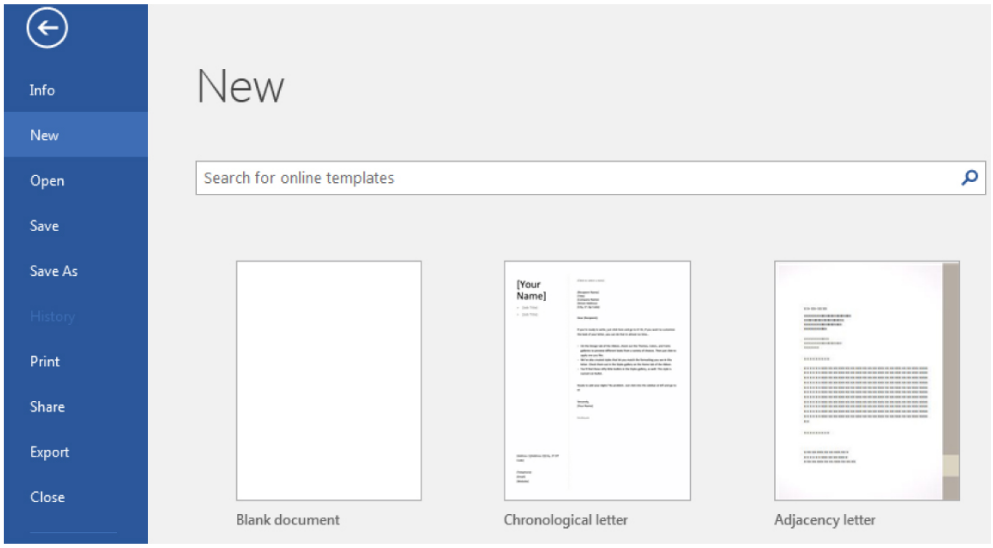


Figure 5.2: You can search for templates using the desktop version of Word, or you can go to your web browser and download the templates. (Used with permission from Microsoft)

Using prebuilt templates can be incredibly useful, but sometimes you might use a custom document type often enough that you want to save it as your own template. To do this, go to the File tab and use the Save As command to save the document with the

.dotx extension. That will save the document as a template. This means that every time you open this .dotx file, a new file will be created, with all your formatting already in place. Once you make your edits to the new document, use the Save As command again to save the template file (.dotx) as a standard Word document file (.docx), making sure to choose the .docx extension to keep the changes. This will ensure that your edits are saved to a new document not to the template file. The .docx files are standard Word documents used for editing and sharing, while .dotx files are Word templates used for creating new documents with a consistent format and style. These same steps need to be followed when building a template for any kind of file, whether it is a memo, envelope, brochure, flyer, or invoice.

Link to Learning

While Word comes with many fantastic templates installed, there are many more available online that are free and can be used with Word. A Google search will garner thousands of available templates. You will likely come across Canva in your search. Canva does provide access to some free templates; however, these files must be edited in that service and are saved and downloaded in file types that are not necessarily fully compatible with Word. When searching for templates, be sure to verify they are indeed compatible with Word and come from a verified and trusted source.

Business Memos

Word has templates for memos and newsletters. These are similar forms of communication in that they both inform a large group of new changes or trends in a company and may call for action. Yet there are some differences. Memos are used internally, while newsletters are for external audiences. Memos also usually have a standardized format. Newsletters have more freedom of form and may incorporate a lot of graphics. Like brochures and flyers, both have been digitized in the form of emails.

Despite the widespread use of email, printed business memos are still commonly used to communicate important information within a company. Memos typically follow a specific format, which formal company email transmittals may also do today. One common structure is to include an opening thesis statement, the main issue, and a closing statement. The opening is an introduction, and it may recall some relevant past activities or current activities. The main issue should include the changes that are being announced to the company. The closing is a reminder of the current project's general objectives. It may also include a complimentary closing, such as “Thank you for your kind attention,” or something similar. Last comes the signature, which is the sender’s name, job title, and email address.



Figure 5.3: Today's emails have copied the classic style of a business memo. (Used with permission from Microsoft)

Like an email, a memo should always include fields for To (the employees), From (typically management), and CC, which stands for "carbon copy." In the 1980s, before personal computers, letters were typewritten, and a piece of carbon paper was inserted between two sheets to make a copy of the letter. The copy created by the carbon paper was the "carbon copy," or "CC." CC'ing others is a process still used in emails today, although, of course, there is no physical hard copy involved.

Memos should also include fields for the Date and a Subject. You can see a memo template that was downloaded from Microsoft's template page(opens in new window) in Figure 5.3.

Newsletters can follow a similar format, but consider that your audience will be different. You may want to use a different language, incorporate graphics, or include more details. Newsletters may not only communicate information and updates to an external audience, but are often used as advertising. Microsoft's newsletter templates are a good place to get started if you are not sure how to format your newsletter.

Link to Learning

Newsletters are the most popular email advertisement form. Read this step-by-step guide to writing a newsletter(opens in new window) at Readz.com. You can find advice on newsletter creation, the audience, the types of newsletter formats, idea prompts, and more.

Letterhead and Envelopes

A letterhead is a type of heading that contains company contact information and a logo. It can be used in many scenarios, both personal and professional. Figure 5.4 shows an example of a professional letterhead for a business. The logo and company contact information will go at the top right of the document. The information in the template is generic so that you can customize the template with your specific company information.

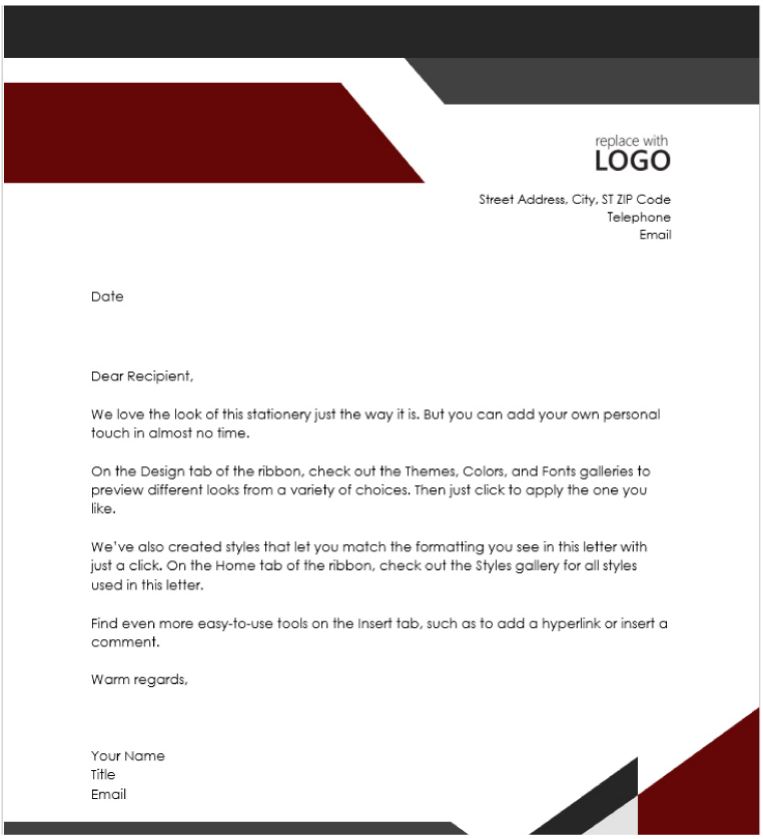


Figure 5.4: Using the letterhead templates can make creating a brand/image for your company easier by providing prebuilt designs. (Used with permission from Microsoft)

Business letterheads are also used in conjunction with company envelopes. You may have preprinted company envelopes with the company logo on them. If not, you can create one using templates. When corresponding by mail, it is much more professional to have a printed envelope with the recipient's information, rather than have handwritten details. While we will cover creating envelopes for larger mailings in the next section, here we are focused on printing one or two envelopes.

Word has templates and other customizable capabilities to create printed, custom envelopes. You just need to fill in your address with your name in the left corner, and fill in the recipient's data in the middle. To print the envelope, you will need to load the envelope in the correct orientation in the printer. Then, you will go to the File tab and select Print. Printers can vary by brand, so consult the owner's manual for your printer or search online for the proper way to print an envelope.

Using the Envelopes command is another solution, and it allows for more customization. You first need to make sure that your address is saved in Word's settings. This is done through the Options command, located on the File tab. Selecting the Options command will open a window, and inside that window, you will see a tab called Advanced. This is where you can set your address, as Figure 5.5 shows.

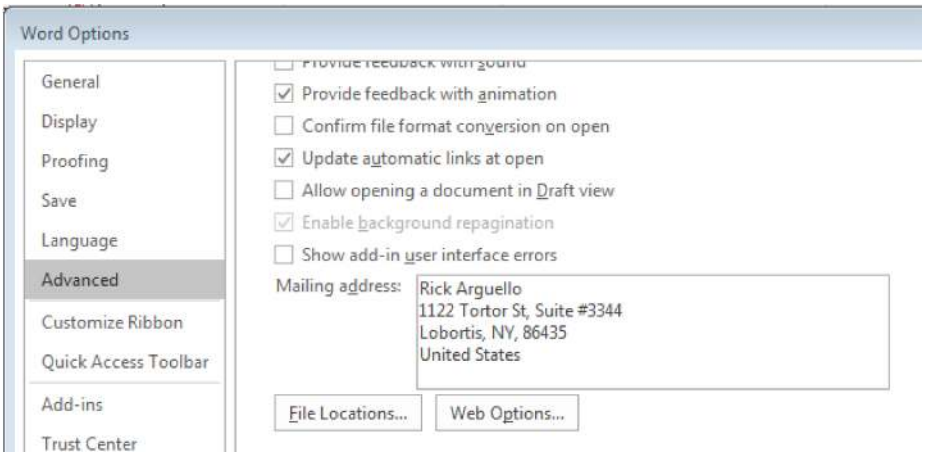


Figure 5.5: The Advanced tab of the Word Options window is where you can make sure your address is saved. (Used with permission from Microsoft)

Mac Tip

From the Tools menu, click on Envelopes. You can make formatting changes here. Also, in the Tools menu, there is an option for Labels, which has a similar functionality for preparing mailing labels.

Next, go to the Mailings tab and select Envelopes. In Figure 5.6, you can see the dialog box that will appear. The blank address is the recipient's address, and on the bottom is your auto-generated mailing address. If you want to change the envelope size, choose Options, and you will see a combo box with the standard sizes (Figure 5.7). When you finish typing the recipient's address, click on Add to document.

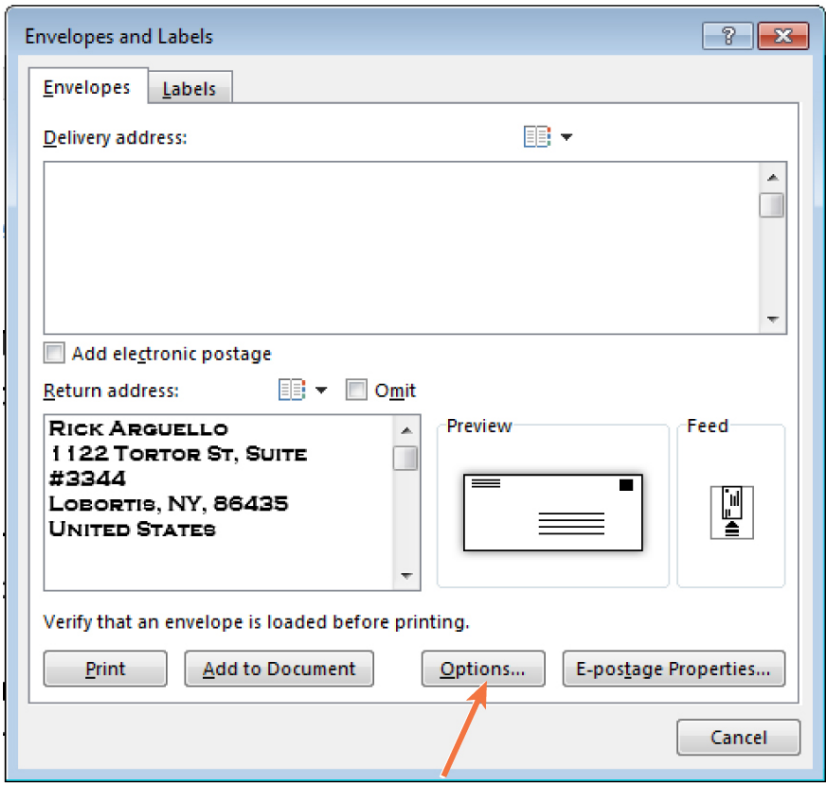


Figure 5.6: The Envelopes and Labels dialog box shows you a simple preview of what your customized envelope will look like. (Used with permission from Microsoft)

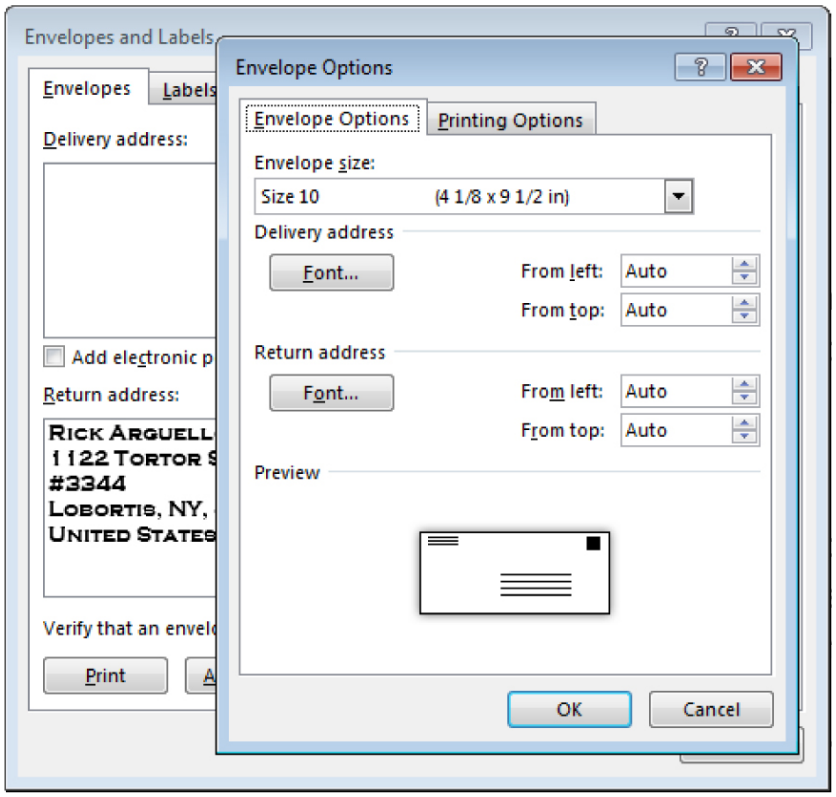


Figure 5.7: The Envelope Options dialog box allows you to customize the placement of addresses, as well as set custom printer settings. (Used with permission from Microsoft)

As Figure 5.8 shows, the envelope is inserted as the first page of the document, and along it, there is a section break. If you want to repeat the styling and envelope size again, it would be a good idea to create the envelope in a new blank document and then save it as a .dotx.



Figure 5.8: This is what the Envelope command will ultimately generate. (Used with permission from Microsoft)

Business Cards

A business card is a small, typically wallet-sized card that contains your contact and company information. It is usually given to clients or potential clients when you meet them, so that they have your contact information easily available. Business cards may be provided to you by your company, or, if you are self-employed, you may make them yourself. They usually contain basic contact information, like your name, your position (title) with the company, your phone number, and your email address, in addition to some eye-catching design elements, like a logo or image. Business cards are usually printed on thick, sturdy paper called cardstock.

Many companies will order business cards for their employees using approved company designs and layouts; at WorldCorp, the marketing department is responsible for providing business cards to employees. However, if you are a small business owner or freelancer, you might need to create your own business card.

You can easily design a business card in Word and send it out for printing at a business card printing shop, where you will likely have a few different cardstock options (lighter or heavier weight, glossy or matte finish). You could also purchase the cardstock and print the business cards on your own. This paper is generally perforated, and some major paper companies that produce this type of paper have templates for their products in Word. Some of these printing companies may want your design in .pdf format. As we discussed in Creating and Working in Documents, having a document in .pdf format means that the design elements will not change at all, no matter who opens the file. If you send the printing company a design in .docx format, some elements might move when they open the file, depending on which program they are using to open and print the file.

In Figure 5.9, you can see most of a business card template that we downloaded from Microsoft. The page has ten business cards per page. Simply fill out the information in the fields provided. Once you fill in one area of the first card, it will auto-populate the same area in all the remaining cards.

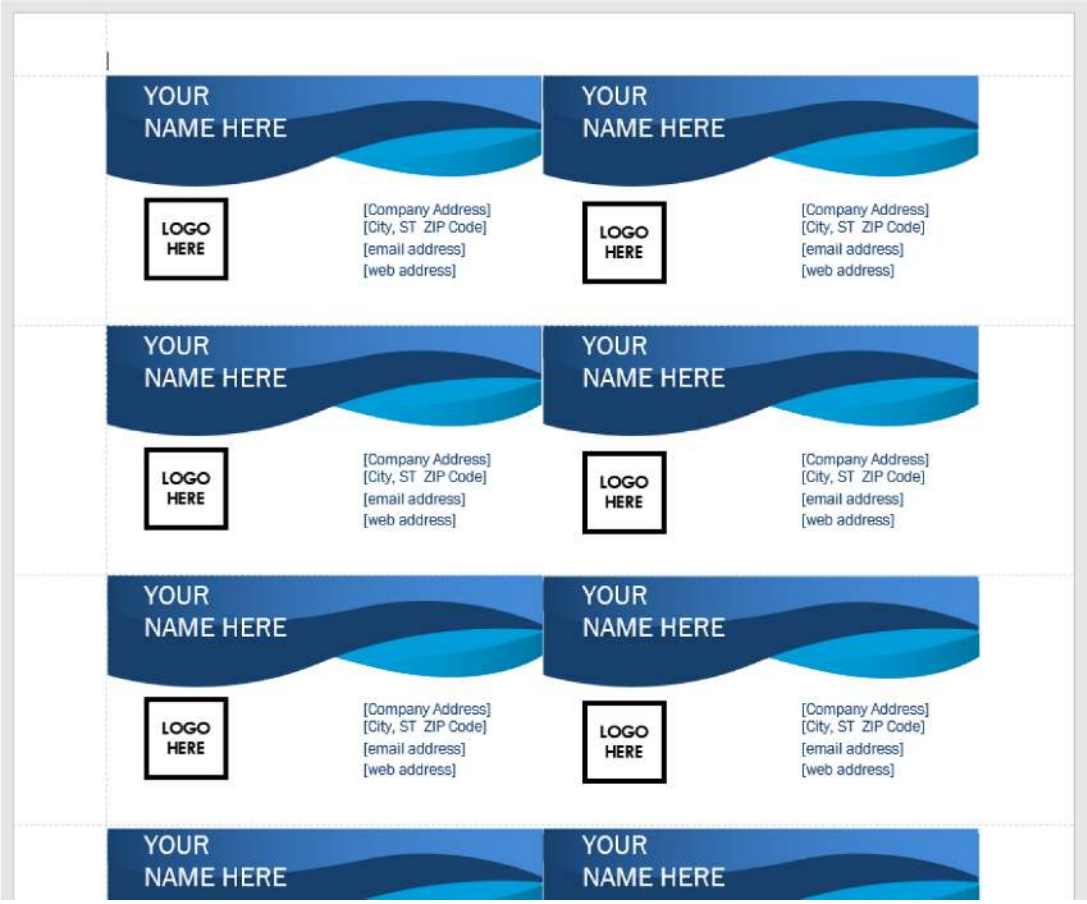


Figure 5.9: Using a business card template can make designing your cards easy. (Used with permission from Microsoft)

Brochures and Flyers

Both large and small businesses use advertisements to display what the company offers and detail the specifications of the offer. Brochures and flyers are a printed form of advertisement. Although many advertisements are found on the internet these days, printed ads are still popular. Flyers tend to be graphic-oriented, contain minimal text, and often advertise an event or temporary promotion. Brochures can be an introduction for a company or specific product and may be used for a longer duration than a flyer.

As with many documents discussed so far, the best way to create a brochure or flyer is to download a template from Microsoft and then fill in the information. Because brochures and flyers can be image-heavy and can have complicated layouts, using a template

is the fastest and easiest way to create them. With a template, you can establish a base layout and then easily change the images and the color scheme.

In Figure 5.10 and Figure 5.11, notice the default design of a brochure from Microsoft's template page(opens in new window) called Business Brochure. The brochure is two pages, as it is designed for double-sided printing. The brochure is also set in a three-column layout that is meant to be a trifold design. The layout is there, and all you need to do is change images, the color scheme (if desired), and the text.

At WorldCorp, the marketing department plans a holiday toy drive each year. Your boss has asked you to create a brochure with the details for the drive to be distributed to all employees. You can use this template to create the brochure for the event. We will walk through the steps to create this brochure in the following sections.

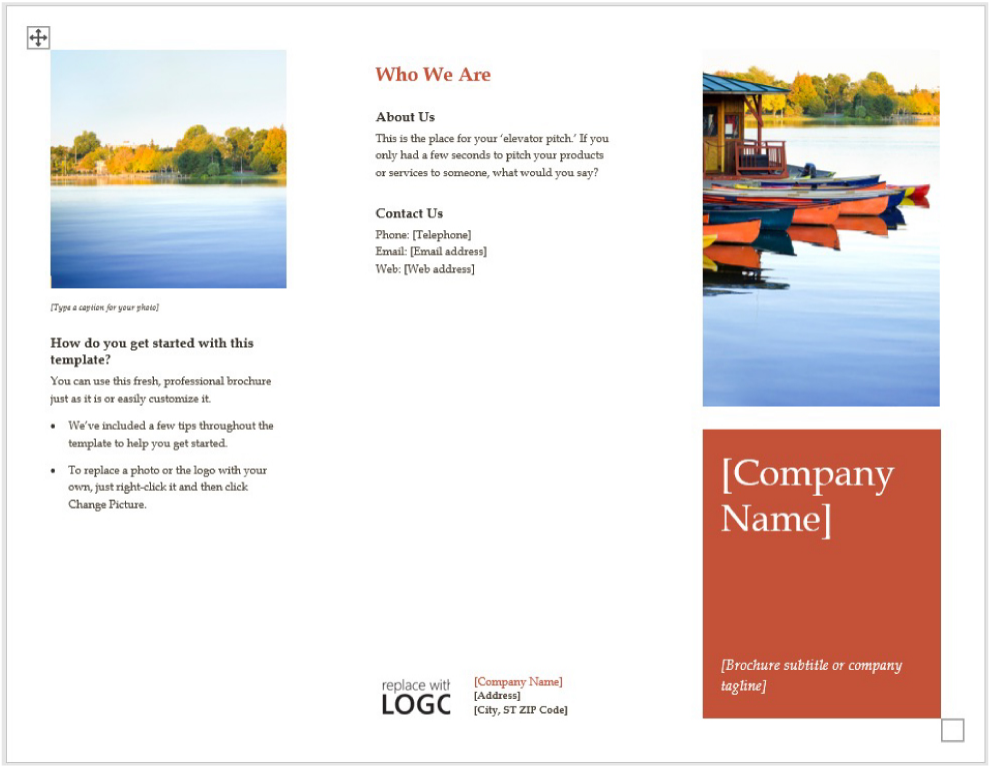


Figure 5.10: This template is a trifold design. When folded, the panel on the right is the cover and the panel in the middle is the last page. (Used with permission from Microsoft)



Figure 5.11: Designing the brochure from an existing template saves time. (Used with permission from Microsoft)

To change the two images, right-click on one of them and select Change Picture, as shown in Figure 5.12, then browse to the folder where the image is and select Insert.

Mac Tip

On a Mac, the command is Control+right-click.

If the new image is too wide, use the command Crop from the Picture Tools Format tab. To change the color scheme for the whole brochure, go to the Design tab and click on the Color drop-down menu, as in Figure 5.13. Changing the colors this way will change the color palette for the whole brochure. Finally, to change the actual text, put your cursor on any of the panels of the brochure and change it manually. In this example, you changed the pictures and the text on the first page of the brochure to include details of the toy drive at WorldCorp.

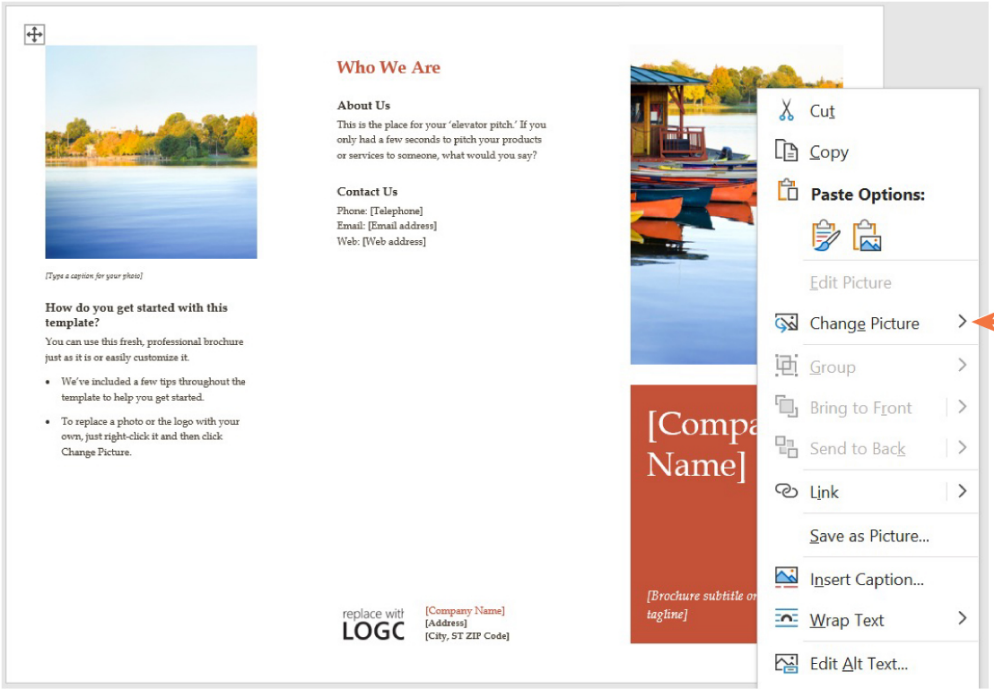


Figure 5.12: The pictures can be customized to your needs either from stock photos, photos on your computer, or photos you find online. (Used with permission from Microsoft)

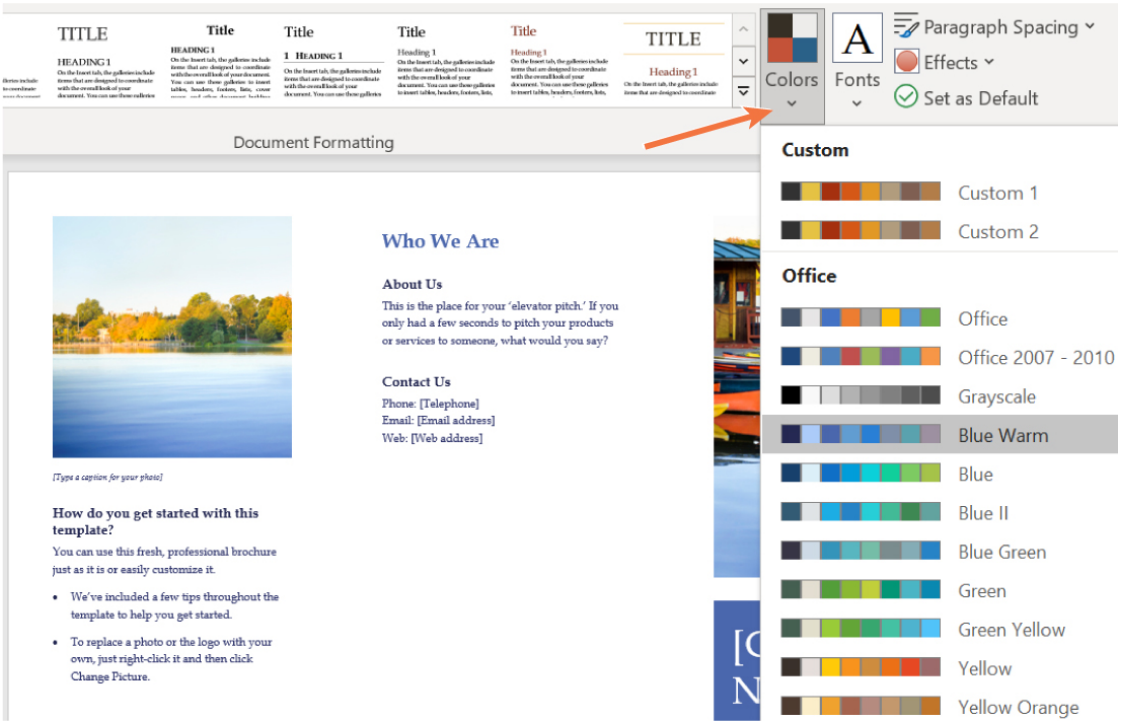


Figure 5.13: The color scheme can be changed using the Design tab. (Used with permission from Microsoft)

To create a flyer, choose a flyer template from Microsoft's templates, and follow the same steps as for creating a brochure. As you can see in Figure 5.14, flyer templates are just one single page, meant to be printed single-sided on one sheet of paper.

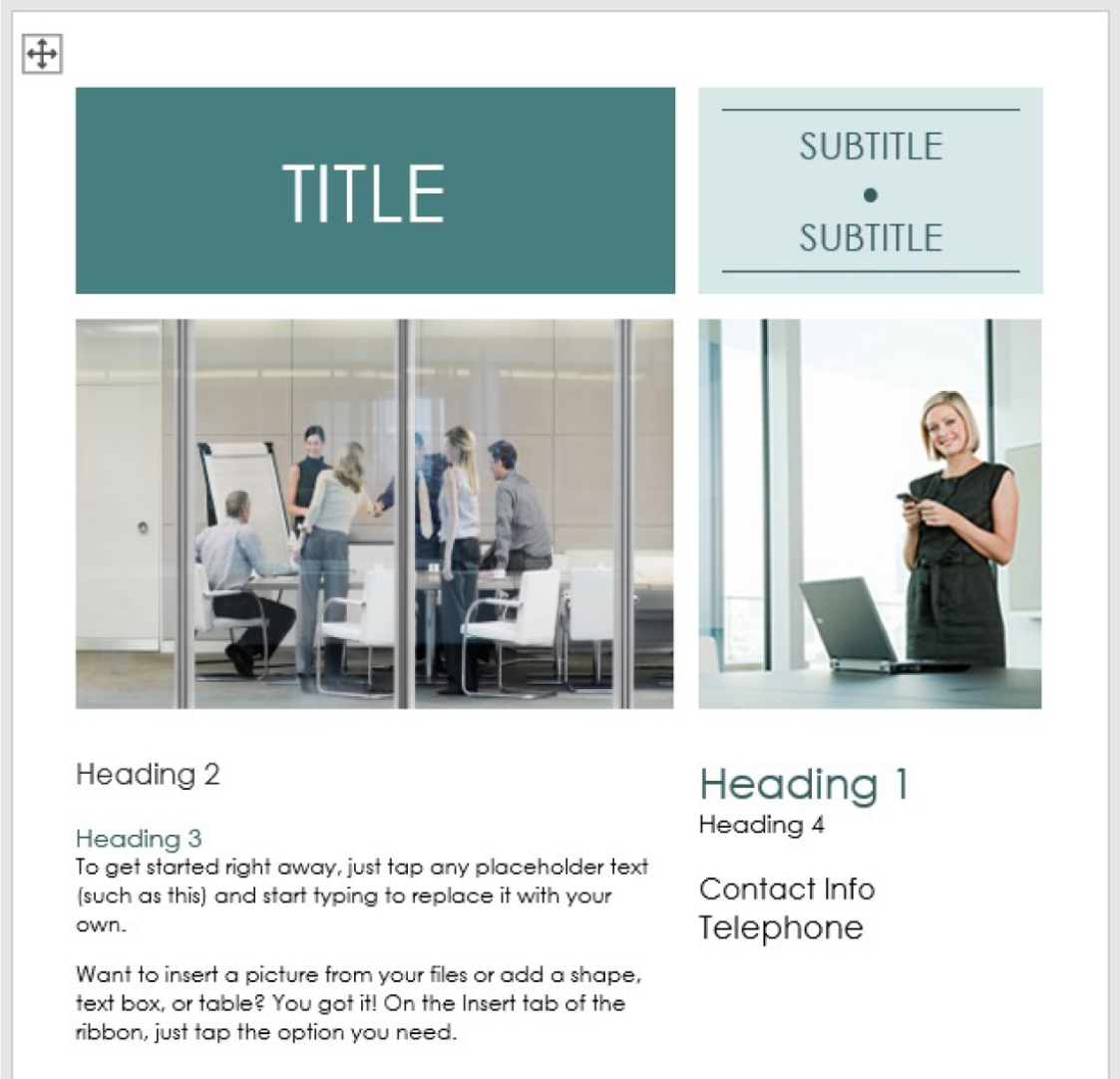


Figure 5.14: A flyer is similar to a brochure, but it is printed on one single-sided page. (Used with permission from Microsoft)

Invoices

An invoice is an important document. It is essentially a bill given to a customer for a product or service provided by a company. You may encounter invoices either as a recipient or the sender. If you are the one purchasing a good or service, you will receive an invoice. The invoice tells you how much you need to pay. If you are the one selling the goods or services, you will need to create the invoice yourself, then send it to the company or person making the purchase. In both cases, an invoice should always explain what was provided, sold, and what is owed.

There are many kinds of invoices for many kinds of businesses, but all invoices should have a date, invoice number, description of the goods sold or services performed, the quantity, the price per item, the total, and the payment due date. The Microsoft 365 collection of templates has many designs and types of invoices by industry. Using a template to design your invoice can be helpful because invoices often include complex table formatting that can be difficult to design. The invoices can vary based on whether you are providing a service, such as maintenance (for which you might charge an hourly rate), or providing an actual product, like WorldCorp's laptops and TVs (for which you might charge a per-price fee or flat rate).

You can create an invoice by following the same steps outlined above for brochures and flyers: by creating a new document and selecting an invoice template. Just as you would with the other document types, click in the text boxes to make the necessary adjustments to the information in the invoice. Figure 5.15 shows some of the different invoice templates available.

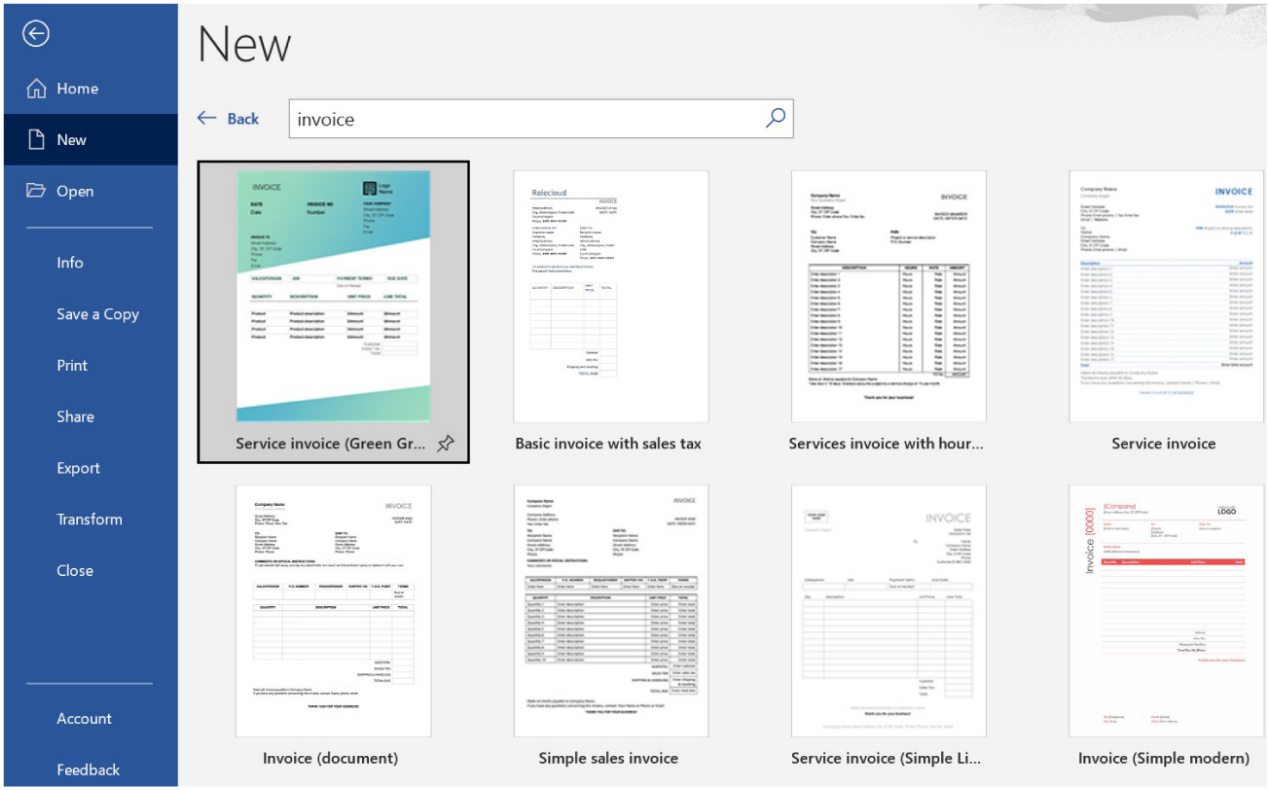


Figure 5.15: Invoices can be customized to include the company logo and include custom fields, such as sales tax or discounts. (Used with permission from Microsoft)

Business Plans

A business plan is a document that describes a company's plan for growth and profitability. Business plans may have different uses and applications depending on the type of business and stage of growth that the business is experiencing. For instance, some start-up business plans are used to seek funding for a venture. They may describe a detailed short-term plan for the company's first few months of activity, then a broader long-term plan for future growth. There are also business plans for established companies, such as capacity-building business plans. These types of plans are used to explain why a company needs funding to buy a new capital asset, such as a manufacturing plant, or to refurbish an existing one. The business plan templates you will find in the Microsoft Office database will give you a head start on designing and formatting your business plan, but keep in mind that these templates will not give any advice on what to include or what kind of language to use in your business plan. For that, you can get some examples of an already-made business plan online. Figure 5.16 shows an example of the first couple of pages of a business plan template in Word.

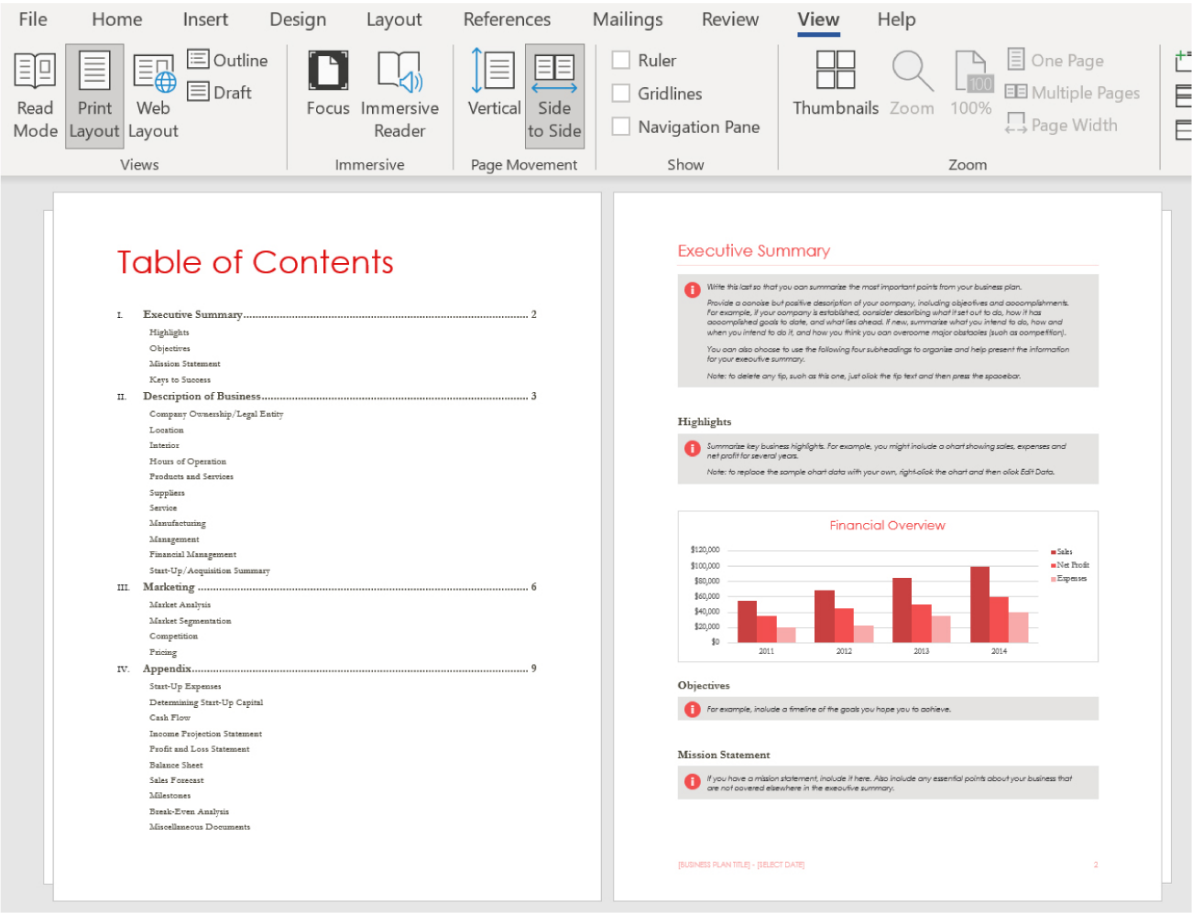


Figure 5.16: The purpose of a business plan is to discuss the road map for opening or expanding a business. (Used with permission from Microsoft)

Resumes and Cover Letters

As you start your career and begin your job search, you will want to present yourself as a serious candidate, ready to take on challenges. One way to put yourself on the right track toward professionalism is by having a resume. A resume displays your work experience, academic degrees, and overall skills. Some resume experts say that you should limit your resume to one or two pages, but depending on the position, you may want to describe your studies and experience in more detail.

Like business cards, resumes can be simple or more imaginative. While a visual, graphics-heavy resume may be eye-catching, a plain text document may be more practical. When you apply for a position, you will often be directed to an area of the company's website where you are prompted to upload your resume to their system. Then, using computer software, they scan the document for critical information such as keywords, years of experience, and skills, and then filter the resumes that meet the desired job requirements. These computer programs do not read drawings and designs well, so a creative or graphics-heavy resume may not be interpreted well by this technology.

If you need to print your resume, it is appropriate to add your personal letterhead to the top of the document. While letterheads are often used to present company information, as we learned earlier in the chapter, you can also create a personal letterhead. This type of letterhead is essentially a professional branding of your personal data, displaying your name, position (if applicable), mailing address, email address, and telephone number. It might have a simple graphic design, like a solid color bar, or a more intricate design or logo. Using a consistent letterhead across all your communications will add a look of professionalism and could help increase your job prospects. That consistency confirms to the potential employer your ability to see "the bigger picture" and your ability to visualize the tied-together documents.

Another way to use your personal letterhead is on a cover letter. Cover letters always have a distinct purpose: to present you as a person, and your skills and relevant experience, in a brief manner. Writing a letter on your own personal letterhead shows professionalism, as well as allows the recipient to write back or respond. Like a business memo, there is a specific way to structure

a cover letter. It should always include the date, your letterhead, the recipient's address, salutation, complimentary closing, and signature. The body of the cover letter should address these aspects in different paragraphs, usually in this order:

- The introduction: discussion of the job position that is being offered, and your interest in applying.
- The second paragraph: your work history summary. You need to be brief and cover the main points of your career. Also include the relevant skills you possess for the job. If you are applying for a management position, include your management responsibilities in past jobs, for example.
- The third paragraph: description of how you fit the job offered. You might also want to add your overall career objectives here, and explain how this job furthers these.
- The conclusion: a closing paragraph that includes your willingness to be right for the job, and your motivation for applying to this company.

Normally, cover letters are one page, and at most, two pages. You may adjust the mentioned format by adding new paragraphs to add more detail on your work experience and skills.

The templates covered in this section can help you develop your personal letterhead and cover letter. There are several options for resume and cover letter templates in Word. Figure 5.17 shows a sample cover letter, and Figure 5.18 shows just a few of the options available through Microsoft. As with the other templates, simply replace the generic text in the template with your specific information.



March 28, 2023

City Administrator
1645 Davids Drive
Wilmington, OH 45177

Dear Mr. Breckel,

Please find attached my résumé for consideration for the part-time position open in your office as a billing clerk. I am a seasoned professional with the skills needed for the position. I have previous office experience at various points in my career. I am very involved in the local community serving on the board of directors of several nonprofit organizations with leadership positions as President and Treasurer. I am proficient in all Office products and have a strong attention to detail. I am very experienced in QuickBooks so I am confident I can learn the billing system used by the City Administrator's office.

I am looking for a position that allows me to contribute more to the community in a challenging environment. I am a team player with a commitment to excellence. I enjoy working with the community promoting the success of organizations in which I am involved.

Please feel free to contact me if you have any questions or wish to discuss my qualifications further. I look forward to hearing from you.

Thank you for your consideration.

Sincerely,

Sylvia Griffin
griffin_sa@gmail.com
513-333-7654

Figure 5.17: A cover letter is a complement to your résumé and specifically outlines how you are a good fit for the position to which you are applying. (Used with permission from Microsoft)

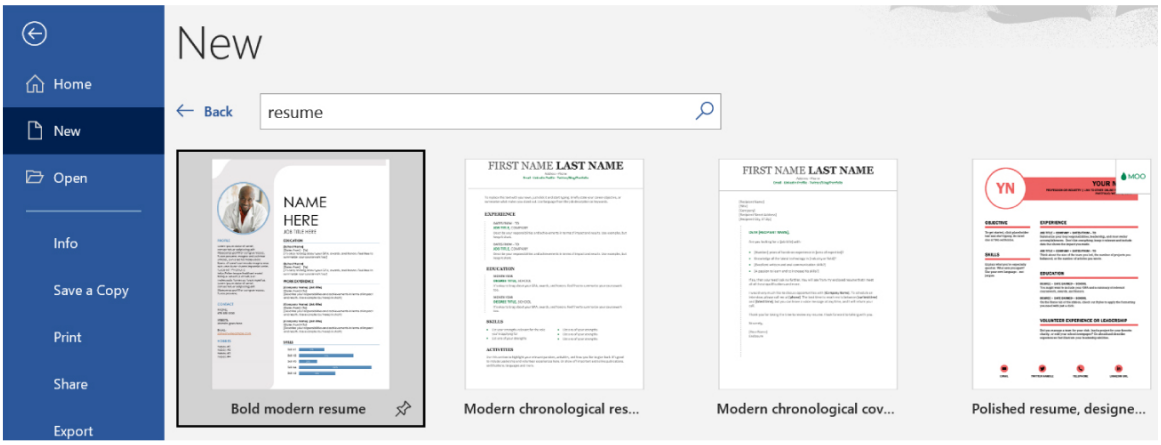


Figure 5.18: Choose a resume template that not only matches your personality, but also coincides with the type of job you are applying for. (Used with permission from Microsoft)

Real-World Application - Creating Brand "You"

As you grow in your own profession, you might want to consider developing your own brand. This will include how you present yourself on social media, as well as all media and supporting documents you might use to advertise yourself and your "product"—you. Corporations often use brand guidelines to ensure consistency across all brand items, such as business cards, letterhead, envelopes, and logos. Here are logo guidelines from Mitsubishi Motors(opens in new window), for example. These guidelines give specific details on how to use and not use the company logo in different circumstances.

When developing your own personal brand, consider using the following steps:

1. First, investigate personal brands. Canva offers a guide to personal branding that can help. Seek out individuals who do this well. What elements are they using, and why is their strategy effective?
2. Next, design your business card. You might also want to consider developing your own logo; however, there are many free, online resources available that can help you with this. Once you have a business card, design your other stationery.
3. Finally, develop a memo and invoice design from scratch. These will be important as your personal business grows, and you have regular business communication and contracts to support your business.

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4.3: Working with Graphics and Text Tools in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Insert and modify a table
- Use tools in the Illustrations command group to enhance documents' visual appeal
- Use the Text command group to enhance and format documents
- Use the Symbols command group to insert special characters and equations

The WorldCorp market trends report will include more than just text. It will incorporate graphics and images to visually convey the information in the report. Some of these graphics are needed to show the relationship between product lines and distribution centers. Other graphics are used to visually summarize information. In this section, you will learn about the tools for creating engaging, professional graphics within Word.

Tables

Tables are a critical feature of many business documents. They are typically the most popular way of presenting results and/or data. They are particularly useful for presenting simple data with only one or two variables. You can easily glance at a table to see, for example, how many sales were made in a given month by a given group of salespeople. In other words, tables are a good way of presenting a limited amount of information in an easy-to-read format. Keep in mind that they are not best suited for complex data or information sets with multiple variables, as the tables can quickly become overloaded with information and hard to read.

You need to create a table to summarize WorldCorp sales information for the market trends report. The following columns will be needed: Product, Quantity, Price, Revenue. This information will be arranged in four rows to represent the four different product lines. (Remember that rows are represented horizontally from left to right, and columns vertically from top to bottom.) To insert a table, go to the Table drop-down menu on the Insert tab and select the number of rows and columns you want for the table by hovering over the squares (see Figure 4.17). For this example, you need four columns and five rows (the products plus the column heading row). You can add more rows or columns after the table is created if needed.

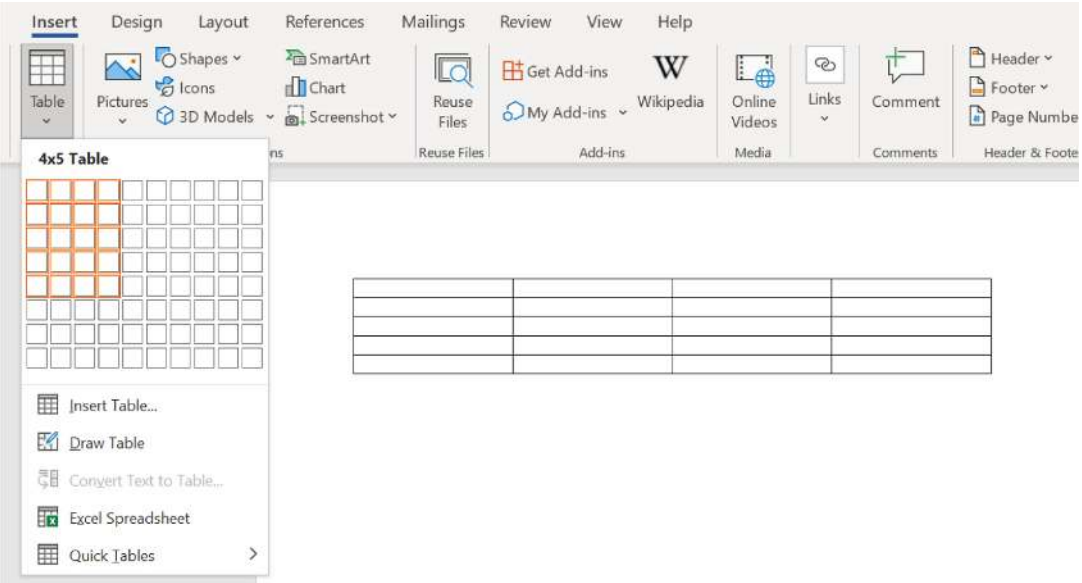


Figure 4.17: The Table tool provides an easy-to-use visual guide for creating tables. (Used with permission from Microsoft)

When you insert the table, the ribbon changes, giving you two additional tabs for changing the formatting and layout of the table. In Figure 4.18 you can see two new tabs: Table Design and Layout tab. These tabs open automatically when a table is inserted into the document. You can modify the table as a whole by selecting one of the Table Styles in the new Design tab. Select the whole table, then Table Styles, and then choose style; we have chosen one with alternating white and blue rows. You can now add the desired text to the table with the new table style.

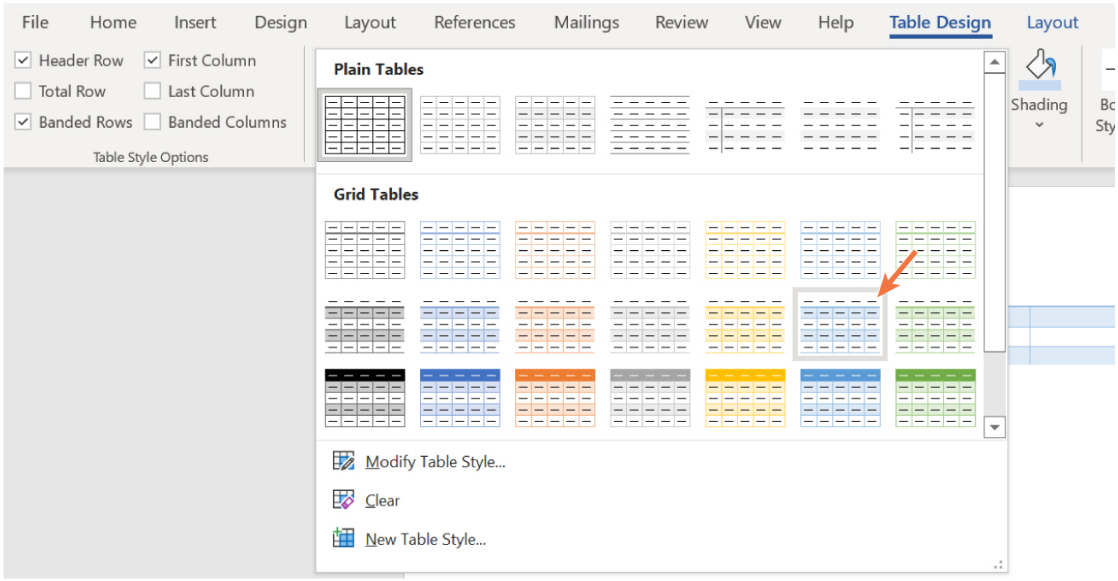


Figure 4.18: With the built-in styles, you can customize the table for a more visually appealing look. (Used with permission from Microsoft)

To add new rows or columns to your table, go to the other new tab, Layout. There are options for adding rows and columns above and below, or to the right and left, of the one you currently have your cursor on. This makes it easy to expand your table as you add more information. Select the area in the table you want to expand such as the column or row. Then, choose the applicable tool from the Layout menu. In this example, we chose Insert Below and Insert Right. In Figure 4.19, you can see an added row to the bottom of the table, and a new column named YoY Same Month. ("YoY" stands for "Year over Year.")

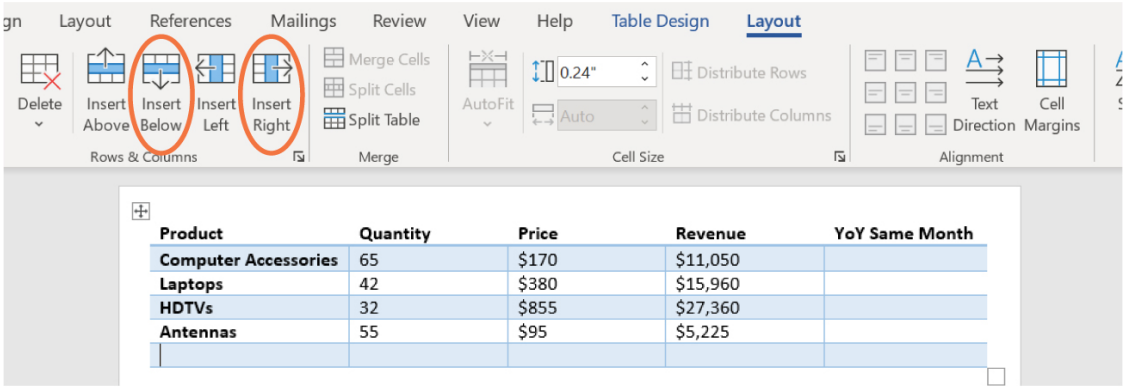


Figure 4.19: The Layout tab tools are used to make physical adjustments to the table, such as inserting or deleting rows or columns. (Used with permission from Microsoft)

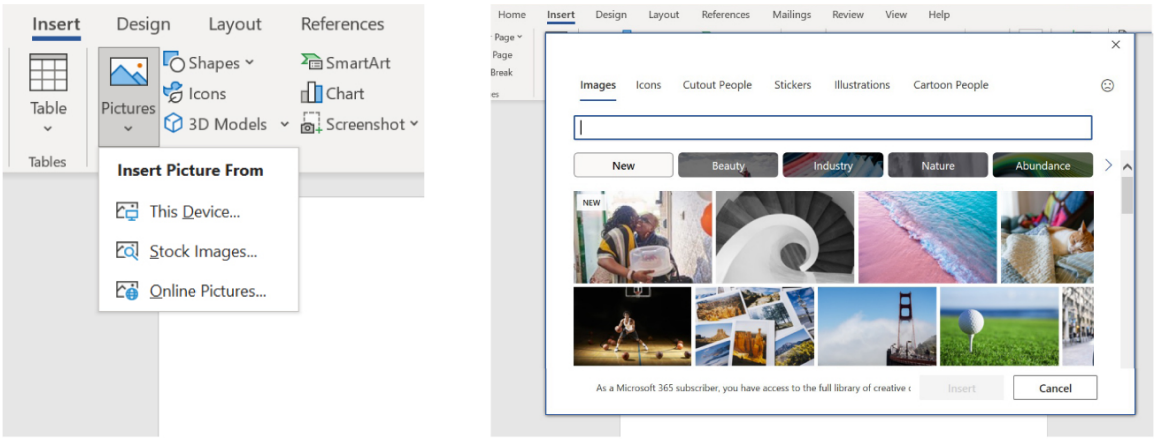
Illustrations Command Group

The Illustrations command group is for inserting images, shapes, SmartArt, or charts. For the market trends report, you will be inserting some graphs and charts that show the size of the market and other related information. You might also want to include images of new developments in the industry or current products on the market from competitors. The Creating and Working in Documents chapter covered the arrangement and aligning of objects. This section will cover how to insert different types of objects.

Inserting Pictures

When inserting a picture into your document, you can choose to get a picture from the internet, from stock images in Office, or from a picture saved on your computer. (Always make sure you are not violating copyright or using pictures from proprietary sites without giving proper credit to the image creator or site.) In a business report, you might want to include images of your products or your office building. These photos will probably already be saved on your computer or be available on your shared company hard drive. To add a picture from a file saved on your computer, go to the Insert tab, choose Pictures, then select This Device from the drop-down menu (Figure 4.20). From the dialog box, choose the picture file you want to insert. The picture will be inserted at the location of your cursor.

You may also choose to insert some stock images available through Office. Stock images are photos or other images that are already licensed for general use through whatever platform you are using. There are stock image repositories, such as Getty; Office has its own repository of stock images, which you can access by selecting Stock Images from the Pictures drop-down menu. These images are searchable and include photos, icons, and cartoons.



(a) (b)

Figure 4.20: (a) Word makes it easy for you to insert images from a variety of locations into their document. (b) The Office stock images give you different options for more generic images or cartoons. (Used with permission from Microsoft)

Word also gives you the option of inserting a picture directly from the internet. If you choose Online Pictures, a dialog box will open, with Microsoft Bing's image search available, as Figure 4.21 shows. This might be a nice option if you want to include a picture of a competitor's product in the market trends report.

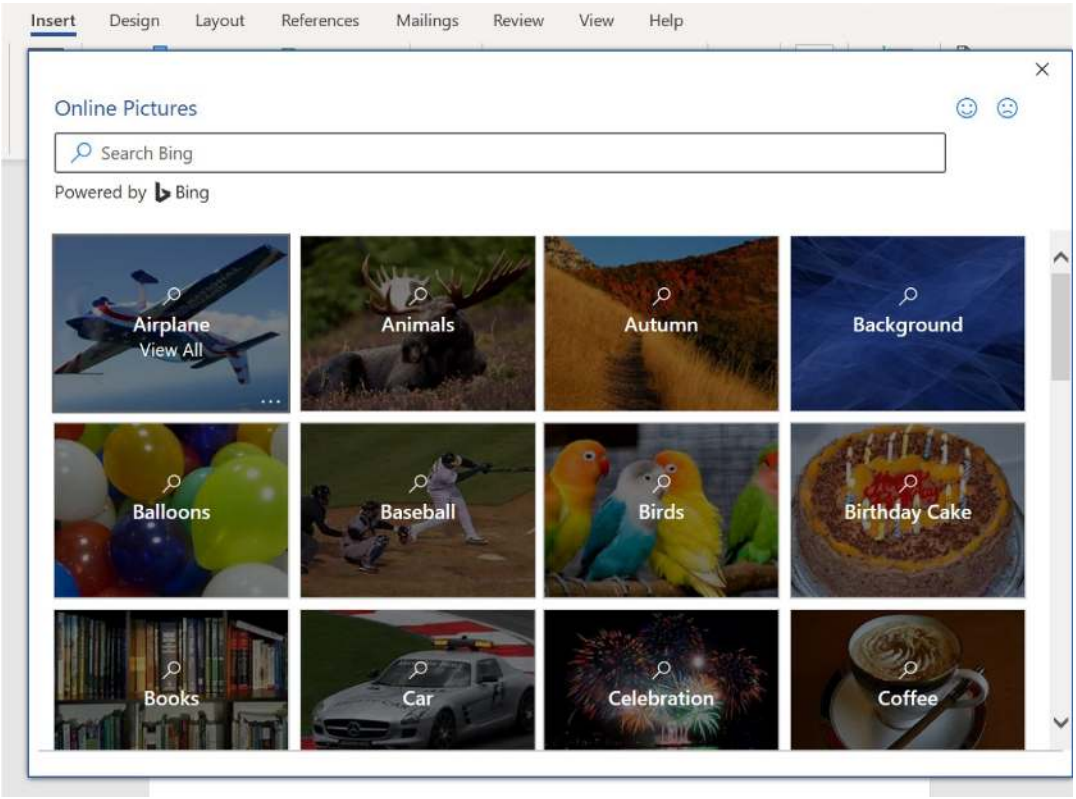
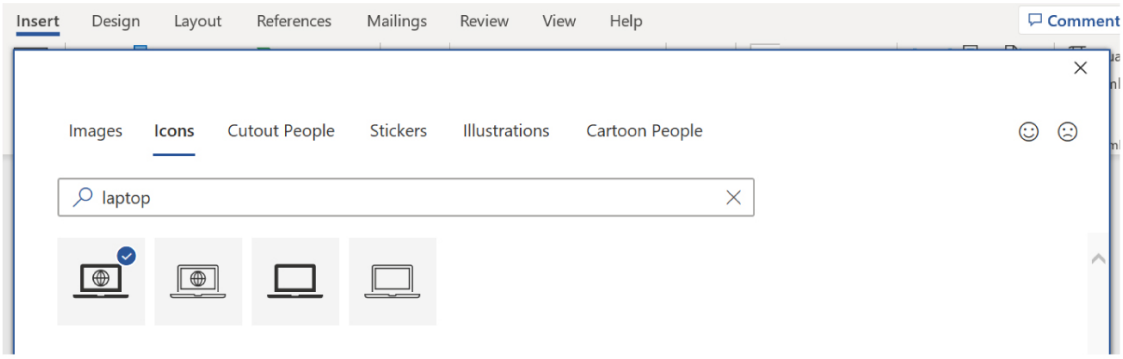


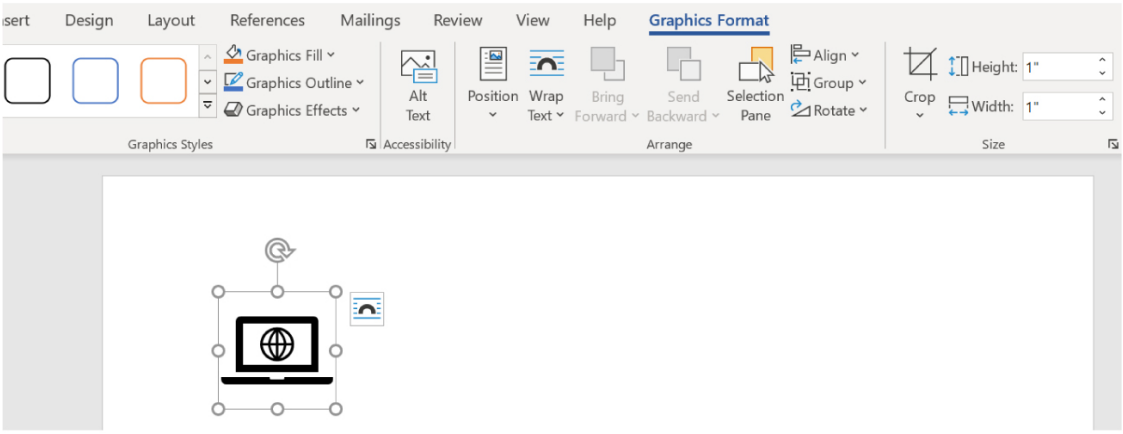
Figure 4.21: Bing's image search tool helps you look for images by categorizing them by topic. (Used with permission from Microsoft)

Let's find images of laptops for the WorldCorp market trends report. Let's include one stock image and one online picture. For now, insert the images in a blank document just for practice. Later, you can insert the images into the market trends report if you desire. Open a blank document and go to the Insert tab.

Choose Picture and then choose Stock Images. Choose the Icons tab and, in the search bar, type "laptop" (Figure 4.22). This will narrow our search to icons, or simple black-and-white illustrations, rather than photographs. This type of image might be useful in a report because it is clear and simple. Notice that when an icon is inserted into the document, a new tab, Graphics Format, appears on the ribbon. The Graphics Format tab will appear when you insert something like an icon or a cartoon into your document. This tab gives you the tools to make adjustments to the icon that you inserted.



(a)



(b)

Figure 4.22: (a) Word gives you different categories to help you narrow down your search. (b) The Graphics Format tab offers tools for applying different styles, effects, and other features to your image. (Used with permission from Microsoft)

Now, let's find a picture of a laptop from the internet. Choose Online Pictures and type "laptop" in the search bar. This will initiate a Bing web search for that key term. Notice that you can also search by license; here, we have chosen to search for images under the Creative Commons license only. To select an image, click on the picture and choose Insert (Figure 4.23).

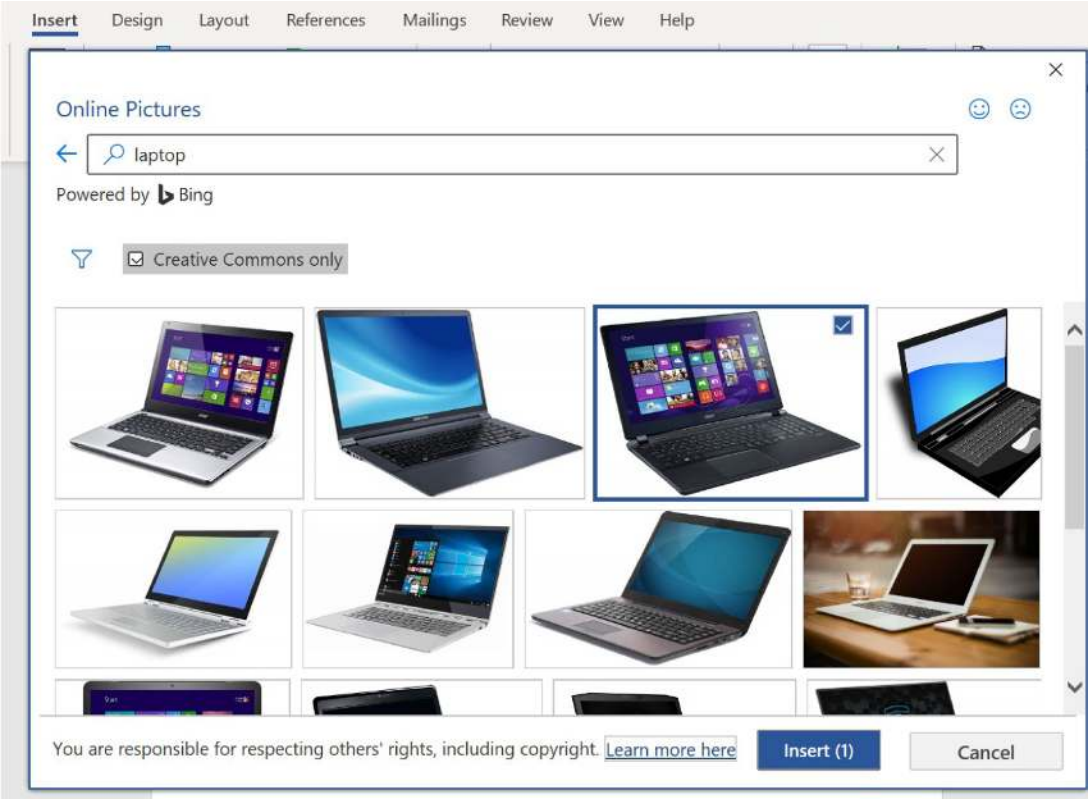


Figure 4.23: Bing is the search engine used for images because it is also a Microsoft product. (Used with permission from Microsoft)

In this case, because you are inserting an actual full-color image, such as a photograph, the tab added to the ribbon is the Picture Format tab, not the Graphics Format tab. As with the Graphics Format tab, this tab gives you the tools to make adjustments to the picture and its placement in the document, as Figure 4.24 shows.

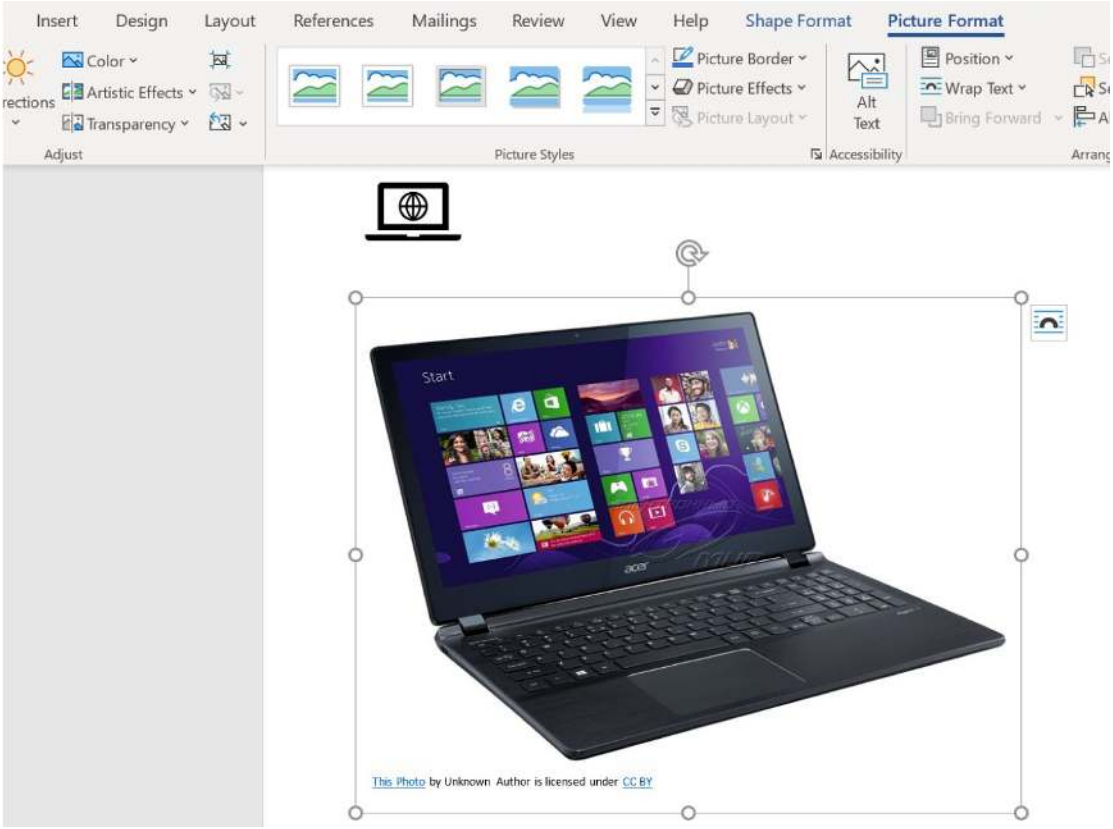


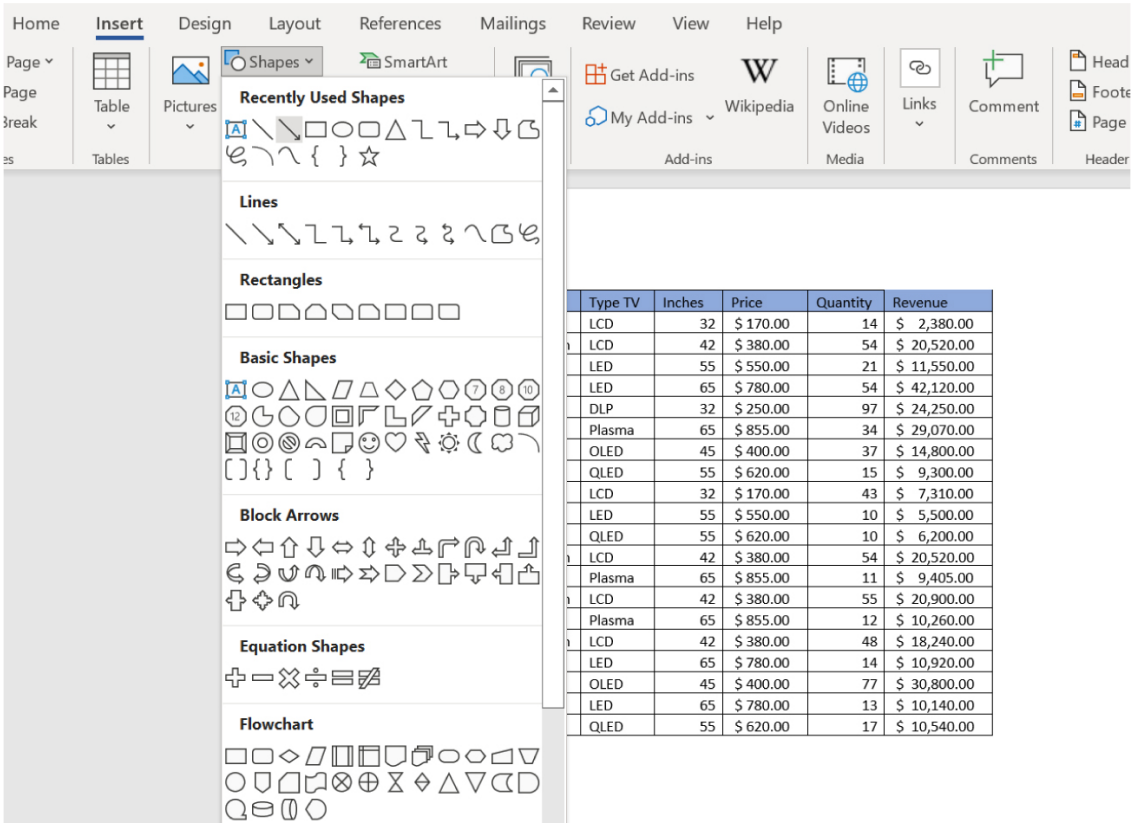
Figure 4.24: When images are used from the web, be sure to recognize copyrights and give credit for images when appropriate. Although this image is a stock photo with an unknown author, other photos you may use will show the author's name and the photo's license in the copyright line that Bing automatically generates. (Used with permission from Microsoft)

Shapes

The Shapes drop-down menu is a useful command if you are designing an ad, flyer, newsletter, or other graphic-heavy document. Shapes are graphical symbols, like arrows, rectangles, circles, and lines, that can be formatted in different ways. These can be useful in business documents because they can help call attention to certain topics or data without being as eye-catching as a photograph. For example, you might want to insert an arrow shape in the market trends report to draw attention to a specific item in a graph or chart. Or you might want to use a circle to outline a key part of a table. However, keep in mind the professionalism and visual appeal of the document you are preparing. Shapes might not be appropriate in all situations.

In Figure 4.25, you can see the wide range of shapes that you can add to your document. Let’s add an arrow to a table that we might use in the market trends report to highlight an important number in the table. This table contains television sales data for WorldCorp. We will revisit some of this data as we move through the spreadsheet chapters.

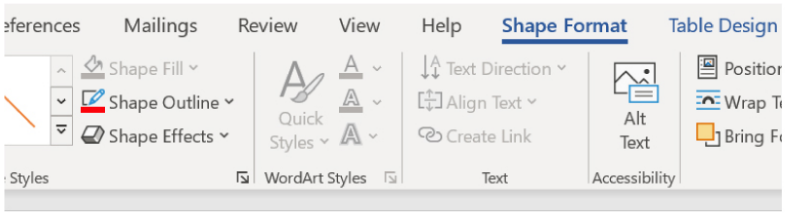
We want to point out the highest quantity sold in the table. To insert an arrow, go to the Insert tab, Illustrations command group, and select Shapes. Select the arrow you want to insert. In this example, the single line arrow (third over from the left) is selected, as shown in the figure. When you select the shape, you will get a black “+” as the cursor. Use that plus sign to insert the shape and to size the shape as you choose.



Type TV	Inches	Price	Quantity	Revenue
LCD	32	$ 170.00	14	$ 2,380.00
LCD	42	$ 380.00	54	$ 20,520.00
LED	55	$ 550.00	21	$ 11,550.00
LED	65	$ 780.00	54	$ 42,120.00
DLP	32	$ 250.00	97	$ 24,250.00
Plasma	65	$ 855.00	34	$ 29,070.00
OLED	45	$ 400.00	37	$ 14,800.00
QLED	55	$ 620.00	15	$ 9,300.00
LCD	32	$ 170.00	43	$ 7,310.00
LED	55	$ 550.00	10	$ 5,500.00
QLED	55	$ 620.00	10	$ 6,200.00
LCD	42	$ 380.00	54	$ 20,520.00
Plasma	65	$ 855.00	11	$ 9,405.00
LCD	42	$ 380.00	55	$ 20,900.00
Plasma	65	$ 855.00	12	$ 10,260.00
LCD	42	$ 380.00	48	$ 18,240.00
LED	65	$ 780.00	14	$ 10,920.00
OLED	45	$ 400.00	77	$ 30,800.00
LED	65	$ 780.00	13	$ 10,140.00
QLED	55	$ 620.00	17	$ 10,540.00

Figure 4.25: There are many shapes for adding emphasis and visual appeal to your documents. (Used with permission from Microsoft)

After you select and insert a shape, the Shape Format tab is added to the ribbon, as shown in Figure 4.26. You can change the color of the shape, add visual effects, align the object, use a word wrap, and change the position of the item.



Date	Model	Type TV	Inches	Price	Quantity	Revenue
2/27/2021	E-900s	LCD	32	$ 170.00	14	$ 2,380.00
2/25/2021	E-900m	LCD	42	$ 380.00	54	$ 20,520.00
2/21/2021	LE-640	LED	55	$ 550.00	21	$ 11,550.00
2/18/2021	LE-740	LED	65	$ 780.00	54	$ 42,120.00
2/15/2021	DL-540	DLP	32	$ 250.00	97	$ 24,250.00
2/11/2021	PL-850	Plasma	65	$ 855.00	34	$ 29,070.00
2/9/2021	OL-450	OLED	45	$ 400.00	37	$ 14,800.00

Figure 4.26: The Shape Format tab is used to change the color, size, and other features of the shape. (Used with permission from Microsoft)

SmartArt

SmartArt is a tool in Word that lets the user design organizational charts or flowcharts. It is also part of the Illustrations command group. It is similar to Shapes, but has the shapes prearranged in useful graphic formats, such as flowcharts. In Figure 4.27, you can see the different organizational graphs and charts available. This section covers three important types of SmartArt: Lists, Process Charts, and Hierarchy Charts.

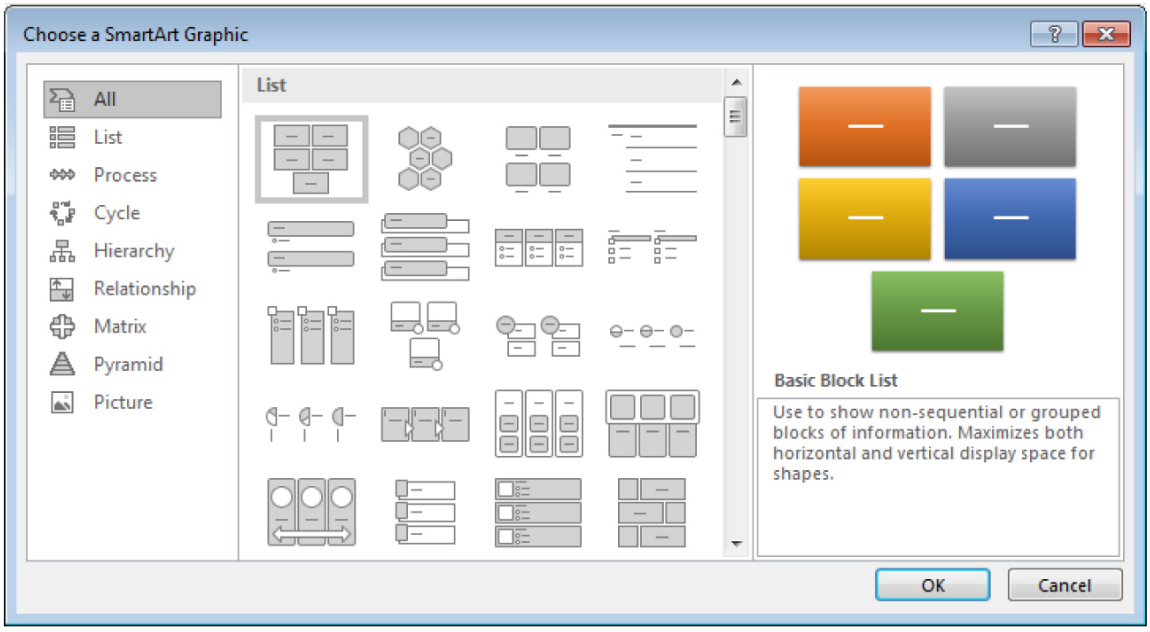


Figure 4.27: There are various business charts that you can design in SmartArt. (Used with permission from Microsoft)

SmartArt Lists

Microsoft Word: Advanced Formatting Features covered basic numbered and bulleted lists. But there are other, more visually complex options in SmartArt that an employee might have to use when creating documents that contain deeper levels of content than, say, a memo or introductory letter to a customer. SmartArt can also be used to outline an organizational structure to show reporting relationships between employees and managers.

To insert a SmartArt list, select the SmartArt icon from the Insert tab and click on the List menu to see all the options for Lists. Figure 4.28 shows a Horizontal Bullet List, which we can use to list the strengths and weaknesses of WorldCorp in the market trends report. Click OK to insert the SmartArt. As you insert it, the SmartArt Design tab is added to the ribbon, which has options for modifying the SmartArt. Figure 4.29 shows what a Horizontal Bullet List SmartArt looks like.

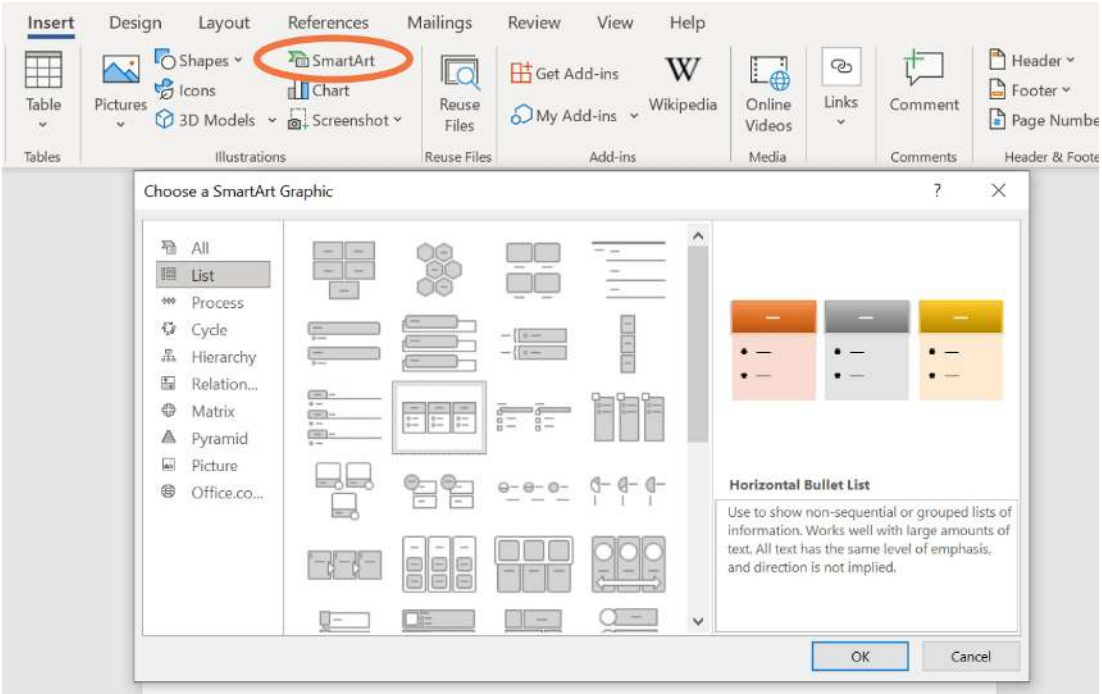


Figure 4.28: SmartArt also includes helpful hints on how to use each type of list best. (Used with permission from Microsoft)

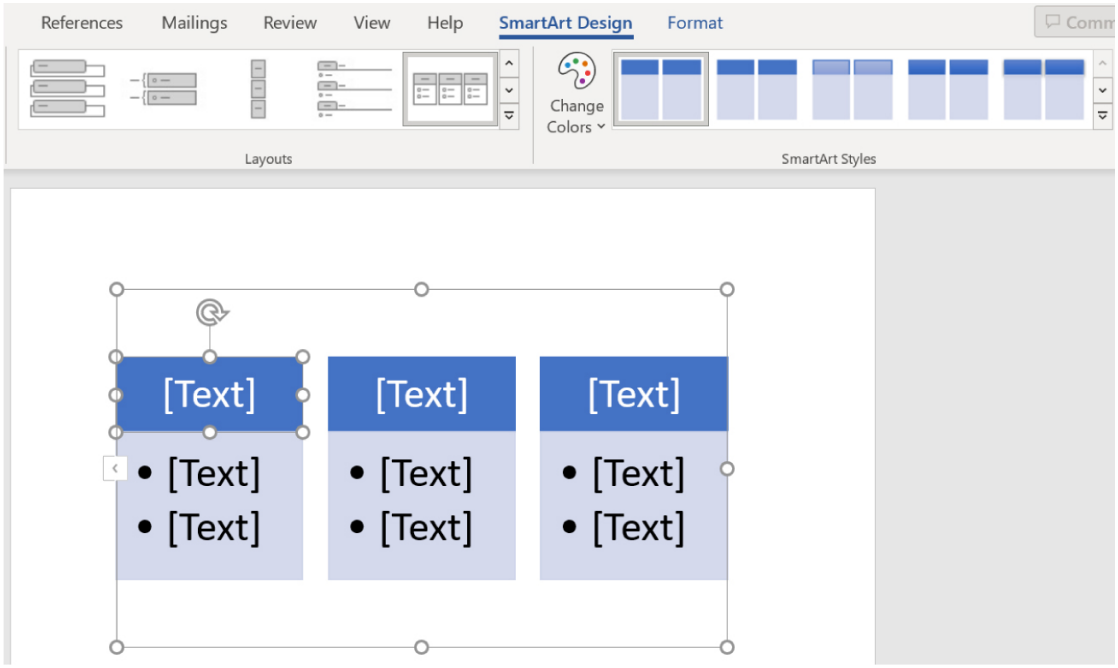


Figure 4.29: Using the text boxes, you can enter the relevant information into the SmartArt graphic. (Used with permission from Microsoft)

Process Charts

Another type of SmartArt is a process chart. This is one of the types of charts that Word offers to enhance documents and is commonly used in business. A process chart is a way of graphically representing a multistep process. Most business processes or workflows can be diagrammed; think about the many steps needed to publish a book or deliver a parcel. These process charts visually organize the steps or major components in a process so that everyone involved can understand what their role is in the workflow. Workers involved in the process may use process charts to check project status or determine which worker or department to consult to move a task along. For your market trends report, you might want to use a process chart to show the sequence of departments that the report will need to move through for approval.

Complex engineering, such as in manufacturing plants, has numerous processes happening at the same time, with each set of processes being dependent on another set. The charts offered in the Process option can help encapsulate the different types of workflows in a company.

In Figure 4.30, you can see a flowchart that needs to be filled. As with the Horizontal Bullet List, the boxes are empty when the SmartArt is initially inserted. To add text, simply click on the text brackets and enter the desired information. Notice there is a line that connects each box to the next one in a down than up pattern, indicating the flow sequence.

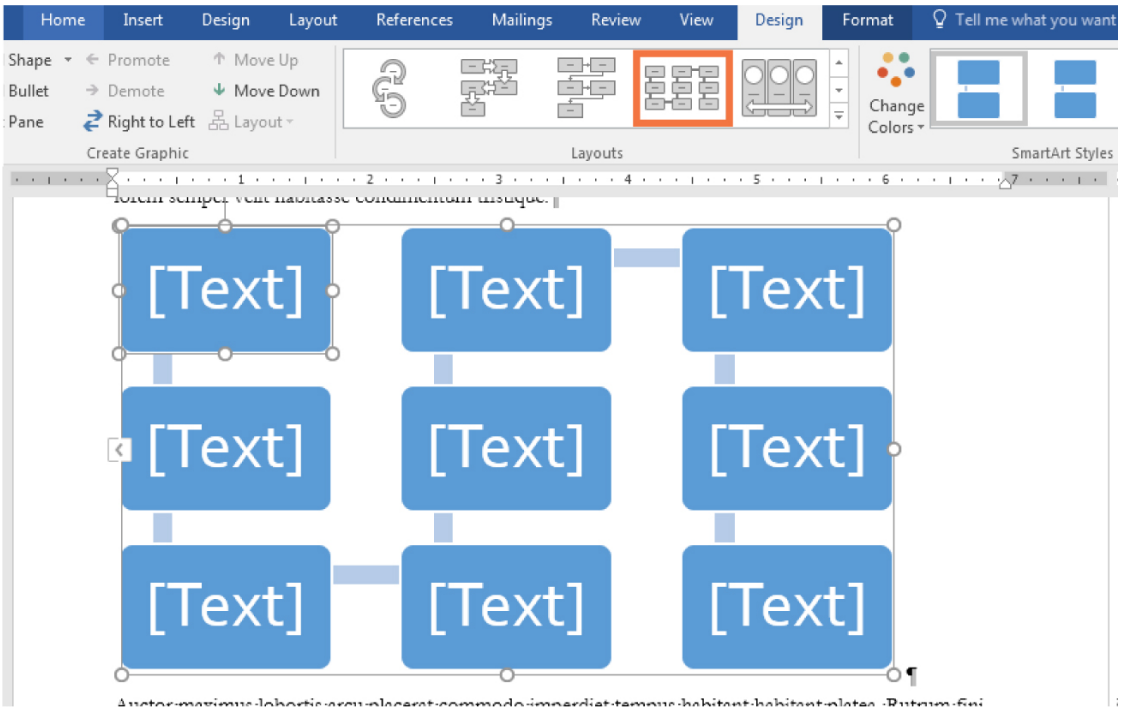


Figure 4.30: This type of SmartArt is called a Vertical Bending Process chart. It can be used to show many different steps in a linear workflow, without taking up too much space on the page. (Used with permission from Microsoft)

Link to Learning

Check out this tutorial to learn about creating flowcharts(opens in new window) in detail. This site provides basic terminology and a step-by-step walk-through on how to create a simple flowchart using the Shapes commands and a more complicated flowchart using the SmartArt commands.

Now let's add a process chart to the market trends report. Open a blank document and go to the Insert tab, SmartArt, and click Process. Choose the first option, Basic Process, and click OK (Figure 4.31). You can also change the colors using the tools on the SmartArt Design tab using the change colors palette on the tab (Figure 4.32).

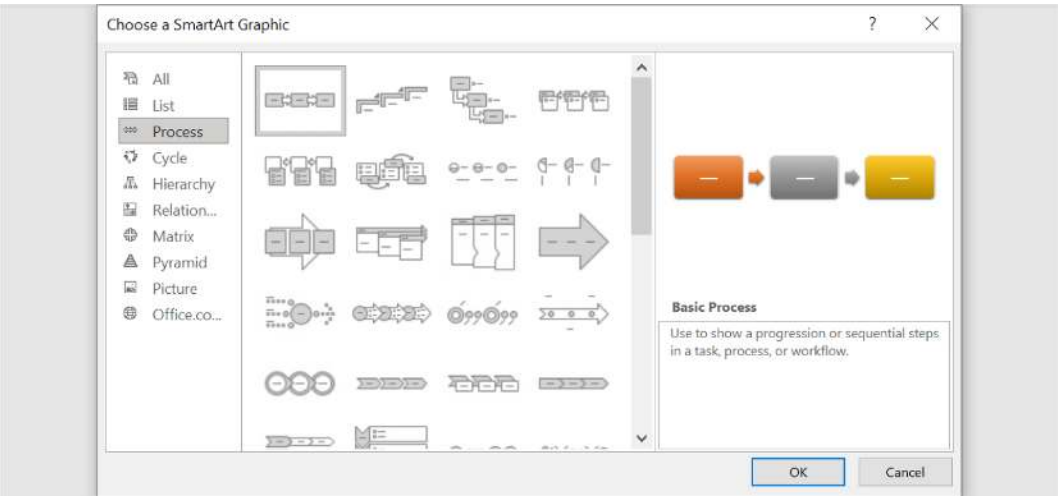


Figure 4.31: Becoming familiar with a Basic Process chart will lay the foundation for progressing to more complex charts in SmartArt that you might need later in the workplace. (Used with permission from Microsoft)

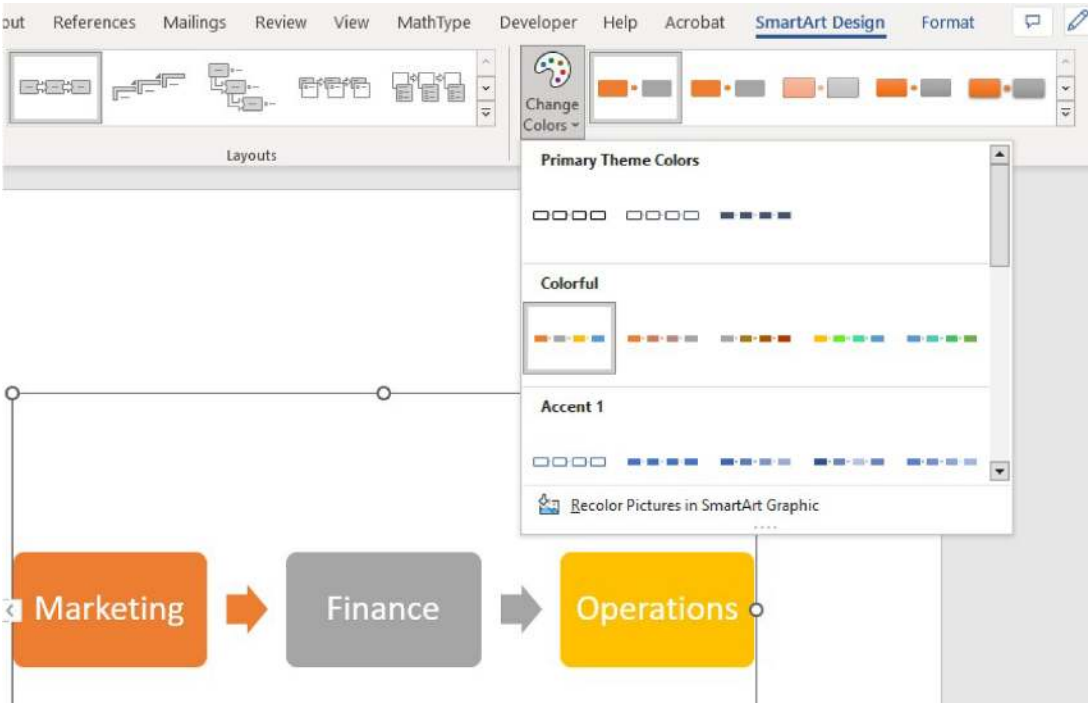


Figure 4.32: The default color scheme is blue and white when the process chart is inserted, but there are many color options to make the process chart look more professional and visually appealing. (Used with permission from Microsoft)

Hierarchy Charts

Another chart often used in corporate settings is the hierarchy chart. These charts typically show the chain of command at a business; in other words, who supervises whom. In a large corporation like WorldCorp, there may be hundreds of hierarchy charts. Every manufacturing center may have dozens, one for each functional department. You could consult these hierarchy charts in a company organizational manual, or online, on the company's intranet. In Figure 4.33, you can see the inserted hierarchy chart of WorldCorp's marketing department.

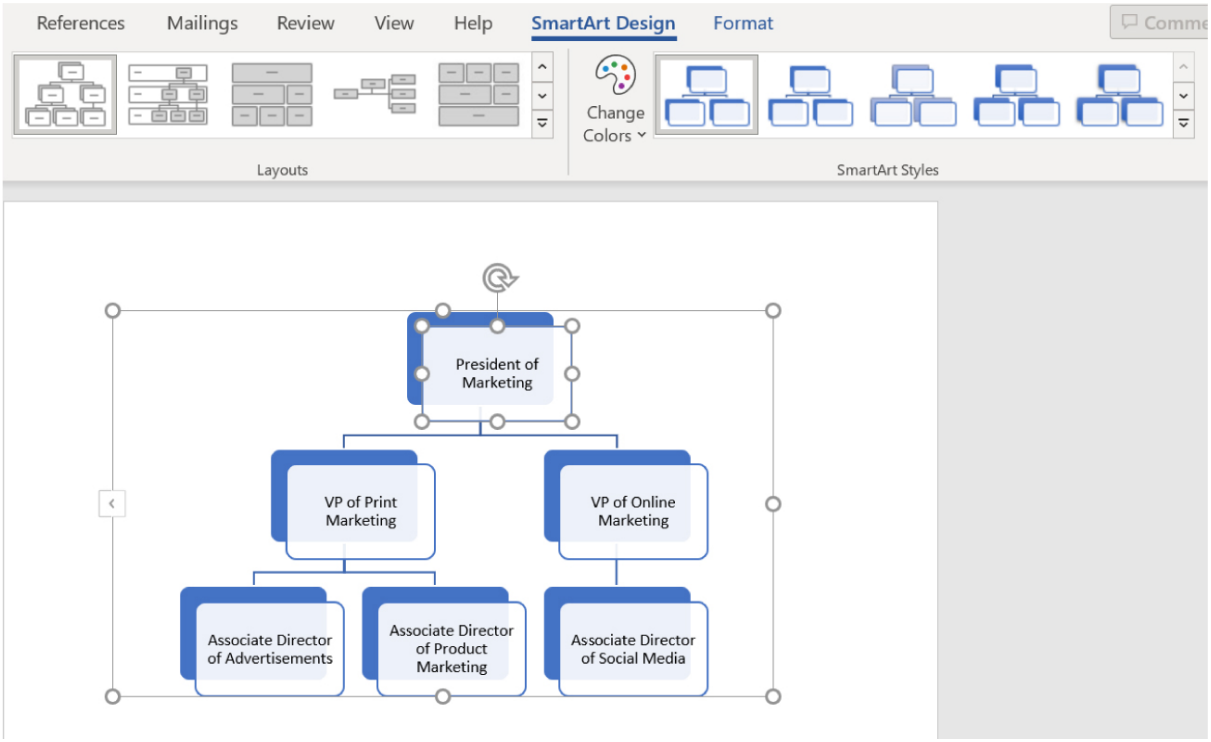


Figure 4.33: You can see the chart formatting and design options on the ribbon on this hierarchy chart. (Used with permission from Microsoft)

Real-World Application: Understanding Types of Organizational Charts

Many companies will include an organizational chart ("org chart" for short) within their internal documentation provided to employees. These serve as important documents that visualize the structure of the company, as well as the chain of command within its service units. Hierarchy charts can help you construct an organizational chart quickly. Before you begin, you will want to identify the type of organizational structure your company has adopted.

Hierarchical organizations will have a clear and linear chain of command, usually organized by product or function, with power primarily held at the top. These are mechanistic, or bureaucratic, organizations. They tend to be formal, with a narrow span of control within each unit. Organic structures are more fluid and flexible. Matrix organizations are a great way to try out a more organic organizational structure, while still maintaining some aspects of a mechanistic structure. In a matrix, employees may report to more than one reporting line and therefore power (and responsibility) is distributed. Dotted lines in such a chart would show informal or secondary relationships. So, before embarking on creating an organizational chart for an organization, first understand its structure to select the most appropriate chart type.

Charts

Charts are another type of visual representation available in Word. While tables present just data, and SmartArt figures show relationships, charts can show both. Word charts include many types of charts that are likely familiar to you, such as bar charts, line graphs, and pie charts. Charts can use data from another source, such as a Microsoft Excel spreadsheet, to create the visual representation.

You can create charts in Word using the tool in the Illustrations command group. You will use some of the data from the sales data in Figure 4.25 and Figure 4.26 to create a bar chart of the quantity sold for each product. When you finish inputting the data, you will see the chart in your document (Figure 4.35). First, select the Chart command in the Illustrations command group, and choose the type of chart that you want to design. Let's choose a bar chart, also known as a Clustered Column chart (Figure 4.34). As you select OK, Word will immediately open an Excel window so that you can enter the data. When you finish inputting the data, you will see the chart in your document. As with the other types of graphical representations that we've covered, once you click on the chart, a new tab will appear in the ribbon. Click on the chart and you can further format the chart using the Chart Format tab that

appears. You can also edit the data in the chart or table using the Edit Data tool on the Chart Format tab, as shown in Figure 4.36. You can choose to edit the data in Word. If you choose this option, an Excel window will open in Word with the data used to build the chart. If you would like to save the data as an Excel file, choose Edit Data in Excel. This will open the Excel application. Here, you can edit the data, but also save the information as an Excel file.

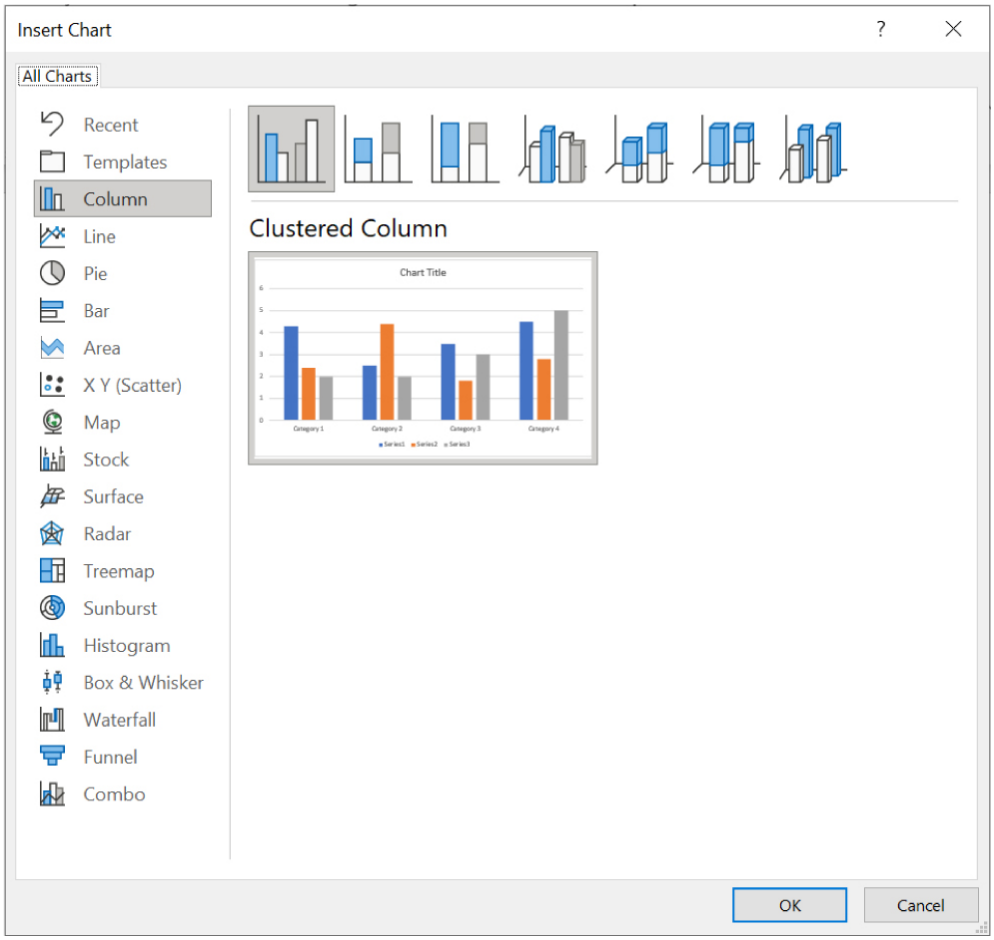


Figure 4.34: Within each chart type, there are many further options for customization. (Used with permission from Microsoft)

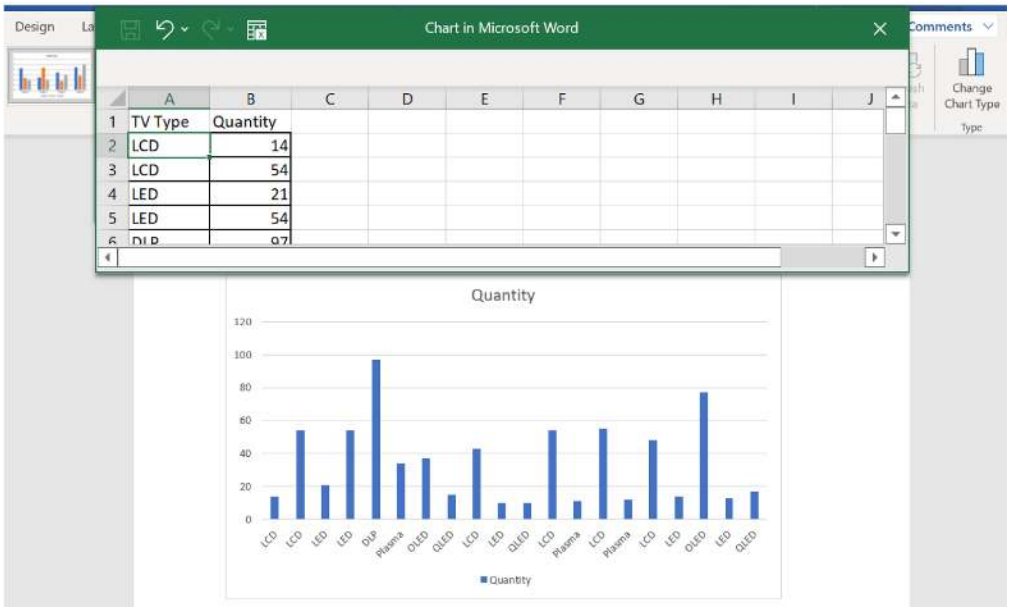


Figure 4.35: As you create a chart, Word will create a new Excel file embedded in the document. You can choose to open the data in Excel using the Edit data tool. (Used with permission from Microsoft)



Figure 4.36: You can change the design and type of chart using the Chart Format tab. (Used with permission from Microsoft)

It is worth noting that when you are looking to design a chart, typically, you can use Excel as a starting point for creating your chart. This is often a much easier approach than starting your chart in Word; this process is covered in Working with Spreadsheets. After creating the chart in Excel, you would then copy and paste the chart from Excel into Word or import the file into Word.

Text Command Group

Like the Illustrations command group, the Text command group is located on the Insert tab. It houses the Text Box, Quick Parts, WordArt, Drop Cap, Signature Line, Date & Time, and Object commands. These commands are all related in their functionality, as they are tools to insert autogenerated text or specially designed text.

Text Box

You may have seen a text box, either in a Word document, on a website, or in a print article. It is simply a self-contained square with some text inside. Figure 4.37 shows text box options. The text box is often used in highly graphical documents, such as an email ad, but you may also add a text box for inserting a meaningful phrase, idea, or data that you want to stand out from the rest of

your document. The advantage of a text box is that you can format the rest of the text in your document to wrap around it in different ways, which you will learn about later in this chapter. In essence, it treats a box of text as if it were an image.

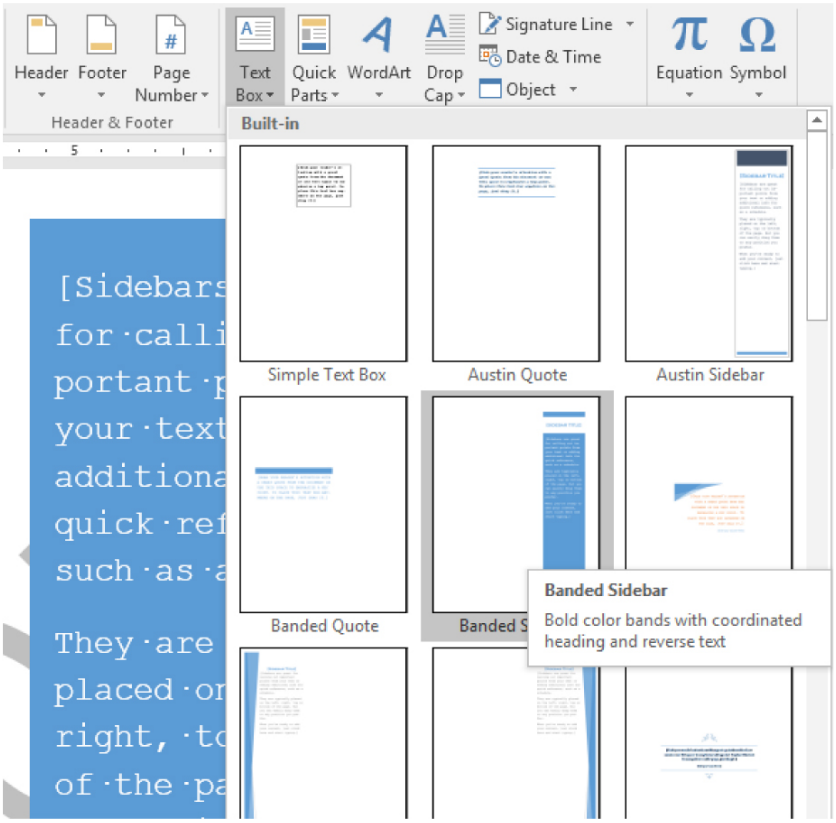


Figure 4.37: Text boxes such as this Banded Sidebar can help make your report more visually appealing and easy to read. (Used with permission from Microsoft)

Quick Parts

The Quick Parts command in the Text command group was also part of the Header & Footer tab that you get when you insert a header or footer. This is an alternative path to quickly add information to the document. Through this menu, you can add a number of items to your document. The first option, AutoText, will automatically add either the author's initials or name to the header of the document. Another option under Quick Parts is to add additional information such as the company mailing address (as shown in Figure 4.38). The Fields option adds fields for a more specialized feature of Word called Mail Merge, which will be covered in the Advanced Document Preparation chapter. This information will only be added if this information was added to the document properties, as you learned in Essentials of Software Applications for Business.

Figure 4.38: Key company information, such as address, email, and phone number, can also be added through the Quick Parts tool. (Used with permission from Microsoft)

WordArt

WordArt is a type of stylized font available in Word. WordArt can be used to add colors, shadows, or borders to text. In can also be used to change the text to be vertical or even diagonal. While it is appropriate to use in graphic-heavy formats, such as front pages of business reports, newsletters, or brochures, it is not appropriate for more text-heavy or professional documents, such as business correspondence, the inside of a business report, a résumé, or a cover letter. That said, using WordArt in your document can be a fun way to experiment and add color and creativity to it. WordArt could also be used to start the creation process for a logo, although many businesses will use a graphic design company to create corporate logos.

Let's practice with the company name, WorldCorp, to get an idea of what WordArt can do for plain text. To insert WordArt, select the WordArt icon from the Text command group Figure 4.39. Choose a style, and a box with "Your text here" will appear on the page, as shown in Figure 4.40. The ribbon will change to add a Shape Format tab, where you can change the color, the font effects, and the position of the WordArt object. Replace the text in the box with "WorldCorp" and choose a design that incorporates blue as the color because this is the company's primary color. Changes are made using the options in the WordArt Styles command group. You may place the WordArt object behind or in front of other objects, or align it in a certain position within the document, as you would with an image.

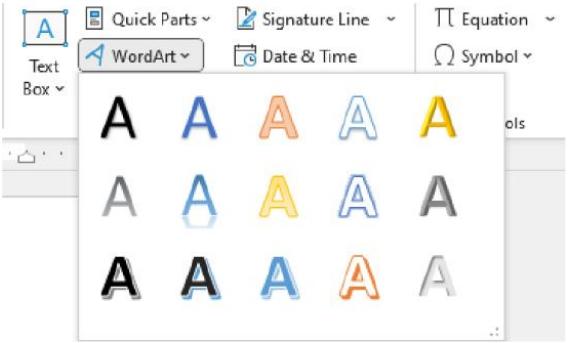


Figure 4.39: Whatever you type in the WordArt box will initially be center aligned. You can change text alignment by going to the Paragraph command group under the Home tab. (Used with permission from Microsoft)

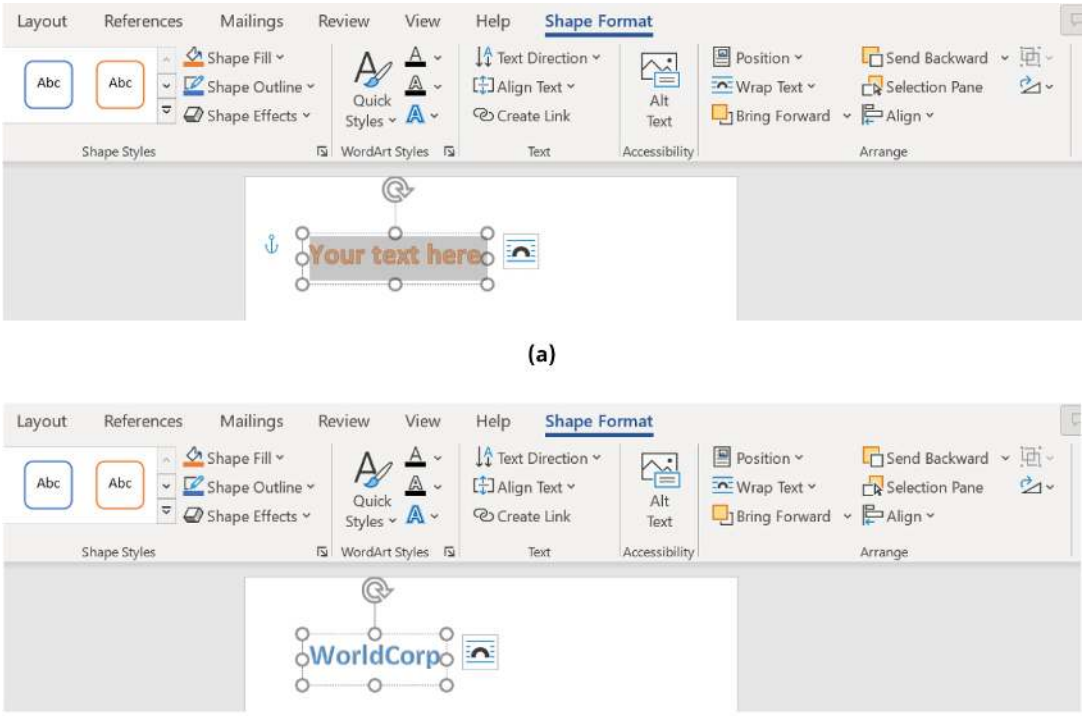


Figure 4.40: (a) When you insert WordArt, you will get another tab on the ribbon to further customize the text. (b) You can send the WordArt forward or backward using the Arrange command group. (Used with permission from Microsoft)

Drop Cap, Signature Line, Date & Time

The formatting options in the Text command group can be seen in books, reports, and other kinds of stylized texts. For instance, you have probably seen a drop cap in a novel or journal article: It's when the first letter of the first sentence is large or in a stylish font, and the rest of the text is wrapped around it. To achieve this effect, select the first letter and choose the Drop Cap drop-down menu from the Text command group (Figure 4.41). Once there, you will see options for font style and placement. You can choose Drop Cap Options to change the font type and size. Generally, drop cap is not used in professional documents such as the market trends report. We are just using it here for illustrative purposes. As you can see from the figure, the large letter T is a bit distracting in the report.

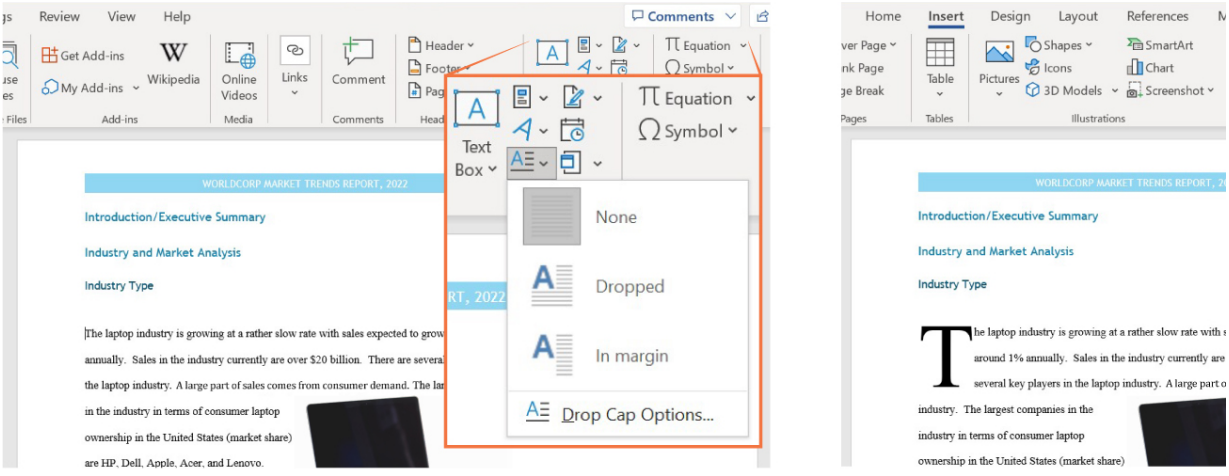


Figure 4.41: (a) You can choose from among a few different drop cap styles. (b) The drop cap design is a decorative style that you might have seen at the start of a novel or magazine editorial. (Used with permission from Microsoft)

You have probably seen a signature line in many emails and letters in Word. The signature line is an autogenerated graphical object that has your name, job title, and email address, as Figure 4.42 shows.

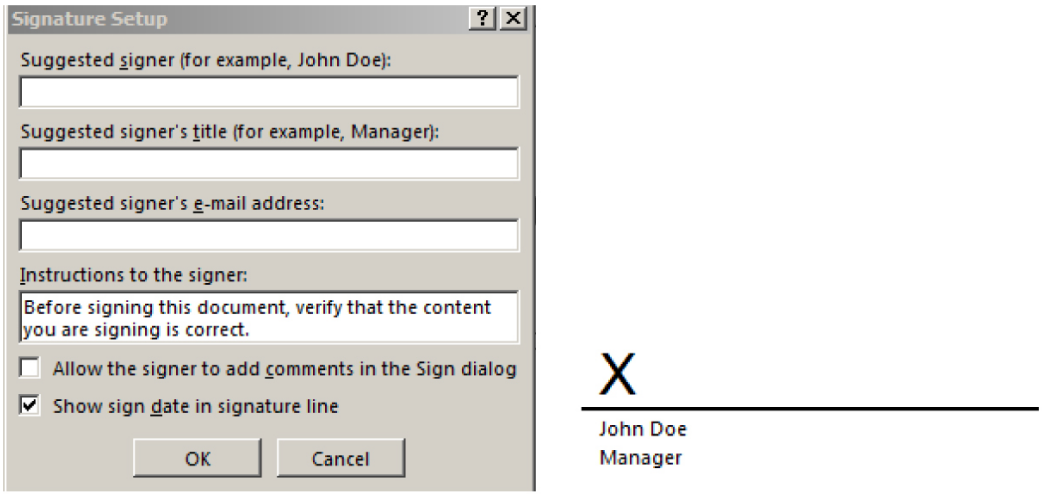


Figure 4.42: The signature line on (b) is what you will see once you fill the dialog box in (a). (Used with permission from Microsoft)

The Date & Time command is an autogenerated time stamp of the date or/and time format of your choosing, as Figure 4.43 shows. You might want to include the date and time stamp to your market trends report as it moves through the development process. This can help you keep track of the edits that are made in the document at various stages of writing or through the different departments at WorldCorp that will contribute to the report. You could include this information as a header or footer in your document. Note that if you use the Date & Time command, it will update to the current date and time, even if you did not make any changes to the document.

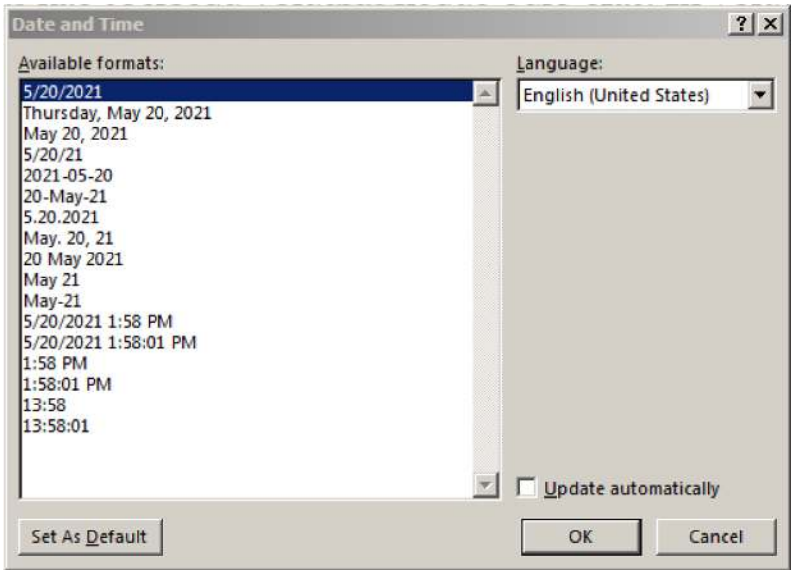


Figure 4.43: You can choose among different date and time formats, depending on the style of your company and what kind of information you want captured. (Used with permission from Microsoft)

Inserting an Object

The final item in the Text command group is Object. An object is anything that is inserted into the document rather than simply typing text. An object can be a wide variety of things, including graphics (WordArt), images, charts and graphs from Excel, links to a web page, files from a program such as Adobe Reader, among others. When you insert an object, Word will create a link to the object and you will be directed to this object when you click on it; it will open in a separate window. This action might be helpful if

you want to direct someone to a file, such as an Excel spreadsheet, without having to actually include all the information in the Word document.

You can also insert an object that links to an outside source, such as a web page. The Object tool can also take text from another file and place that in the current document. This can help you save some time, instead of copying and pasting information from one document to the next. You might consider using this feature for the market trends report because you will have different departments working on different sections of the report.

To insert an object, go to the Object tool in the Text command group on the Insert tab. There are two options in the tool: Object and Text from File, as shown in Figure 4.44. When Object is chosen, a dialog box appears, in which you can select all sorts of file formats if you were to Create New, or Create from File. Create New means that you will create the file within the Word document in the chosen format such as Excel or Adobe. You could also choose to have the link to the object as an icon in your document rather than the first page of the inserted object being displayed. Create from File means that you can use an existing file to insert into the document. The Integrating Applications chapter covers inserting objects in more depth, as it includes the integration of Office programs.

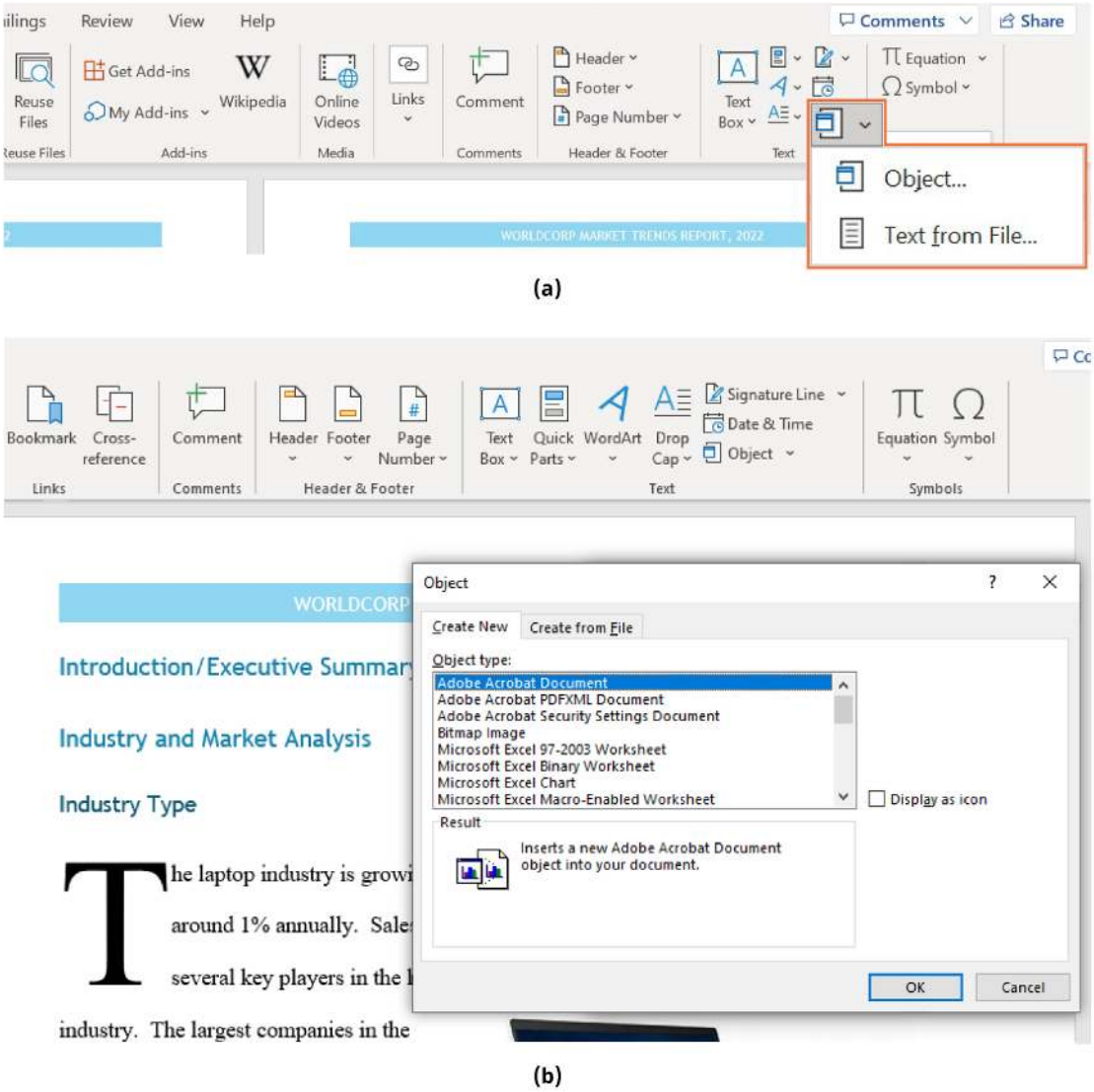


Figure 4.44: (a) You can insert an object or use text from another file in your document. (b) When you choose Object, you can create a new object or use an existing file. (Used with permission from Microsoft)

Symbols Command Group

The Symbols command group is also part of the Insert tab. A symbol is a special character not found on most keyboards, and includes characters such as currency symbols, en dashes and em dashes, arrows, Greek letters (often used in economic or financial math), and many other characters. Figure 4.45 shows some of the character choices available in Word.

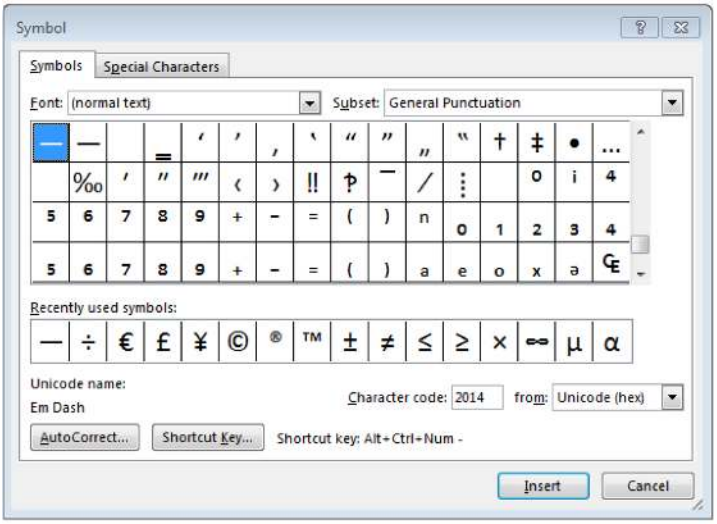


Figure 4.45: You can use the Subset combo box to look for the category you are looking for, to help narrow down your choices. (Used with permission from Microsoft)

The Equation command is for inserting mathematical equations into the document. The drop-down arrow by the Equation tool allows you to see some built-in equations from common calculations, as Figure 4.46 shows.

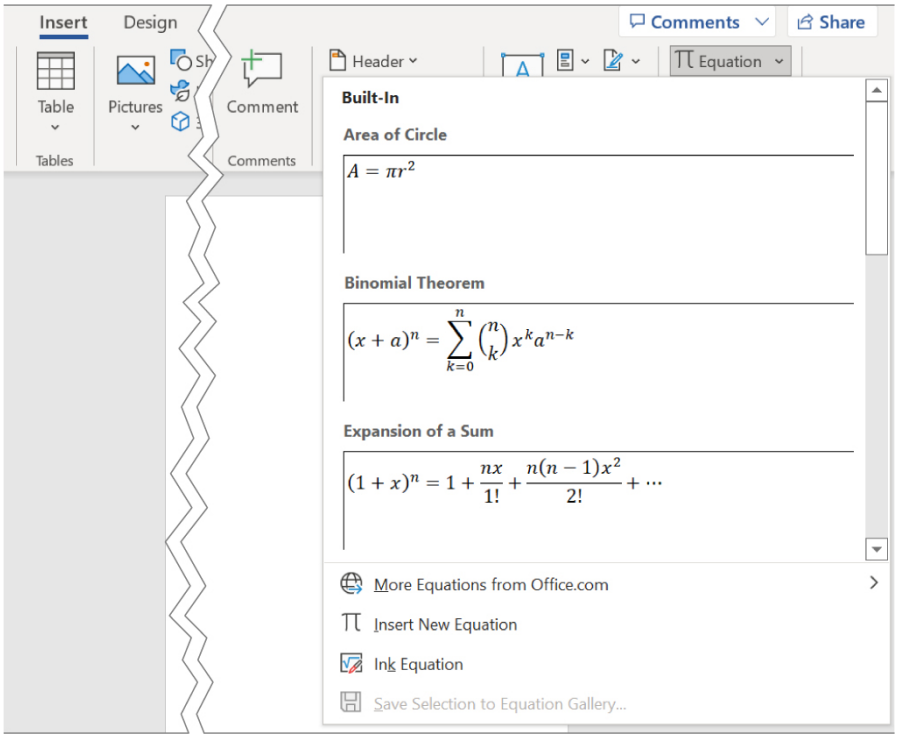


Figure 4.46: Several built-in equations are available in the Equation tool. (Used with permission from Microsoft)

You can also choose to insert a new equation if none of the built-in options meet your needs. When you insert the equation (either new or built-in), a new tab appears on the ribbon called Equation. Here, you can choose the math notation of your choice and build your own equations. This is especially useful for economic and finance research, engineering reports, or any other kind of quantitative discipline or science. You can even draw the equation that you want to insert, and Word will recognize the numbers

and symbols. Select Ink Equation from the Equation drop-down menu. This allows you to use the mouse or your finger to draw the equation symbols if your touch screen or pad allows this (Figure 4.47).

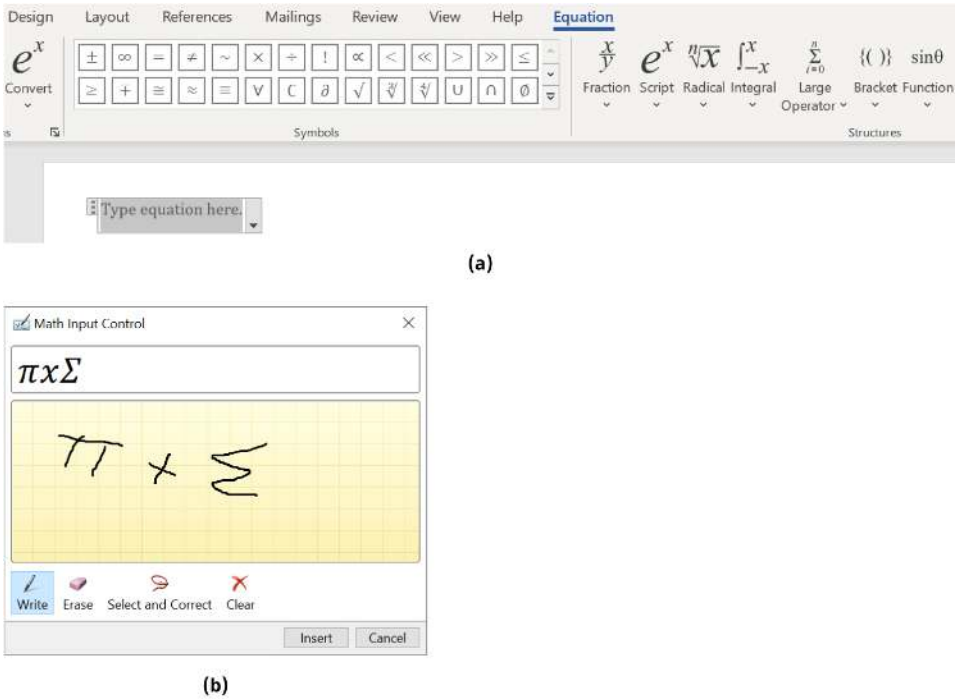


Figure 4.47: (a) The Equation tool can be helpful in making your documents look professional when you need to incorporate mathematical equations. (b) Word has the ability to read your drawings and recognize the symbols. (Used with permission from Microsoft)

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4.4: Collaborative Editing and Reviewing in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Use the tools in the Review tab
- Use the Editor tool

To put together the market trends report, you will need to gather information from several departments. This information will likely include past sales data, information about current major vendors and customers, an evaluation of the major competitors, and other related content. To ensure the accuracy and integrity of the content, you want to have each department review the data specific to their sector. You also want to have the report reviewed by a peer colleague and your supervisor to ensure it is correct and of the quality expected. Word offers collaborative tools in the Review tab that make it easy to solicit, see, and implement feedback from other stakeholders.

Review Tab

The Review tab is vital for teamwork between collaborators of documents. Many documents are created in collaboration across functional departments, and each contributor to the document needs to record their changes and suggestions so others can review them. The Review tab also has several proofreading tools you might need for editing a document, such as a thesaurus.

Proofing Tools

As a student, you have probably been instructed to spell-check your work before handing it in. Word offers spell-check by simply selecting Spelling and Grammar on the Review tab. This tool will automatically check your spelling and grammar according to the dictionary and other language parameters in Word (which you can adjust from the default settings if desired). A dialog box will appear, and Word will give the option to accept or reject each of its corrections. It should be noted that spell-check will not always check when a word is misused.

For example, if you have typed “four” instead of “for”, spell-check will not indicate a misspelled word. The document creator will still need to proofread the document and not rely entirely on the Spelling and Grammar check tool.

Word gives its users many options for customizing their dictionary and language preferences. For example, you may frequently use the abbreviation “e.g.,” in your business documents, which means “*exempli gratia*,” or “for example.” If you don’t add this abbreviation to your Word dictionary, it may be labeled as a spelling mistake. “*Id est*” is another Latin term you might see, which means “that is to say.” After you add these words to your dictionary, Word will stop flagging them as an error (Figure 3.23).

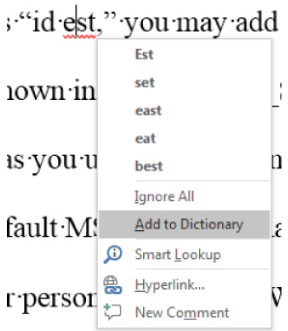


Figure 3.23: Adding regularly used new words to your dictionary will save you time when spell-checking a document. (Used with permission from Microsoft)

Another language customization feature is setting the proofing language. Word comes with dictionaries for several languages, as well as a variety of English dialects, including British, Canadian, Australian, Caribbean, Singaporean, New Zealander, and

American English. After you set your preferred dialect, Word will check your spelling and grammar according to that dialect. For example, if you choose American English as your preferred dialect, the Spelling and Grammar tool will mark the word “favour” as an error and suggest the American spelling “favor.”

Comments

Comments are used for calling attention to any content in your document that you want to solicit input on or note for yourself. You can also use comments to flag spelling or usage queries, provide instructions to others reviewing your document, remind yourself to address something later like adding a graphic or fact-checking a statement, or ask questions about the content. To add a comment, select the segment of text in question, and then select New Comment from the Review tab, as shown in Figure 3.24. You can then type within the comment and click the arrow when you’re done to make sure the comment sticks.

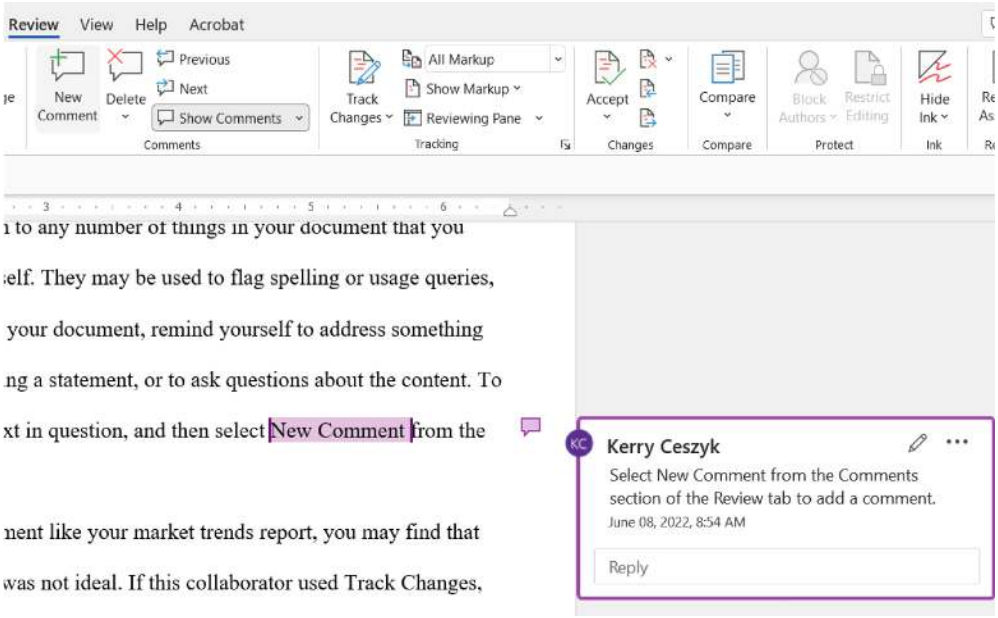


Figure 3.24: Comments can be used to communicate collaboratively within a document, or to add notes to yourself. (Used with permission from Microsoft)

When working in a document with comments, you can reply to any comment to add additional information or start a dialogue about a specific item. Once comments are addressed and are no longer needed in the document, you can either delete or resolve them, as Figure 3.25 shows. Deleting a comment removes it completely from the document, whereas resolving a comment retains the comment in a history stored digitally with the document.

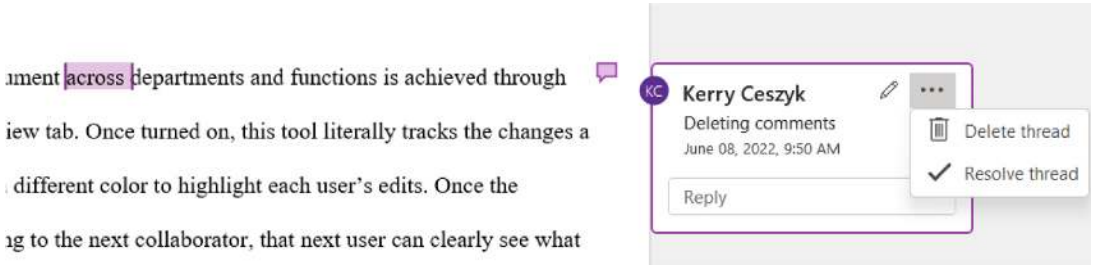


Figure 3.25: Comments can be either deleted or resolved when they are no longer needed. (Used with permission from Microsoft)

In a collaborative business document like your market trends report, you may find that another collaborator added content that was not ideal. The next collaborator or editor in the process could flag this content with a comment and send the document back to be revised. When the collaborator is done making the changes, you or they can resolve the issue.

Tracking Changes

The shared effort of writing a document across departments and functions is achieved through the Track Changes tool on the Review tab. Once turned on, this tool literally tracks the changes a user makes to a document, using a different color to highlight

each user's edits. Once the document is saved and passed along to the next collaborator, that next user can clearly see what has changed from the original document. This makes collaborating on a document asynchronously—that is, not at the same time—easy to do.

Sometimes, you might work in a document that goes back-and-forth between you and one or two colleagues, and you review each other's changes and resolve comments at each pass. In other cases, all feedback may be collected and processed by one person. In the latter situation, after all collaborators have added their inputs to the document, a final author decides what changes are going to be kept for the final draft. This person might be a project manager or higher-level editor, depending on the workflow and organization of your company's editing process. This type of editing cycle—sending documents to various stakeholders for revisions and/or input—is common in many industries. An editing cycle may repeat multiple times before the document is finalized. Using Track Changes and comments allows for many iterations of the editing cycle, all while maintaining clear version history and control.

The Tracking command group offers options for which changes or markups are shown. You can toggle between No Markup and All Markup to see tracked and clean versions of a document (Figure 3.26). The Show Markup selections allow you to turn off Formatting revisions so you can focus more easily on content changes. There is also an option to turn on/off feedback from specific reviewers. These possibilities are helpful when you have a document with a lot of markup and want to focus on one area of input in particular.

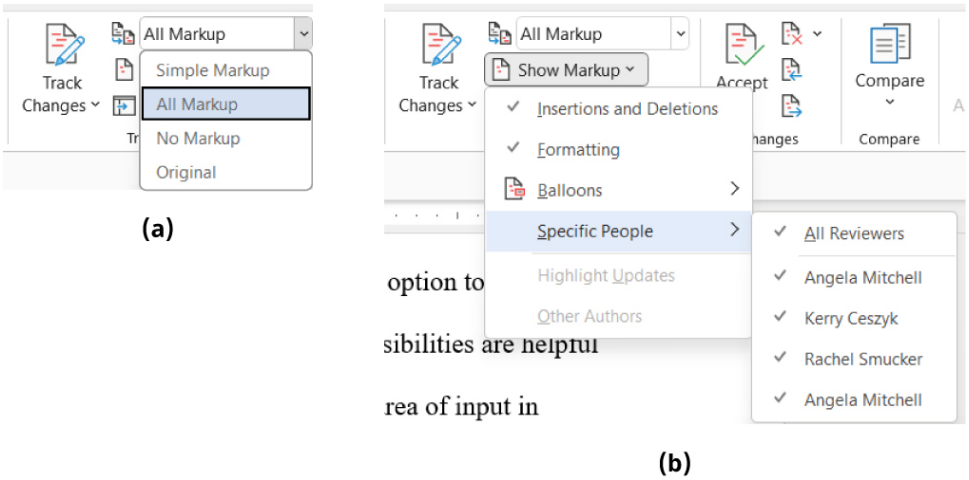
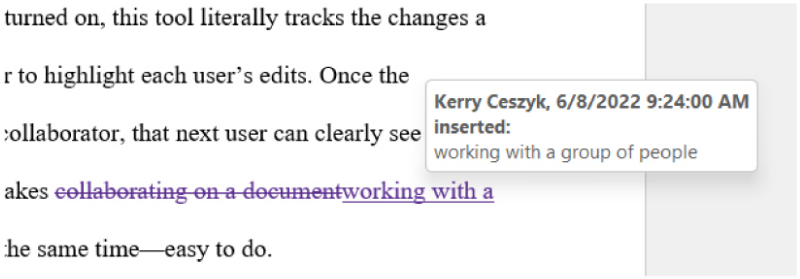
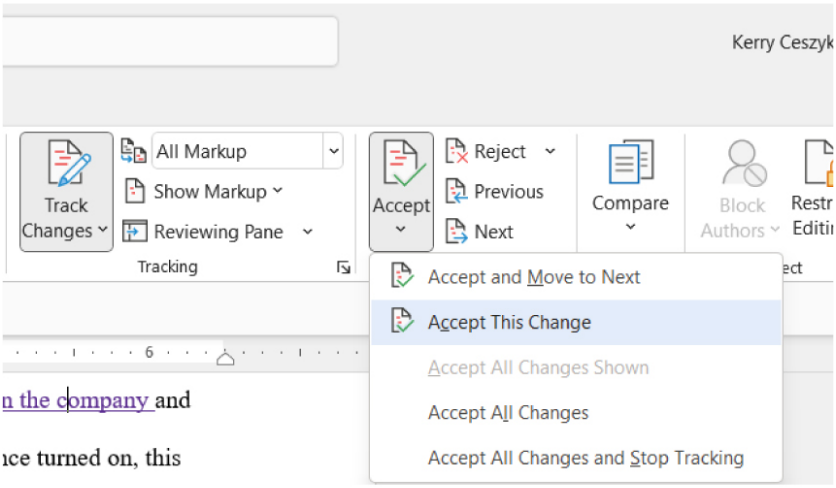


Figure 3.26: (a) Users can adjust how much markup they see, as well as (b) what types or markups are shown and which reviewers' feedback is displayed. (Used with permission from Microsoft)

Collaborators, or a final author, have the option to accept or reject each change that has been tracked. While reviewing changes, you can hover over any individual edit to see who made the edit and when, as shown in Figure 3.27. The Changes command group on the Review tab has the option of accepting or rejecting the various tracked edits as they are reviewed. You can also select to accept all changes in the document without reviewing them individually.



(a)



(b)

Figure 3.27: (a) Track Changes tells you who made a revision, and at what time, and (b) lets you accept or reject each suggested edit. (Used with permission from Microsoft)

Real-World Application

Resume Peer Evaluation

A resume is a summary of your work experience that you use when applying for a job. You might not have a resume at this point, but you will probably need to create one in the near future. One option is to start with a template that you find online or in Word and create one on your own. However, you might consider starting at the career services office at your college. The career counselors in that department can help you craft a professional resume for your job search. You will first be asked to develop a list of your previous jobs and the responsibilities that you had while working in those positions. Then, the career counselor will ask about what type of job you are looking for now and your career goals in general. All of these aspects will be reflected in the resume you develop. The next step will be to create a first draft of your resume. The counselor will likely give you some tips and maybe even a couple of examples to reference when creating your resume. You can expect that your resume will go through several edits and evaluations before you have a final product.

Word has the tools you need to get feedback on your resume drafts from the career services department. You can share the file with others and have them insert comments or make revisions to your resume. Through the tools in the programs, you can see revisions made, who made the revisions, and respond to comments. The collaboration tools in Word make it easy to get feedback so that you can create a polished resume to help you secure the perfect job.

Protect

If you do not want certain collaborators to change a document, you may configure your document so that future readers of the document can change only certain components. In the Protect command group on the Review tab, select Restrict Editing. This will offer two types of restrictions that you can set, as Figure 3.28 shows. The first, Formatting restrictions, lets you specify which

elements of a document can be edited (see Figure 3.29). For example, you might allow editing only to the main text and not allow it to headers or tables. The second option, Editing restrictions, limits the level of editing others can do—from none, to commenting only, to only tracked revisions. Those restrictions can be further customized to allow different restrictions for different users.

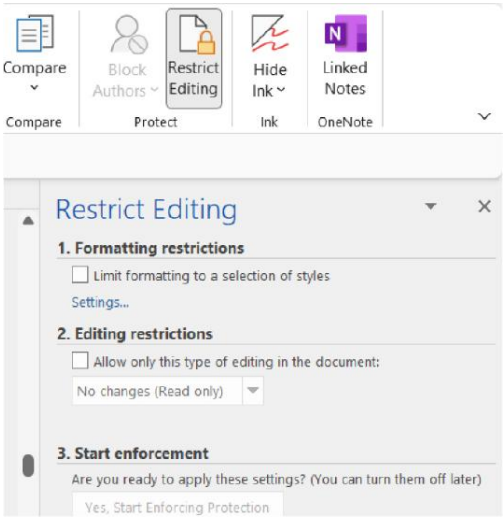


Figure 3.28: Document protections can be added by restricting editing to certain components of a document, or to limited levels of editing. (Used with permission from Microsoft)

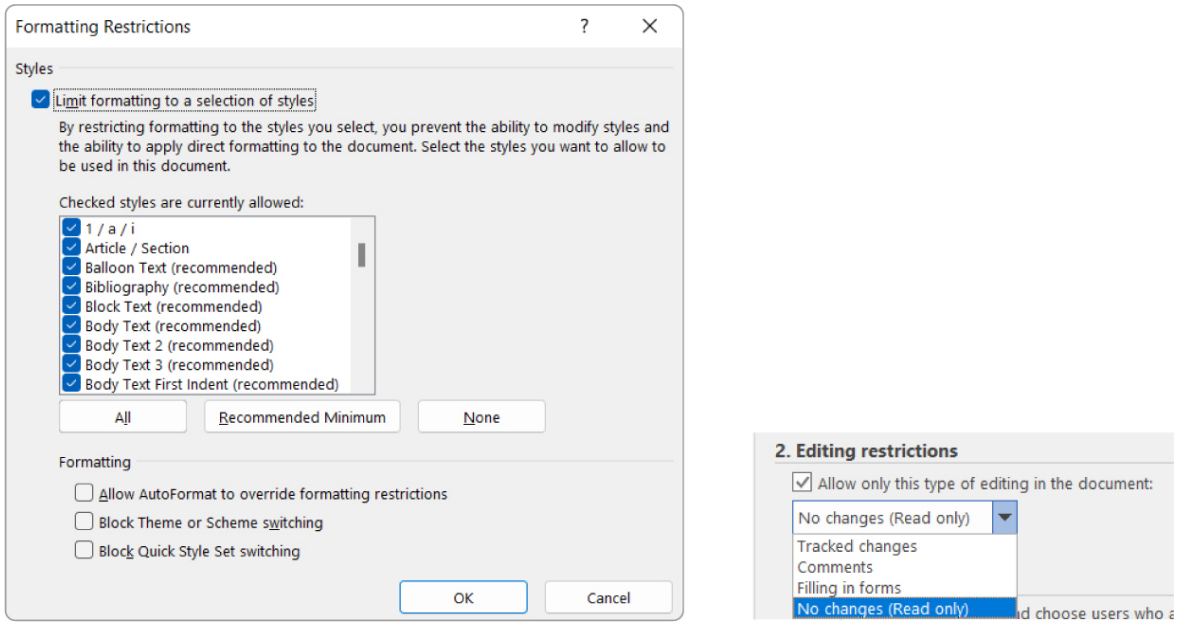


Figure 3.29: (a) Formatting restrictions can get quite detailed; however, they're important to set to keep your document's style from becoming inconsistent. (b) Editing restrictions for other users can range from allowing others to work freely, to work in Track Changes, or to "read only" and not make any changes. (Used with permission from Microsoft)

Mac Tip

Protect menu options on a Mac also include password protections, document review protections, and privacy. There is also a menu button for Always Open Read-Only.

Editor Tool

The Editor tool in Word adds another level of document support with a more comprehensive editorial review. Essentially, it is like a virtual editor, which goes beyond simple spelling and grammar checking. The Editor tool is on the Home tab and can also be found

on the Review tab. Simply click on the icon, and it will review your document and provide a report and score. You can set the Editor to review for formal writing, professional writing, or casual writing.

The Editor tool will check for spelling and grammar errors, as well as potential improvements, providing an explanation of the issue and a suggested revision (Figure 3.30). In addition to spelling and grammar, it will check for clarity, conciseness, formality, punctuation conventions, inclusiveness, vocabulary, cliches, and many more. In fact, the Editor tool checks for over 150 different issues with readability in documents. For each item, it will give a rationale and suggested improvement that you can accept or reject.

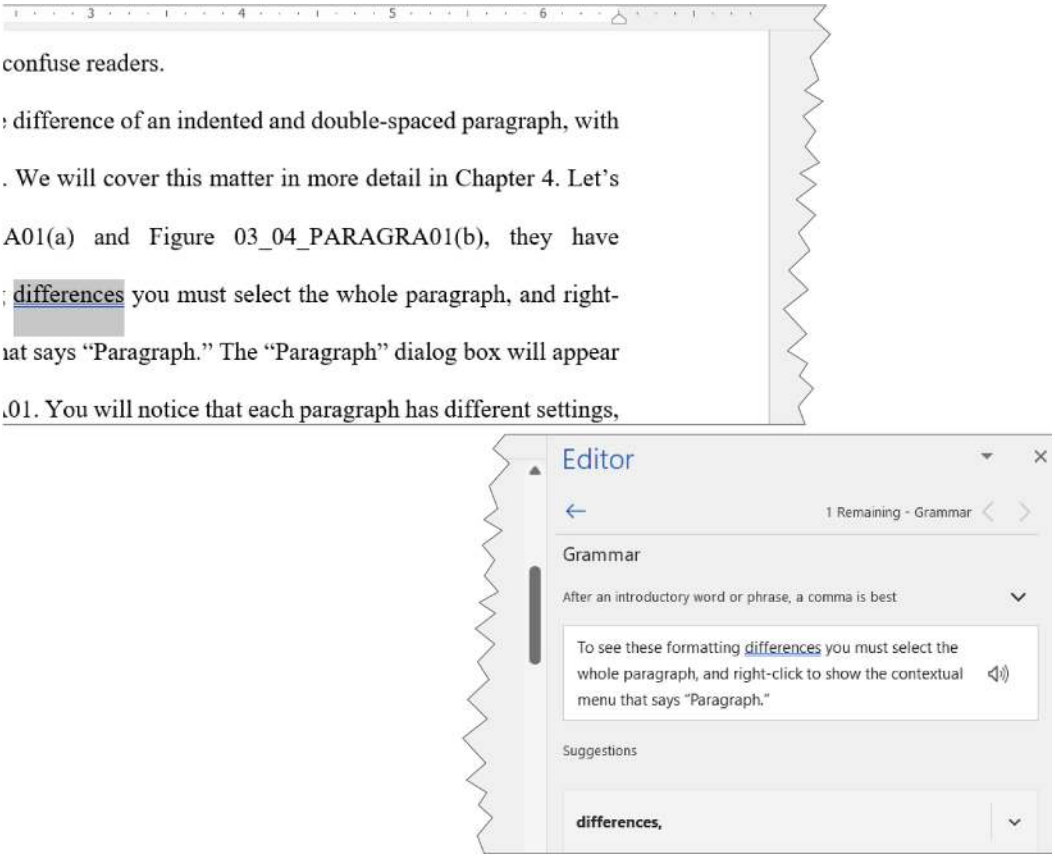


Figure 3.30: Editor will provide explanations and suggested revisions for errors of spelling, grammar, clarity, inclusivity, conciseness, and more. (Used with permission from Microsoft)

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4.5: Versions and Version History

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Access and use versioning features in Microsoft Word

This section delves into a feature of Microsoft Word called versioning. Versioning refers to the technology where programs store multiple iterations of files until they are approved and saved. Essentially, several edited versions of the file are maintained on an online server, as well as the original document. Versioning technology can give you some peace of mind that your original document is saved somewhere, and that any changes will need to be accepted (approved) before the final document is saved.

In Word, there are fewer options for accessing and using version history features, but they do exist if you keep your documents stored on Microsoft's cloud service, OneDrive, or on a SharePoint server.

When you are creating the market trends report, you will be sending the draft to key personnel in various departments to contribute to the report. Using these collaboration features will help as the document moves through each stage toward a final, accurate report.

Versioning in Microsoft Word

Microsoft Office has many options for accessing version histories, but this can be done only if the file is stored in OneDrive or SharePoint Figure 3.73.

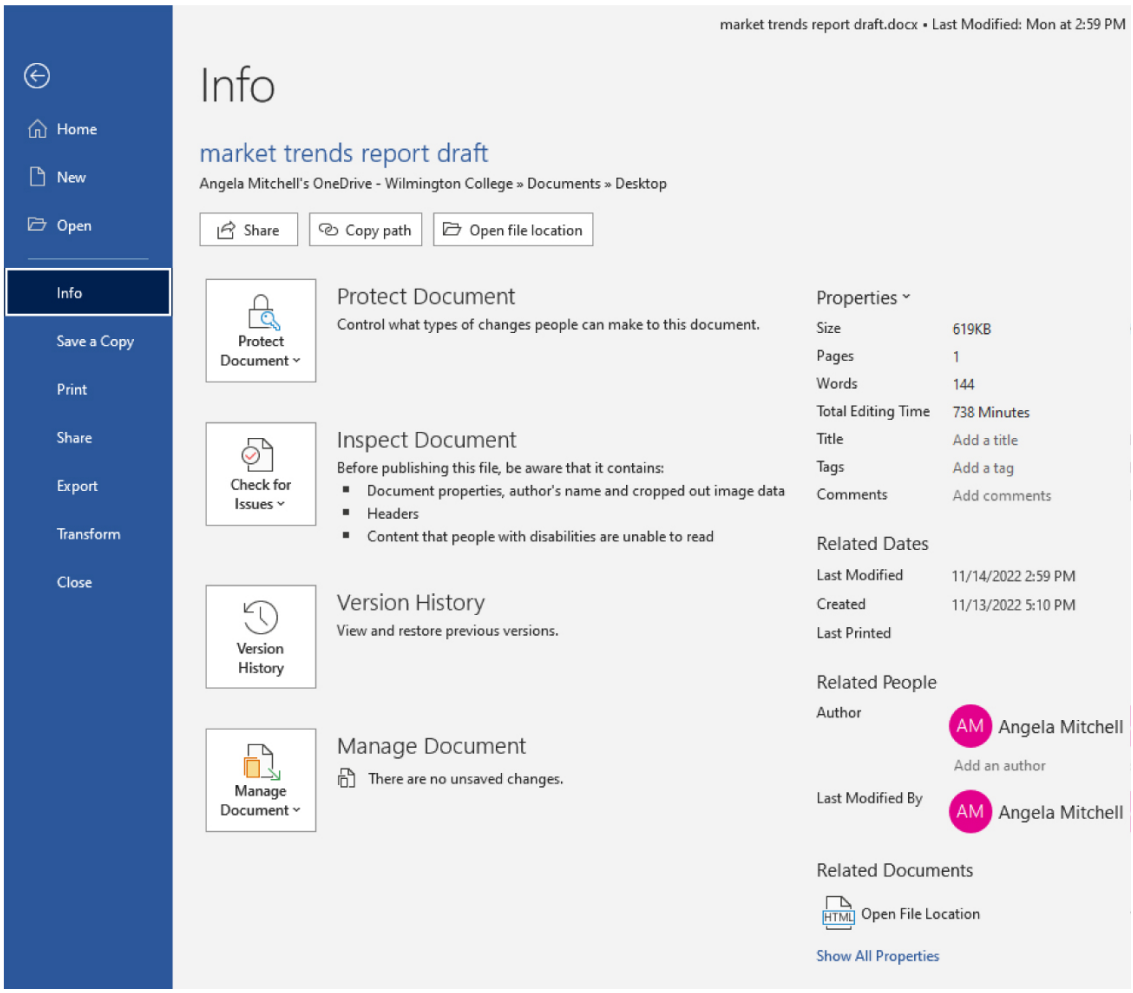


Figure 3.73: The version history in Microsoft Word desktop is activated if the document is located in OneDrive. (Used with permission from Microsoft)

If you have a desktop version of Word, you have to sign in to your Microsoft account. You will be able to access the last 25 versions of your file on OneDrive (that is, if your file is stored on OneDrive), as you can see in Figure 3.74.

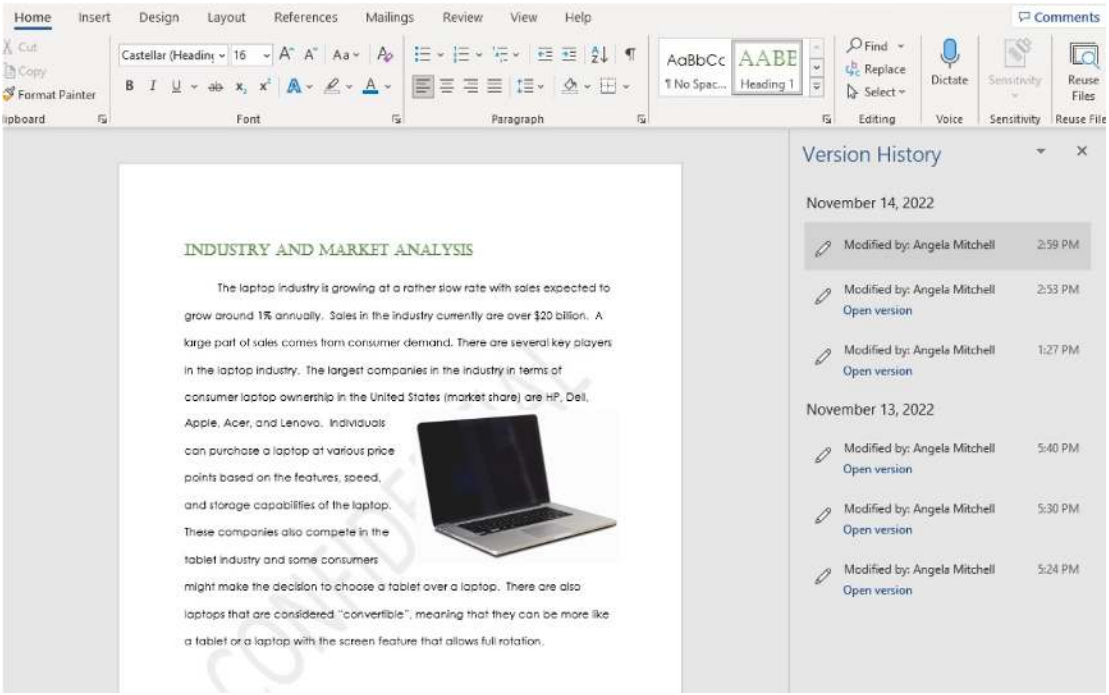
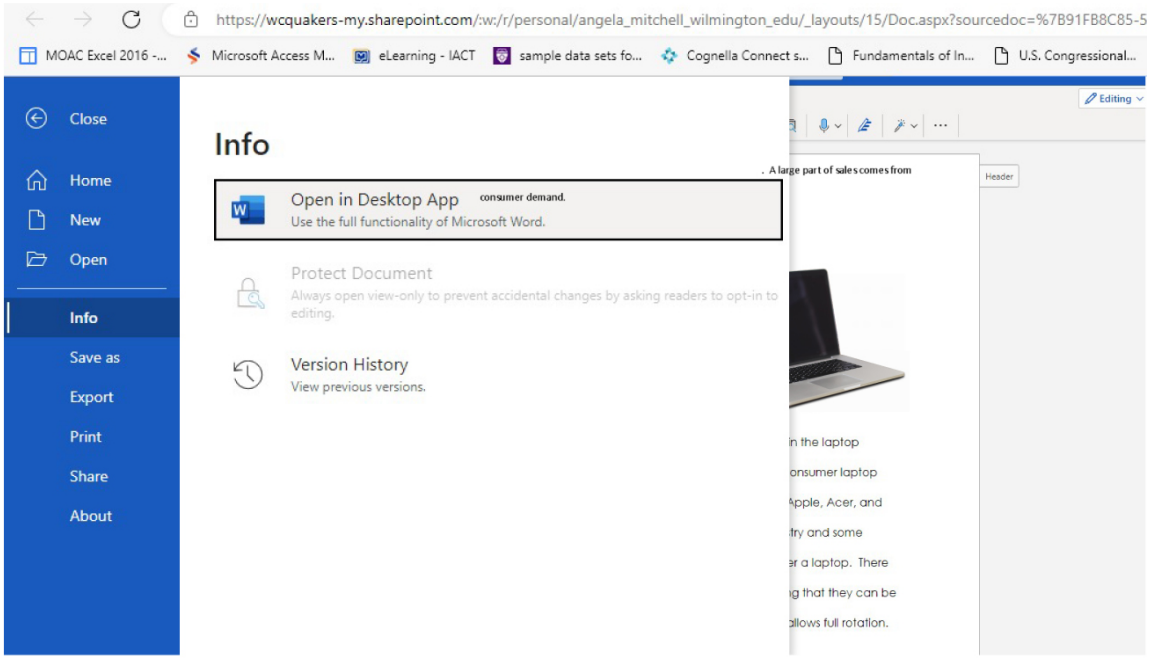
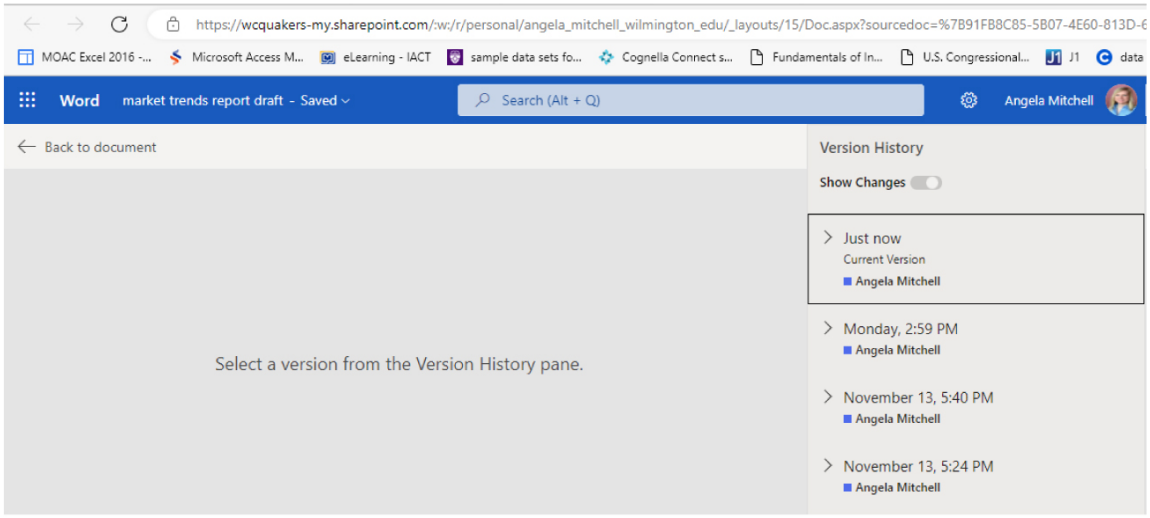


Figure 3.74: When you choose Version History from Info, you will see a pane open on the right side of the document with the versions that are saved. (Used with permission from Microsoft)

You can access your version histories in Word by going to the File tab and selecting History. If you have a Microsoft 365 Word subscription, you can access the version history by going to the File tab, then Info, followed by Version History. There, you can see the versions available and browse through them. You can also choose to restore a previous version, as Figure 3.75 shows. Moreover, if you have SharePoint Server or SharePoint365, the possibilities of versioning are much more powerful, allowing as many as 500 versions to be retained, as you can track a version's history, view multiple earlier iterations, determine who can edit or write on the files, control the number of versions stored, and more.



(a)



(b)

Figure 3.75: (a) Microsoft 365 also has Version History that is also accessed through the File tab. (b) Select a version from the pane on the right to see that version of the document. (Used with permission from Microsoft)

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4.6: Mail Merge in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Understand the purpose and function of mail merge
- Set up a main document for mail merge
- Set up a source document for mail merge
- Complete a mail merge

As companies grow, they may need to scale up their production methods. This can be a complicated process. An increase in size usually means an increase in revenue, but this comes at the cost of an increase in units produced or services rendered. As a result, companies need to find ways to make their everyday business process more efficient and automated.

One form of automation is the streamlining of communication with customers. With an increase in volume, the sales team needs to handle hundreds or thousands of clients every day. This can be made easier through the use of form letters, which are a kind of template for communication. In form letters, the content of the letter is the same for all recipients, but certain information may be personalized or customized. The mail merge tool in Word is one way to create these autogenerated letters. Although there are third-party companies that offer these large mailing type services, the mail merge features in Word are free and simple to learn.

What Is Mail Merge?

Many businesses stay in touch with their clients and customers using some form of communication. Some of these communications may be printed ads; some may be email newsletters. These communications are sometimes personalized with the name of the recipient. How do businesses automate this personalized process? One way to do this is by using mail merge. Mail merge is a tool in Word that lets the user write a form letter or advertisement, while leaving some areas of the document blank. These blanks are fields that can be programmed to contain personalized information: the recipient's given name, phone number, address, or any other type of customized field.

The mail merge tool makes sending letters or emails to hundreds or thousands of people relatively easy. The process typically begins with the composition of the communication that you want to send to the recipients; this is referred to as the main document. The main document will have blank spaces, or fields, where personalized information will go. Then, you need to create your source document, a separate document that has all the required information that will go into the blank customizable fields, such as postal addresses or email addresses. The source document can be a document that already exists, such as a list in Microsoft Excel or Access (we will talk about these programs later in the text). Or, you can create a new list of names and addresses. A business may already have this document in Excel or Access, as some businesses keep a running contact list. Finally, information in the source document and the information in the main document are combined to create the merged document. This merged document will show the personalized customer information in the designated blank fields on the main document, then multiply this form by the number of recipients. For example, if the form letter is one page and you have fifty clients, Word will create a merged document of fifty letters that can be printed.

Let's walk through an example of how to use the mail merge tool to send out a set of personalized letters to customers. You will learn how to build a main document, your source document, insert merged fields, and merge to finalize your letter.

The Main Document

The first step of the mail merge is to compose your main document. The main document could be an existing document, a template (.dotx) document, or a brand-new document. In this example, let's use a business letter template as the main document. You can type it up yourself based on the example in Figure 5.19, or use the text provided in the downloadable Mail Merge document(opens in new window). This letter will be sent to WorldCorp customers, informing them of the upcoming holiday hours for the warehouses so that they can plan for delayed shipments.

Figure 5.19 shows a form letter to inform the customers of the holiday closures. The template used is called Business Letter (simple design) to create the letter. We also added a simple WorldCorp logo at the top of the letter. We have highlighted in green where we want the mail merge tool to create the personalized fields. These are not the actual fields, yet; this highlighting is simply to help us mark those locations for when we do add them. In this letter, we will insert the customer's address and the greeting line with their name. You can certainly use more fields than these. But for this example, keep it simple so you can learn the process.

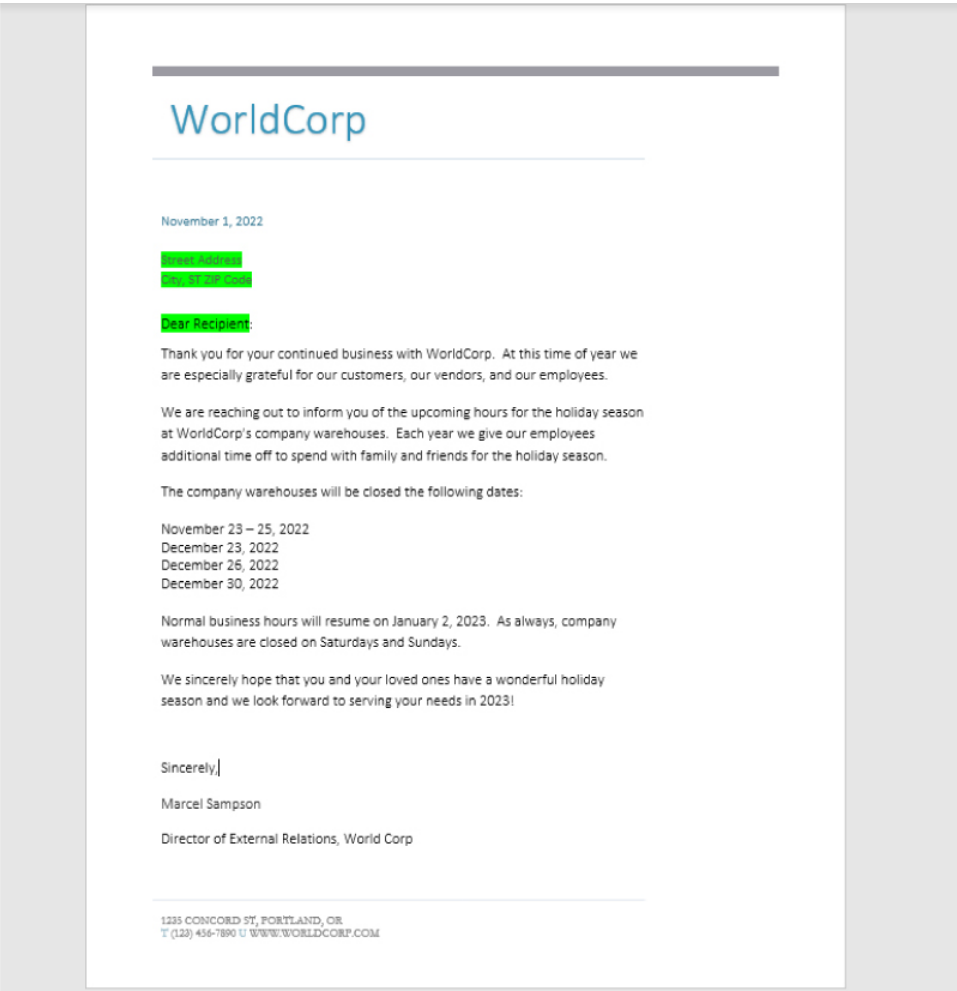


Figure 5.19: Templates can be used to create the main document for mail merge. (Used with permission from Microsoft)

The Source Document

The source document needs to be a listing created in Excel or Access. But this walk-through will build a new list rather than using an existing list. You will build the new list with just a few customers so you can see how mail merge works. But remember, mail merge can be used with many customers and is virtually limitless. The capacity of the mail merge is limited by the capacity of your computer.

The source document is built with the intended recipients. To begin, go to the Mailings tab, Select Recipients, and choose Type a New List from the menu (Figure 5.20).

Mac Tip

Under the Mailings tab, click on Select Recipients, and choose Create a New List.

Notice there are two other choices: Use an Existing List and Choose from Outlook Contacts. When you have finished entering in the information for the customers, click OK.

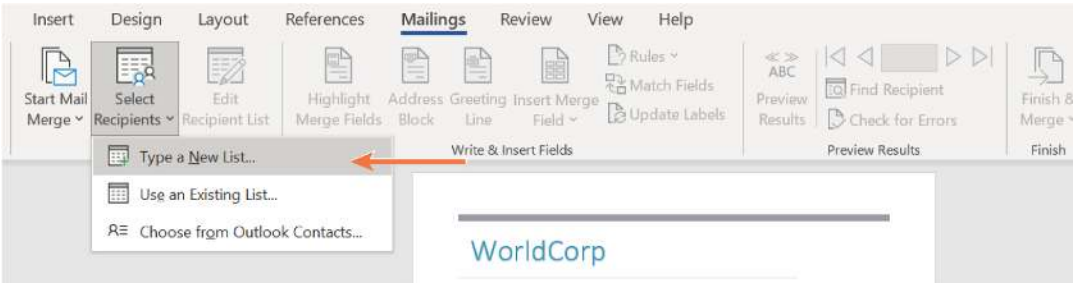


Figure 5.20: Although you can create a new recipient list, if you have a long list, it is better to work from an existing file. (Used with permission from Microsoft)

When you choose to create a new list, a dialog box will open so that you can build your list of recipients. Here, you type in the relevant information for the mail merge, as shown in Figure 5.21. By choosing Customize Columns at the bottom of the dialog box, you can add or remove the fields that you are not using. Make sure you add all the information you think you will need for your custom fields. When you do the final mail merge, you will only be able to choose from the defined information you provided in the source document. For this example, we need the customer name and address.

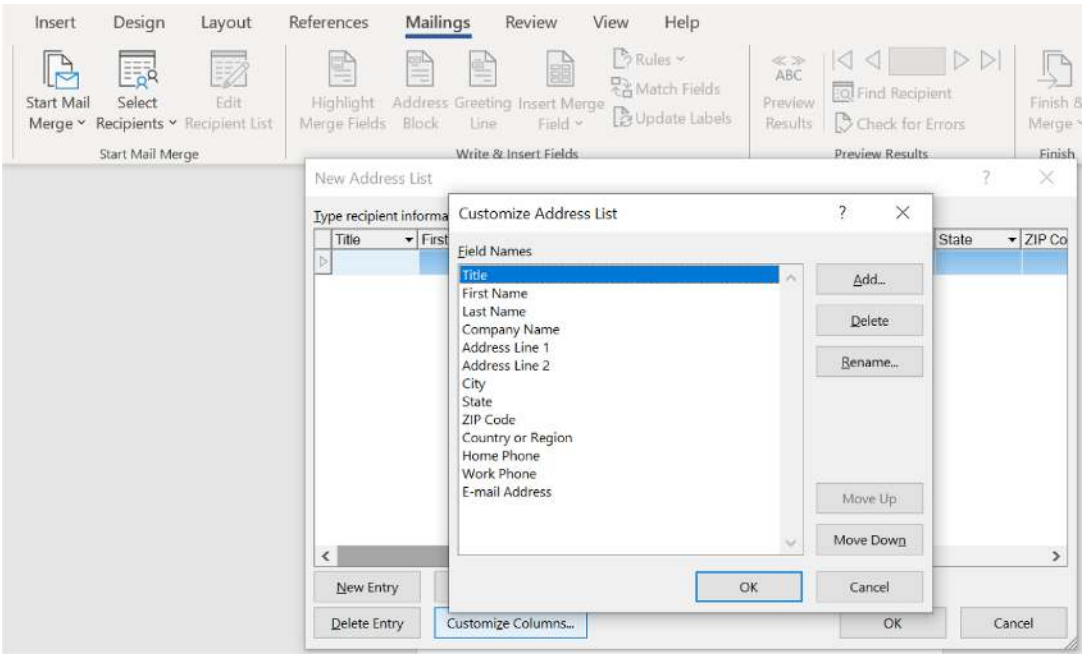


Figure 5.21: You can customize the fields used in the list. (Used with permission from Microsoft)

When you finish selecting the fields needed for the mail merge, you will be prompted to save the list as a new file for use as the source document in the mail merge (see Figure 5.22). The default location for the file is in a folder called “My Data Sources” (Figure 5.23). You might consider a descriptive name to tell you that this file contains data used in a mail merge.

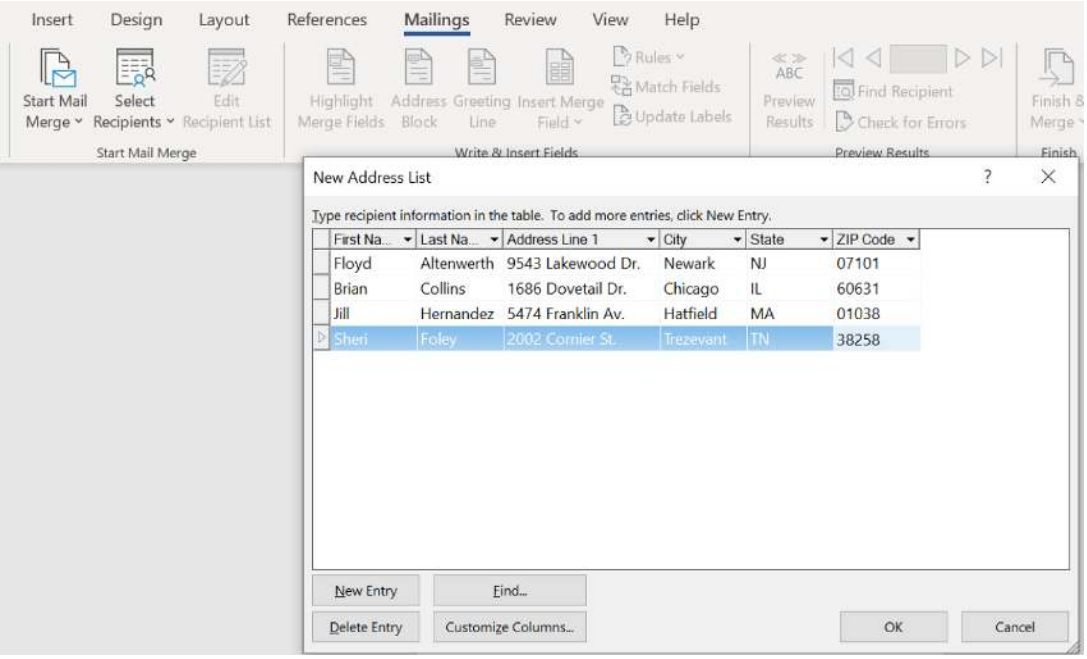


Figure 5.22: When you finish entering the information, click OK to save the file. (Used with permission from Microsoft)

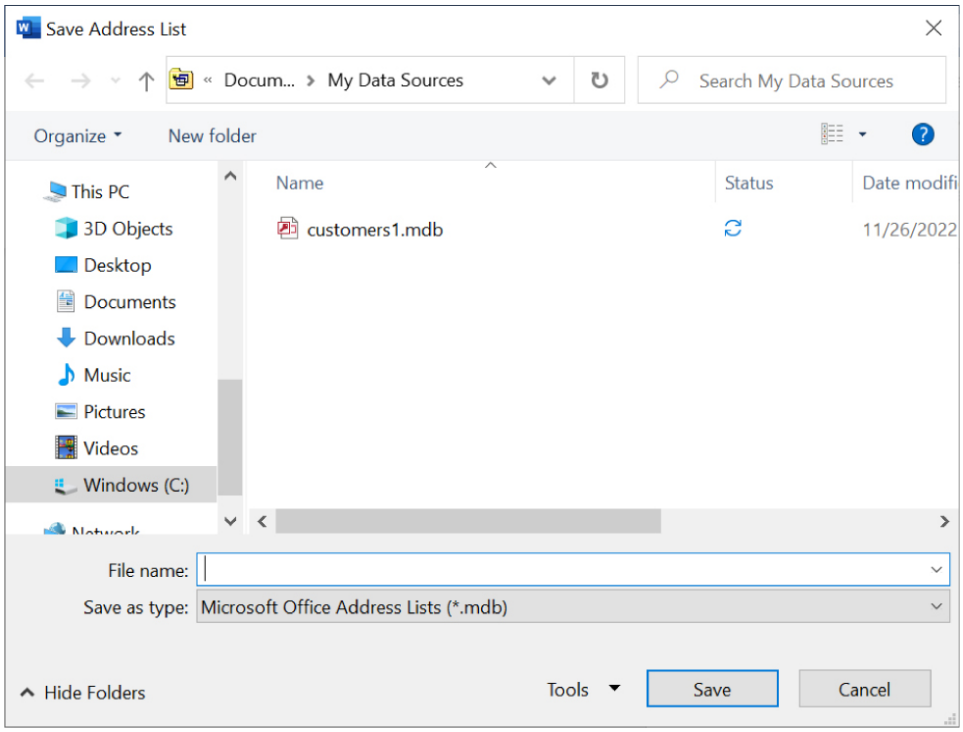


Figure 5.23: The list will be saved as a file with a special extension so that Word knows the list is the source document for mail merge. (Used with permission from Microsoft)

Merge Fields

Now that you have created the main document, and created and saved the source document, you now need to insert the merge fields into the main document. First, insert the blank fields on the letter so that Word can automatically fill them with personalized information: First name, Last name, Address, City, State, and Zip. In Figure 5.24, you can see the icons in the Write & Insert Fields command group on the Mailings tab. These give us some common merge fields: Address Block, Greeting Line, and Insert Merge Field. For this example, use Insert Merge Field. When you select the option, you will notice that the fields available in the drop-down list are the fields from your source document. Therefore, make sure the fields in your document are descriptive and as

separated as you would like them to be, for example, if you are sending a mailing out to voters, consider whether you should include all the members of the household in one mailer, or if you should address them separately (in which case, you should list each of their names individually).

To insert the field, put your cursor where you want the field inserted into the letter. For our example, we want “Address_Line_1” to replace our highlighted green street address placeholder (see Figure 5.25). Simply click on the field from the list and it will be inserted at the cursor location. Repeat this process for the other fields. Notice the fields are denoted by “« »”. This notation tells Word to get the relevant information from the source document to put into that line in the document.

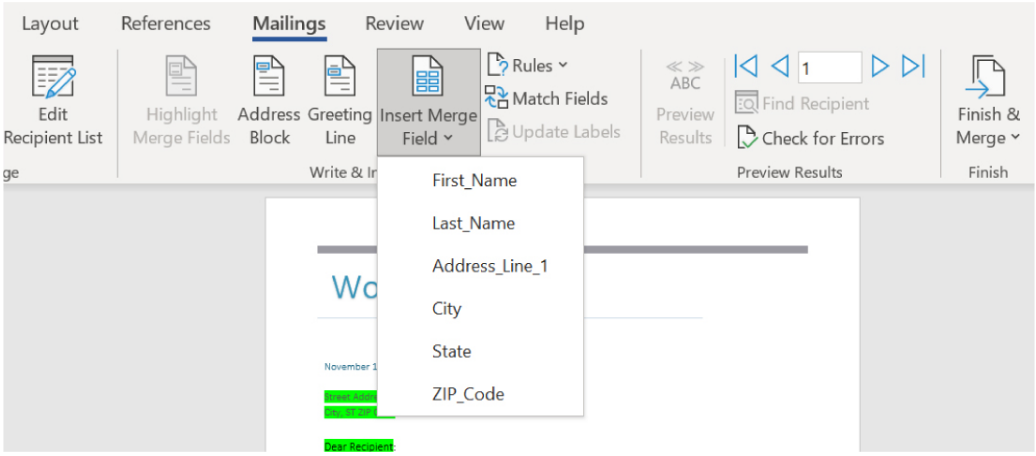


Figure 5.24: The fields in your source document are in the Insert Merge Field drop-down menu. (Used with permission from Microsoft)

November 1, 2022

«Address_Line_1»
«City», «State» «ZIP_Code»

Dear «First_Name» «Last_Name»:

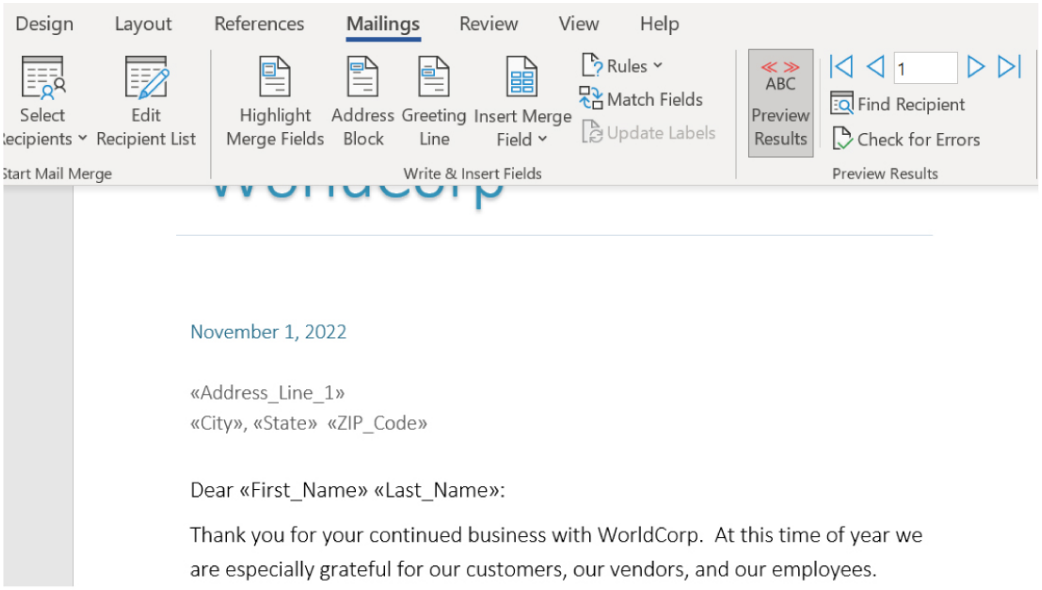
Thank you for your continued business with WorldCorp. At this time of year we are especially grateful for our customers, our vendors, and our employees.

We are reaching out to inform you of the upcoming hours for the holiday season at WorldCorp’s company warehouses. Each year we give our employees additional time off to spend with family and friends for the holiday season.

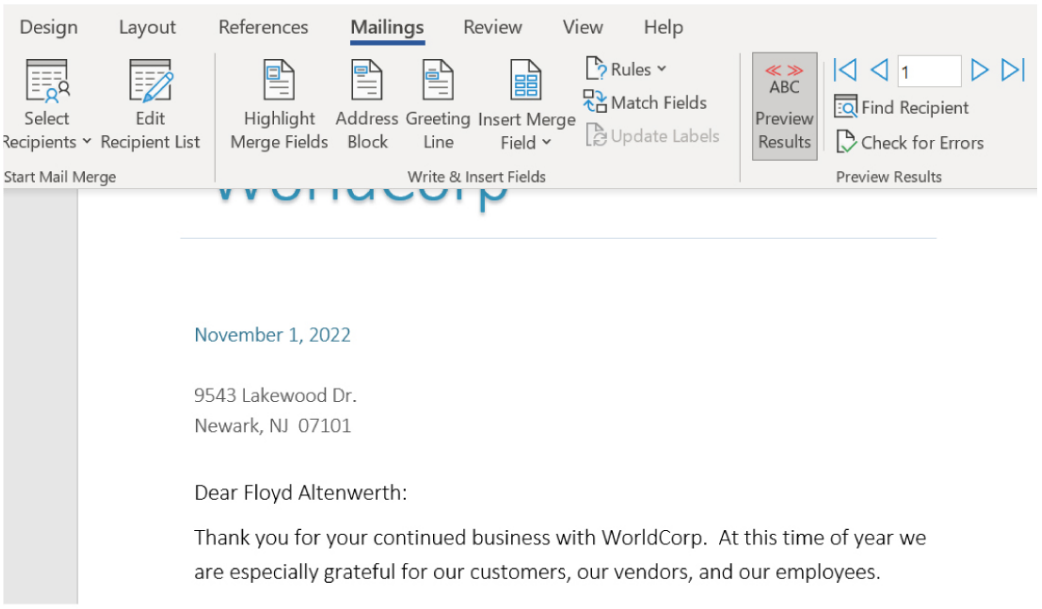
The company warehouses will be closed the following dates:

Figure 5.25: Be sure to remove the green highlighting in the document as we just used this to show where we wanted to insert the merge fields. (Used with permission from Microsoft)

Now that we have our source document with all of the customer information saved, and we have inserted the custom fields into the main document, we can complete the mail merge process. First, you should always preview the document to make sure it looks as it is supposed to. Go to the Mailings tab and select Preview Results, as shown in Figure 5.26a. This allows you to see all of the letters with the actual, personalized information in place, as in Figure 5.26b. All the merge fields you designated in the main document will be substituted by the actual information. You can use the left and right arrows at the top-right area of the ribbon to toggle between recipients.



(a)



(b)

Figure 5.26: (a) Before you complete the merge, preview the results so that everything looks as it should. (b) Notice the fields have been replaced with the first name in our recipient list. (Used with permission from Microsoft)

If everything looks okay, then you can complete the mail merge. Go to the last icon on the Mailings tab, Finish & Merge. The drop-down menu gives you options to edit, print, or send emails with the merged documents. In this case, we are going to mail the letters to the customers, so we will choose Print documents from the list. If there were any issues when you previewed the letters, you could select Edit Individual Documents to make the necessary changes. When you choose to print, you are given the option to select which ones you want to print. We will choose “All” for our example. The Print dialog box will open with the default printer displayed. You can choose to send the letters directly to the printer now by selecting OK, or you can choose to print the file to a .pdf file so that it will be saved. This .pdf file will have four pages, one for each of the four recipients in the source document list.

What you have just walked through is a mail merge from scratch. There is also a “Step-by-Step Mail Merge Wizard” that guides you through the same steps. You can use mail merge for a wide variety of applications, such as creating name tags for an event;

making labels for mailing packages/letters; creating envelopes, business cards, or postcards; or sending emails to a large group. Even though the tool is called mail merge, its capabilities go beyond simply creating a mailing.

Link to Learning

Visit Microsoft's detailed support page on doing a mail merge(opens in new window) to learn more.

Further support can be found on Red Tail Technology's sample mail merge templates page, which has some examples of downloadable form letters.

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4.7: Creating Forms in Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Understand the Developer tab and its usage
- Use the tools in the Controls command group
- Create a fillable form in Microsoft Word

This section reviews how to build a fillable form in Word. Fillable forms can be very useful in businesses. These forms can be emailed to recipients as attachments and the recipients can fill in required information into the form quite easily. The fillable form creates fields that can be filled in by typing directly into the Word document. You can also insert checkbox fields, drop-down menus, and long text fields into the form. Fillable forms have many applications in business, such as gathering information on new hires that you might later want to put into a database, or obtaining company information from vendors for billing purposes. The primary purpose of the fillable form is to facilitate electronic completion while keeping the integrity and formatting of the document. Individuals can only input information into the fields you have identified. The rest of the document is locked from editing or deleting.

Figure 5.28 shows a simple example of how a fillable form can be a useful tool. If you wanted to gather information on a new vendor, for example, you could create a simple document, email it to the vendor, and have the vendor send the completed document back to us. However, as Figure 5.27 shows, if you just create the form as a typical, printable Word document, it is difficult for the vendor to input their information. They would need to edit the form itself in order to fill it out, which is not ideal. With a fillable form, the vendor simply inserts their information into the provided fields and the rest of the document is protected from editing. The fillable form can also be enhanced with decorative features, such as the company logo.

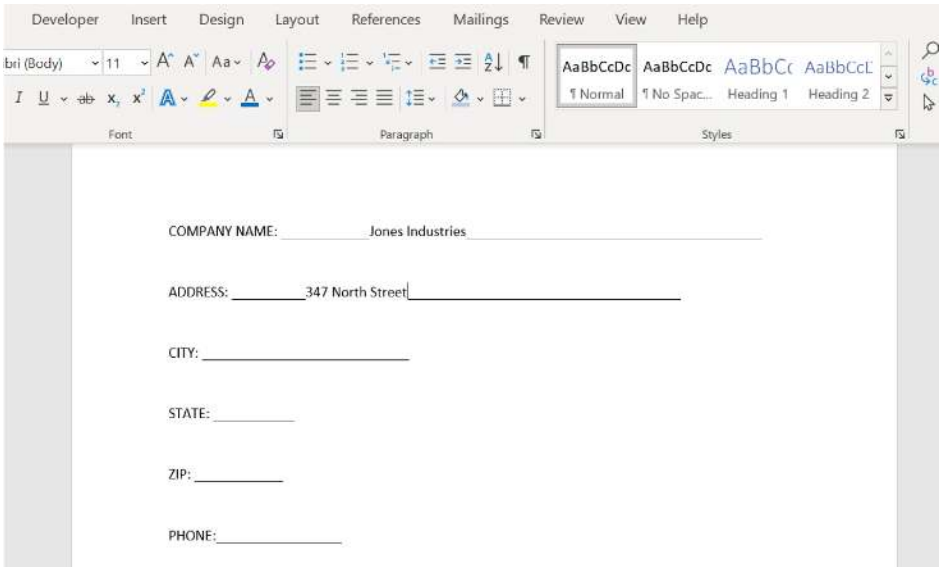


Figure 5.27: As information is entered into the form, the underline is replaced with the text. (Used with permission from Microsoft)

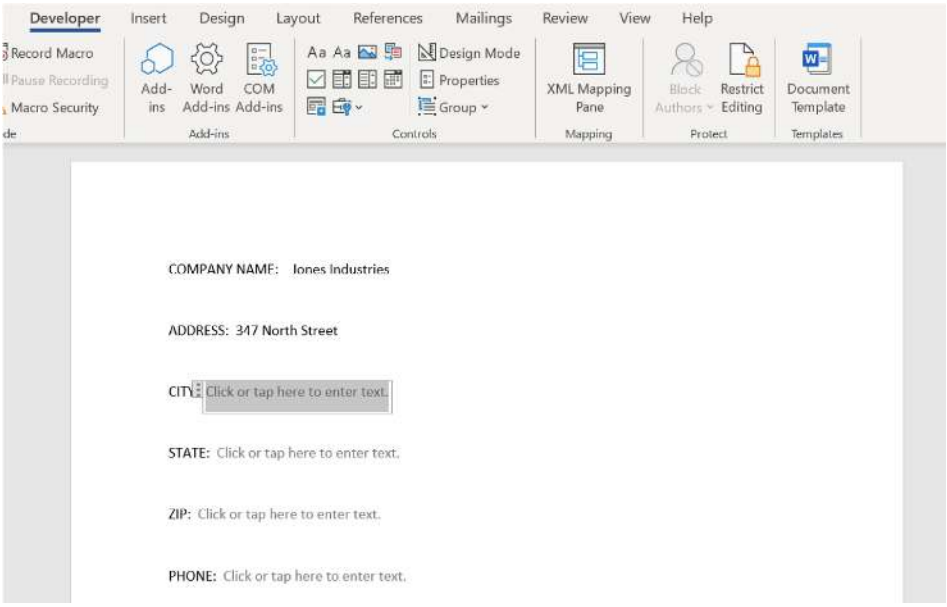


Figure 5.28: A fillable form gives a more professional appearance and can be customized with the company logo or letterhead. (Used with permission from Microsoft)

Developer Tab

To create surveys in Word, you need to enable the Developer tab. This is typically not one of the default tabs in Word, so you need to manually add it. Go to the Options command on the File tab, then on the Customize Ribbon tab, then enable the Developer tab.

Mac Tip

To add the Developer toolbar on a Mac, you will need to go to Word, then select Preferences, then go to Ribbon & Toolbar. In the Search box, type "Developer." Select the Developer tab from Suggestions. In the dialog box under the ribbon header, select the box that says Show Developer Tab.

The Developer tab serves several purposes, as Figure 5.29 shows. In addition to containing the tools needed to design fillable forms, it also contains the tools to create computer programs (macros) in Word, to protect and restrict access to your document, and other advanced tasks.

The majority of the features on the Developer tab are for more advanced uses of Word and are outside the scope of this text. This section focuses on the Controls and Protect command groups, which contain the tools we need to create and secure our fillable form.

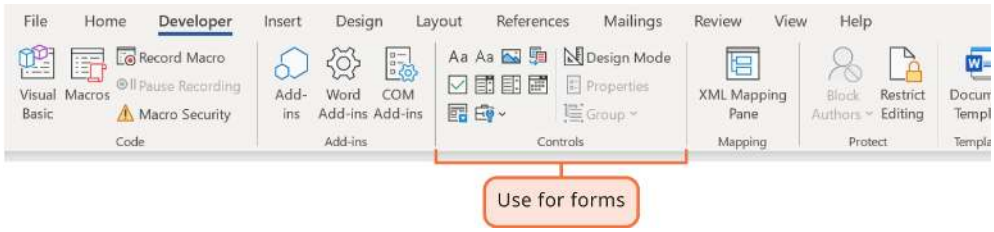


Figure 5.29: Making a form in Word uses these control commands. (Used with permission from Microsoft)

Controls Command Group

The Controls command group includes several different icons to represent the fields you can use in your form. Figure 5.30 identifies the icons you will be using to create the form. The remaining icons in the command group are used for building sophisticated templates in Word. The controls we are using in this example are called content control fields. These fields give people a space to type in, add a date or image, or choose their response from a list. In other words, they are interactive fields that

can be specially programmed to receive input from recipients. The content control fields create a user interface that seeks input from the respondent.

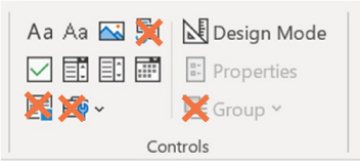


Figure 5.30: The controls you see with the "X" are not used when creating fillable forms. (Used with permission from Microsoft)

The top-level commands are for inserting text or images into your form. The inputted answer will use either rich text or plain text. Rich text allows the user to use bold, italic, and underlined font, different font types, and so forth, whereas plain text does not allow these types of font formatting. This distinction is important if you plan to print the form and want the text to appear with specific formatting. In general, the plain text response will suffice, as most respondents will not need to add formatting to their answers. The Insert Picture command (the landscape icon) is for letting the respondent add an image to their answer; this command may be used to ask the user to upload their profile picture, for instance.

The middle-level commands are for asking multiple-choice-type questions and for setting the date. The first (leftmost) in this row is the checkbox. This handy option reduces the amount of information that needs to be typed into the form. For example, the form could have a list of all departments at the company, and the respondent could simply check the box of the department that they work in, rather than type in the response manually. You could also have multiple-select questions that ask the survey taker to "check all boxes that apply."

The combo box and the drop-down list also ask the respondent to select from a set of preset choices. The main difference between the two is that the combo box lets the individual type a message after their selected answer, whereas the drop-down list forces them to choose between the options. The last (rightmost) command is the Date Picker, which allows the individual to select a date when they are completing the form. The respondent can choose any date with the Date Picker, such as their birthday or their date of hire.

The Design Mode tool is used to customize the prompts that appear as the survey taker fills out the form. You can use this to customize the prompt to the respondent; this can be more helpful to the survey taker than the generic default text (e.g., "Click or tap to enter text").

The last item you may use in the command group is the Properties tool. This tool allows you to modify the lists associated with the combo box and the drop-down list. It becomes active once you have added a combo box or drop-down list to your form.

Creating a Form

Before adding the fields, you should first develop the plan of the form. One way to do this is to type out the information or questions that you will ask into a blank document. Creating the form using a table is one option for presenting a professional appearance; this format helps keep everything organized and neatly aligned. The table should have two columns, and as many rows as you will have questions. Using only two columns allows you to put the questions in one column and the answer fields in the other. The column on the left will have your questions, and the column on the right will have the fields for the respondent's answers. You should change the table borders (in Table Properties) so that they are transparent, making it so that the respondent cannot see them. This way, the questions and answers remain aligned, but they will not appear to be in a table format to those viewing the form. Alternatively, you could choose to not use a table to create your form. In this case, the questions and answer fields would need to each be manually aligned.

For this example, let's use a table to create a fillable form. In your role at WorldCorp, you have been asked to collect information from all department office managers regarding their need for preprinted company office supplies. Your department (marketing) is responsible for all office supplies that include the WorldCorp logo. A large order is placed each quarter for items such as letterhead paper, envelopes, notepads and pens with the logo, and business cards. To help facilitate the process, your supervisor has asked you to create a fillable form that can be emailed to each department's office manager to gather information on items that will need to be ordered.

Creating Questions and Control Fields

To begin, start with a blank document and insert a two-column table. Type all your questions in the left column: information on the department, whether they need items ordered, and the quantity and type of items are needed. Figure 5.31 shows how the information will be gathered from the various departments. Because this is just the draft form, we have noted in parentheses the type of control that will be used for that question. You can go back and remove that information after you have inserted the fields. Notice that the table lines are still visible in this initial draft version. To remove the lines from the table, use the Borders tool in the Paragraph command group on the Home tab.

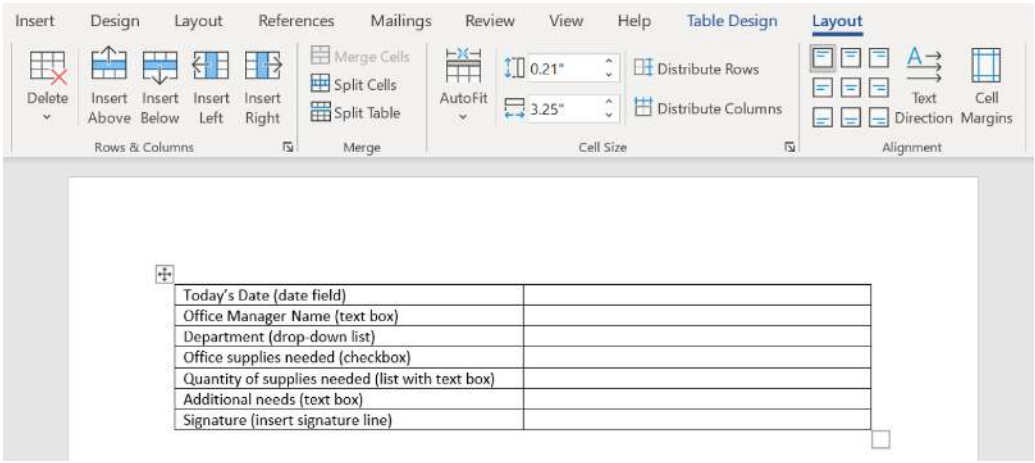


Figure 5.31: Your form should have a tidy and professional appearance. This could mean removing the lines around the table and inserting the company logo. (Used with permission from Microsoft)

Then, insert the control fields—where the respondent will put their answers—in the right column. First, insert the Date Picker control field, as Figure 5.32 shows. Notice the text says, "Click or tap to enter a date." This is not very descriptive. You can change this in Design Mode to be more descriptive. Design Mode lets you change the preset instruction text. To turn on Design Mode, simply click it in the Controls command group. You are now able to change the default text to be more specific such as "Enter Today's Date" (Figure 5.33).

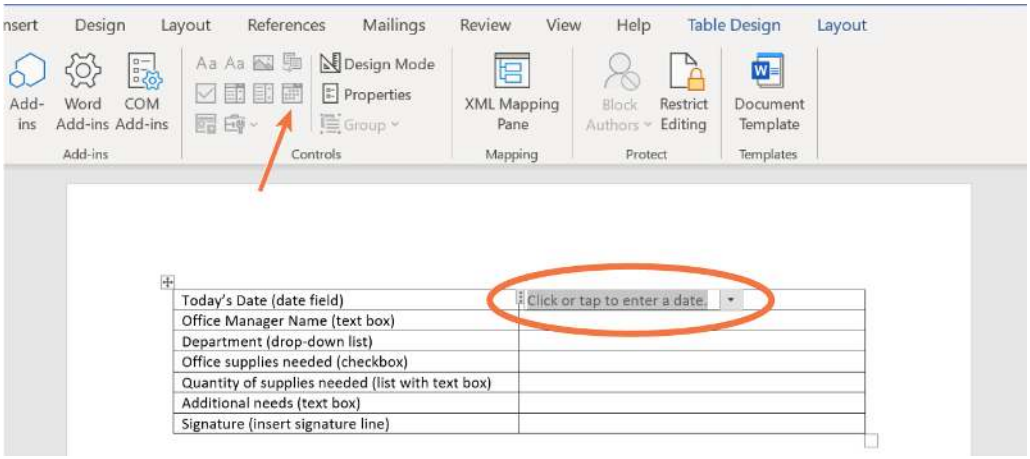


Figure 5.32: The default text inserted with the control fields is not very descriptive, so you may want to replace it with your own, more detailed text. (Used with permission from Microsoft)

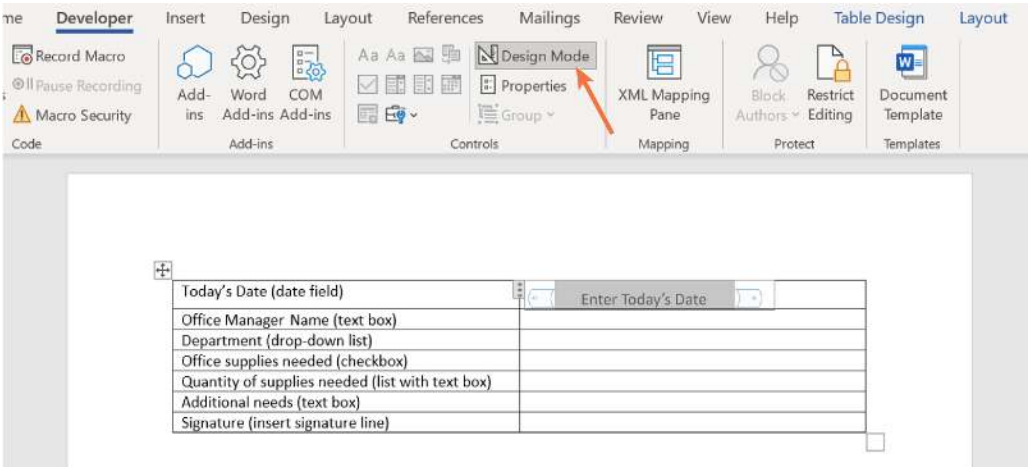


Figure 5.33: Your custom text should be descriptive enough so that the user knows exactly what they need to put in the field. (Used with permission from Microsoft)

Continue with the remaining questions and enter the field and specific prompter text for each question. Figure 5.34 shows how the form should look at this point. Now, go back to each question and examine the properties to determine if changes need to be made. Notice that a bulleted list and the insert signature tool were used in the right column. (You learned these skills in the Creating and Working in Documents and Document Preparation chapters.) Note that the notes in parentheses were also removed.

Today's Date	Enter Today's Date
Office Manager Name	Enter First and Last Name
Department	Choose Your Department
Office supplies needed	☐
Quantity of supplies needed	• Letter head Enter qty needed • Envelopes Enter qty needed • Notepads Enter qty needed • Pens Enter qty needed • Business Cards Enter employee name for cards
Additional needs	Any additional items needed from Marketing ?
Signature	X _____

Figure 5.34: Changes to the line spacing in the table now make the form more visually appealing. (Used with permission from Microsoft)

Now that you have the form constructed and the control fields inserted, you can customize each control field if necessary. To do that, you need to select the control field, and then choose the Properties command. A dialog box will appear for that control, as shown in Figure 5.35 for the first field, “Today’s Date.” Here, you can change the format of the date to be entered. There are only a few options for the text boxes. You can change the font and the fill color. You can also choose to have the control locked so that it cannot be deleted. For this example, use the default settings.

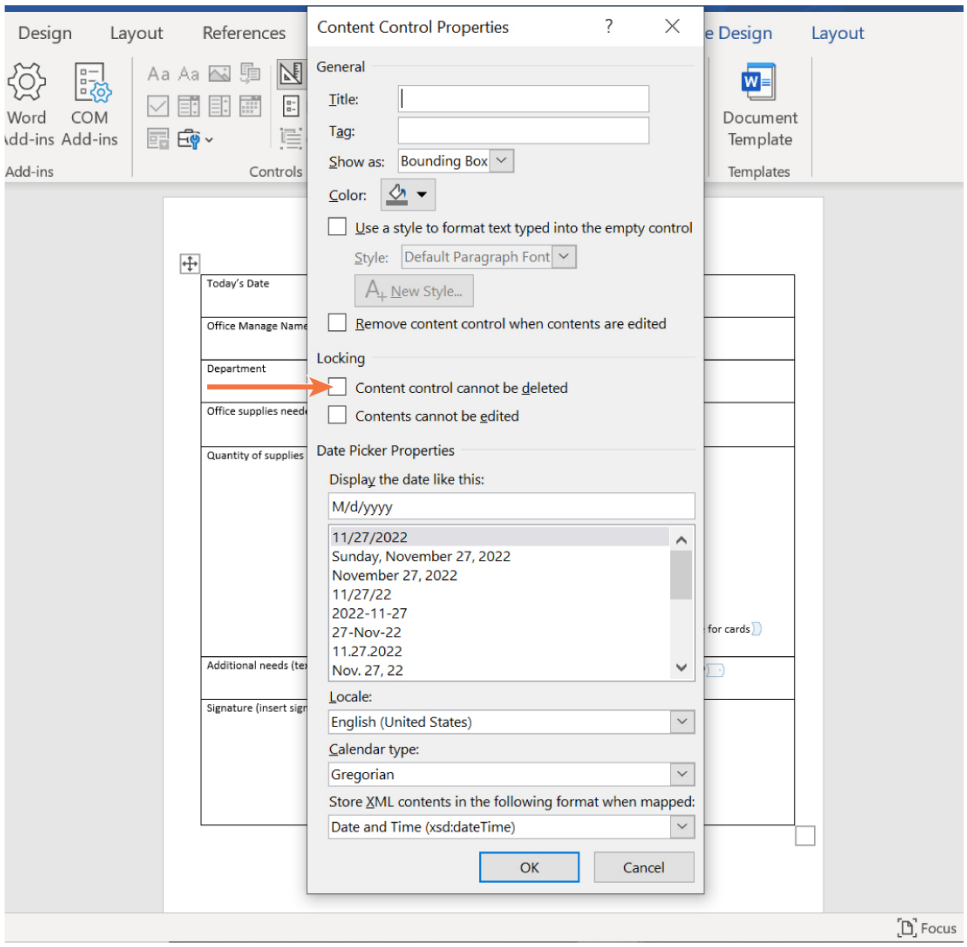


Figure 5.35: By checking the “Content control cannot be deleted” box, you can protect the field. (Used with permission from Microsoft)

For the multiple-choice questions, the drop-down lists, and the combo boxes, the setting up takes a little bit longer. You need to manually add the choices to the list for each question type. In your form, you need to write out the departments so that the office manager can choose the appropriate department. To do this, go to the Properties for the drop-down list (see Figure 5.36). At the bottom of the dialog box, locate the drop-down list properties. Here is where you will add the various departments. By default, the only option is Choose an Item. We need to remove this item and add the departments. Click on Choose an Item and select Remove from the options on the right. Now, choose Add to add each department.

Notice that the Display Name and Value Name are the same. There is really no need to change this, but you can change it if you want the respondent-facing choice to look different from what is actually logged as their response. For example, you could have the Display Name (i.e., what the respondent sees in the drop-down list) to say Accounting, but the actual Value that is displayed when they choose Accounting is “Acct.”

Continue in this same manner to add all the departments as shown. If desired, you can change the order of the options in the list by choosing Move Up or Move Down (Figure 5.36). For a more professional look, consider placing the items in alphabetical order.

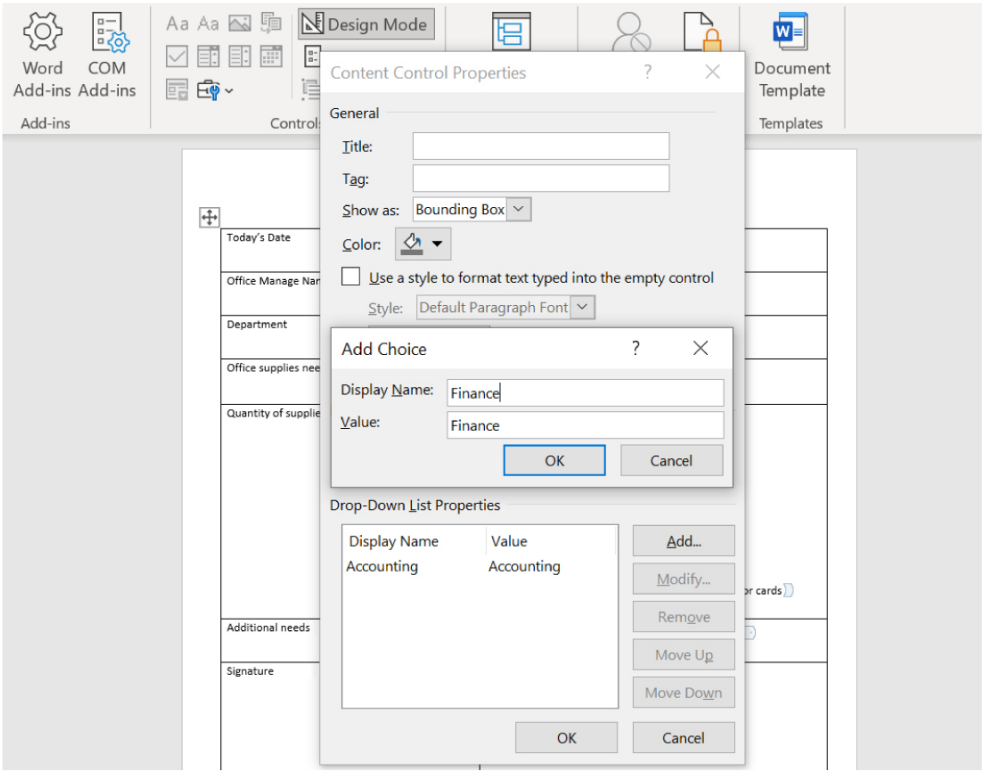


Figure 5.36: With a drop-down list, use Properties to define each of the categories in the list. Generally, the display name and the value should be the same. (Used with permission from Microsoft)

Finally, you need to format the checkbox field. As with the other control fields, you can change the font and style (see Figure 5.37). But with the checkbox, you can also change what type of symbol is used in the box. For example, you can choose a heart instead of an X for the form. To do this, choose Change next to Checked Symbol. Choose what type of symbol you want for the checked box (see Figure 5.38).

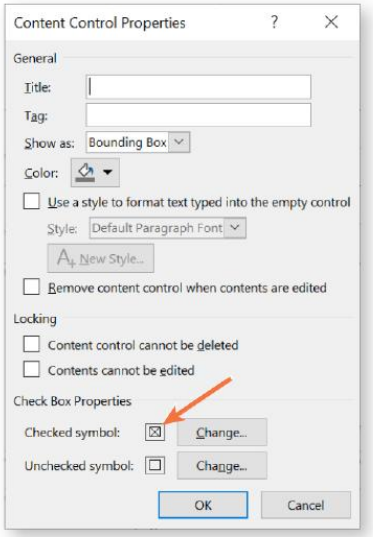


Figure 5.37: The default symbol for the checked box is an X. (Used with permission from Microsoft)

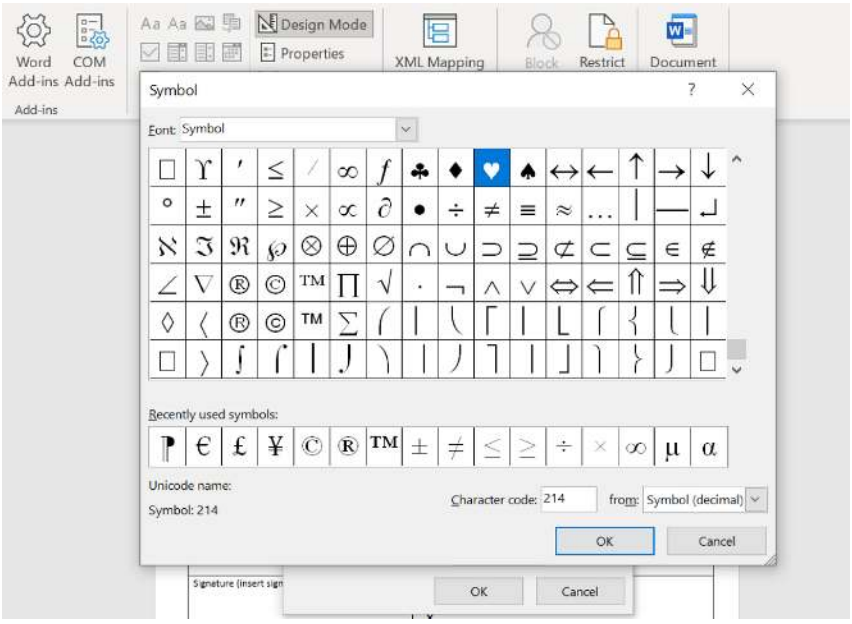


Figure 5.38: Choose Symbols from the drop-down menu in the Font field to find the heart. (Used with permission from Microsoft)

You could adjust the properties of each control field as you enter them into the document. However, it is often easier to add the fields first and then go back and make the needed customizations to each field with the Properties tool.

When you have finished formatting all the control fields, make sure you have saved the document. You can now turn off Design Mode by clicking the tool in the command group. Now is also a good time to add some visual elements to the form, such as the company logo or other elements to make the form more visually appealing. You should also remove the borders around the table. Figure 5.39 shows what the finished product might look like.

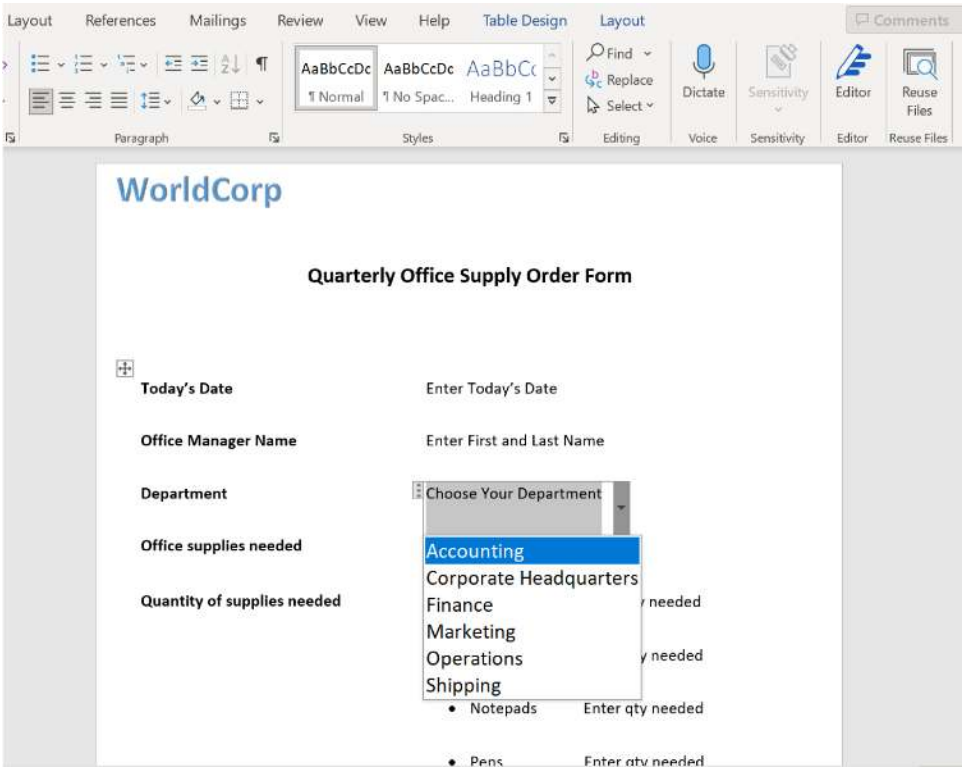


Figure 5.39: Notice that when the drop-down list is selected, the various departments show up. (Used with permission from Microsoft)

Protecting the Form

When you are finished with the form, you need to protect the file before sending it to the various office managers. This will ensure that they cannot edit the questions and controls—that they can only provide responses. The way to protect the document is similar to the process described in the Creating and Working in Documents chapter. To protect the document, select the Restrict Editing command from the Developer tab and a sidebar will appear. You can also access the Restrict Editing command from the Review tab. This sidebar will give you options for preventing editing from happening on the file, as shown in Figure 5.40.

When you send the file to others, be sure to send the file as an attachment to the email rather than sharing the document link. If you have saved this file in your OneDrive and share the document as a link, your original file will be changed. You should instruct them to save the file under a different name and to send the file back as an attachment.

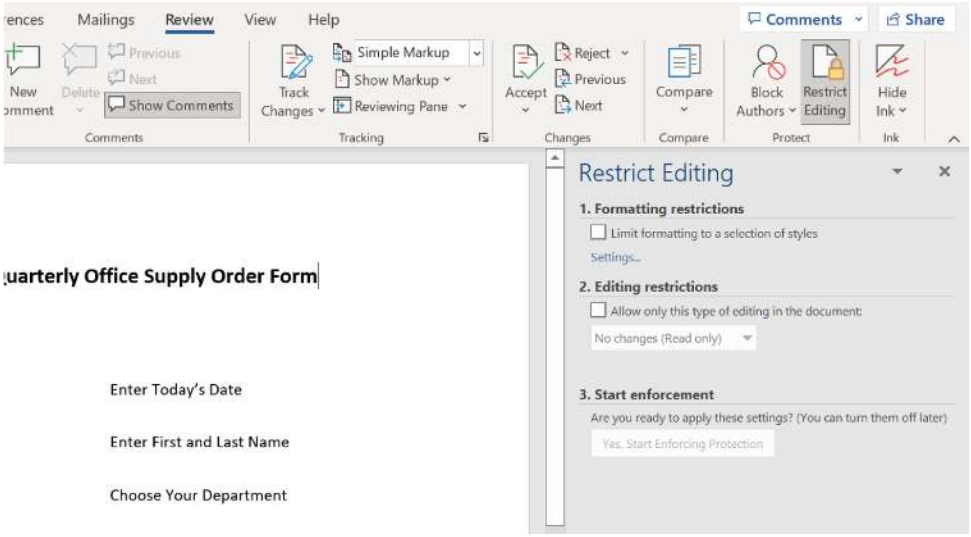


Figure 5.40: Before sending the survey form, you need to prevent clients from editing the document. (Used with permission from Microsoft)

Link to Learning

There are a lot of detailed privacy considerations when conducting surveys. A considerable number of laws are in place to protect consumers when participating in corporate surveys. Visit the Information and Privacy Commissioner of Ontario's Best Practices for Protecting Individual Privacy in Conducting Survey Research(opens in new window) site to learn more.

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4.8: Chapter Review - Review Questions

This page is a draft and is under active development.

Review Questions

1 .
What are the key components of a business memo?

a. the business logo, the memo sign, the heading, the body text
b. the letterhead, the addressor’s address, the addressee’s address, the body text
c. the business logo, the name, the job position, the contact details
d. the cover, the back cover, the inside flap, the inside center

2 .
Why might you want to design your own letterhead?

a. It shows professionalism.
b. It demonstrates mastery of a complicated skill.
c. It helps define your career.
d. It keeps your information private.

3 .
Which document is given to a customer for a product or service provided by a company?

a. Cardstock
b. Letterhead
c. Memo
d. Invoice

4 .
What is the overall purpose of a business plan?

a. A business plan is optional with today’s technology.
b. A business plan is a document that describes a company’s plan for growth and profitability.
c. A business plan should include details about company invoices.
d. A business plan should summarize a company’s interest and motivation for applying for funding.

5 .
What is the source document in mail merge?

a. the file where the field information is located
b. the list of fields you will be using in the mail merge
c. the Word document where the fields are located
d. the file where the fields are inserted

6 .
Merge fields in a document are identified using what denotation?

a. Parentheses ()
b. Double brackets [[ ]]
c. Double angle brackets << >>
d. All caps

7 .
What is the objective of Design Mode?

a. to customize the preset text labels of each form control
b. to add images to the fillable form
c. to change the preset logo of your company
d. to format the appearance of the form questions

8.
Which tab is used for creating forms in the Windows version of Word?

a. Design
b. References
c. Developer
d. Layout

9 .
What Word tool is used as a placeholder for the types of questions you will have in the form?

a. Design Mode
b. comment
c. merge Field
d. content control field

10.
What is one advantage to using a template to create a new form?

a. The template already has a few questions to get you started.
b. The template has all the built-in questions you need.
c. Templates have preset themes that cannot be changed.
d. The template you choose comes with responses.

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4.9: Chapter Review - Practice Exercises

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Practice Exercises

19 .
Design an invoice for the sales of screen panels using a Microsoft template. The client wants 25 LEDs with 64” screens, 99 LCDs with 55” screens, and 15 QLEDs with 75” screens. Use the following information:
Client: Doe’s Electronics
Client Address: 123 Doe Street, Doe City, Virginia, 12345
Use today’s date to date the invoice. Search for the unit price of these TVs on the internet.
11 .
At this point in your life, you might have a résumé of your own. Let’s look at it critically and revise it. Choose a template as described in the chapter, then copy and paste your information into the résumé you are updating for yourself.
12 .
Write a business memo for your department at WorldCorp using one of the Microsoft memo templates. The memo should announce to WorldCorp employees that there is a new set of company brand guidelines, and that all employees at WorldCorp need to upgrade their logos and design in their letterheads, envelopes, and business cards.
13 .
Use mail merge to create envelopes using the names/addresses we used in the example in the chapter. Use a fictional WorldCorp address found on the main document as the return address.
14 .
WorldCorp is sending a letter to its clients thanking them for their participation in a survey. Write the “thank you form letter” for the main document from scratch, or use one of these templates. Adjust the merge fields as needed to include the company name. Add five company names, street addresses, city, state, and zip code by creating a new list as outlined in the chapter. These five names and addresses can be made up, or you can use the data in the downloadable List Names worksheet. Perform the mail merge of the “thank you form letter,” and use the Edit Individual Documents command for the final mail merge.
15 .
Design a new form for your WorldCorp coworkers. You are holding training sessions on the new company-wide computer system, and you need to know when your coworkers can come. Attendance is mandatory, but the coworkers can choose their own time slot and date. Make a form with the necessary information (name, position, department, time, date).
16 .
Create a form that could be used when contacting a new business client for cell phone/tablets for employees. You will want to gather enough information about their needs to provide them an accurate quote for monthly costs. Information that you will collect could be decision maker’s contact information, number of employees, estimated usage of phones/data, how many phones/tablets might be needed, and other related information. Be creative in selecting the correct question type for the correct form controls.

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4.10: Chapter Review - Written Questions

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Written Questions

16 .
How could templates help your professional presence as a business consultant? Explain.
17 .
What is the objective and general form of a business card? Explain.
18.
What are the similarities and differences between a brochure and a flyer?
19 .
What are some advantages of using mail merge?
20 .
Describe the process of inserting fields into the main document.

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4.11: Chapter Review - Case Exercises

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Case Exercises

Exercise A

Scenario: You support a campus or community program (student club, tutoring center, food pantry, cultural center, or nonprofit partner). You've been asked to create a **one-page** document that explains a service in a way that is clear for a **diverse audience**, including students who may be busy, commuting, working, or bilingual.

Prompt: Create a "Student Resource One-Pager" that explains **how to access a campus/community support service** (choose one: tutoring, food pantry, tech help, advising, mental health resources, scholarship support, or another approved service).

Instructions (Microsoft Word):

- Create a **1-page** document with:
  - A clear **title** and **two short sections** (example: *What this service is* and *How to use it*).
- Insert **one graphic** (choose one):
  - an icon, photo, or screenshot (example: a campus map snippet, a QR code image, or a service logo).
- Insert **one SmartArt** graphic that shows a process or structure (choose one):
  - *Process* (steps to access the service), or
  - *Cycle* (repeat steps like weekly support), or
  - *Hierarchy* (who to contact first, second, third).
- Add a **caption** under the graphic or SmartArt (example: "Figure 1: Steps to Access Tutoring").
- Format for readability:
  - Use headings, consistent font sizes, and spacing.
  - Ensure the page looks professional and easy to scan.

Deliverable: Submit **one Word document (1 page)** that includes at least **one inserted graphic** and **one SmartArt** visual.
File name: `Lastname_CaseStudy_GraphicsSmartArt.docx`

Exercise B

Scenario: You are working with a partner (classmate, supervisor, or stakeholder) to improve a short report before it is shared publicly. The topic affects students' day-to-day experience, so accuracy and respectful wording matter.

Prompt: Create a **1–2 page** "Student Experience Update" that summarizes a challenge students face and proposes a solution. Choose one topic: textbook affordability/OER, commuting or parking, campus food pricing/options, tutoring access, technology access, or bilingual communication on campus.

Instructions (Microsoft Word):

1. Create a **1–2 page** report with these headings:
   - Issue
   - Evidence or Observations

- Recommendation

2. Turn on **Track Changes** and make at least **5 edits** to your draft (example: rewrite a sentence for clarity, adjust word choice for respectful tone, fix formatting, add a heading).
3. Insert at least **3 comments** that show your thinking or questions (example: “Need a data point here,” “Is this wording clear for students who are new to campus?”).
4. Demonstrate **version history**:
   - Save the document, then make a noticeable change (example: add a short paragraph or revise a recommendation).
   - Save again with a new version name (or, if using OneDrive/Word Online, confirm Version History is available).
5. At the bottom of the document, add a short “Revision Note” (2–3 sentences) describing:
   - what you changed,
   - why you changed it,
   - and how feedback tools helped improve the document.

Deliverable: Submit **one Word document (1–2 pages)** with Track Changes visible, at least 3 comments, and a revision note referencing version history.
File name: `Lastname_CaseStudy_TrackChanges_VersionHistory.docx`

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CHAPTER OVERVIEW

5: Basic Excel Skills

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Microsoft Excel is a tool that can be used in virtually all careers and is valuable in both professional and personal settings. Whether you need to keep track of medications in inventory for a hospital or create a financial plan for your retirement, Excel enables you to do these activities efficiently and accurately. This chapter introduces the fundamental skills necessary to get you started in using Excel. You will find that just a few skills can make you very productive in a short period of time.

5.1: Overview of Microsoft Excel
5.2: Entering, Editing, and Managing Data
5.3: Formatting and Data Analysis
5.4: Formulas
5.5: Introductory Statistical Functions
5.6: Printing
5.7: Preparing to Print
5.8: Chapter Practice

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5.1: Overview of Microsoft Excel

This page is a draft and is under active development.

Learning Objectives

- Examine the value of using Excel to make decisions.
- Learn how to start Excel.
- Become familiar with the Excel workbook.
- Understand how to navigate worksheets.
- Examine the Excel Ribbon.
- Examine the right-click menu options.
- Learn how to save workbooks.
- Examine the Status Bar.
- Become familiar with the features in the Excel Help window.

Microsoft Office contains a variety of tools that help people accomplish many personal and professional objectives. Microsoft Excel is perhaps the most versatile and widely used of all the Office applications. No matter which career path you choose, you will likely need to use Excel to accomplish your professional objectives, some of which may occur daily. This chapter provides an overview of the Excel application along with an orientation for accessing the commands and features of an Excel workbook.

Making Decisions with Excel

Taking a very simple view, Excel is a tool that allows you to enter quantitative data into an electronic spreadsheet to apply one or many mathematical computations. These computations ultimately convert that quantitative data into information. The information produced in Excel can be used to make decisions in both professional and personal contexts. For example, employees can use Excel to determine how much inventory to buy for a clothing retailer, how much medication to administer to a patient, or how much money to spend to stay within a budget. With respect to personal decisions, you can use Excel to determine how much money you can spend on a house, how much you can spend on car lease payments, or how much you need to save to reach your retirement goals. We will demonstrate how you can use Excel to make these decisions and many more throughout this text.

Figure 1.1 shows a completed Excel worksheet that will be constructed in this chapter. The information shown in this worksheet contains sales data for a hypothetical merchandise retail company. The worksheet data can help a retailer analyze the business and determine the number of salespeople needed for each month for example.

	A	B	C	D
1	**Merchandise City, USA Retail Sales**			
2	**Month**	**Unit Sales**	**Average Price**	**Sales Dollars**
3	January	2,670	$ 9.99	$ 26,685
4	February	2,160	$ 12.49	$ 26,937
5	March	515	$ 14.99	$ 7,701
6	April	590	$ 17.49	$ 10,269
7	May	1,030	$ 14.99	$ 15,405
8	June	2,875	$ 12.49	$ 35,916
9	July	2,700	$ 9.99	$ 26,937
10	August	900	$ 19.99	$ 17,958
11	September	775	$ 19.99	$ 15,708
12	October	1,180	$ 19.99	$ 23,562
13	November	1,800	$ 17.49	$ 31,416
14	December	4,560	$ 14.99	$ 75,125
15	**Total Sales**	21,755		$ 313,619
16				
17				

Figure 1.1 Example of an Excel Worksheet

Starting Excel

1. Locate Excel on your computer.
2. Click Microsoft Excel to launch the Excel application where you are presented with workbook options to help get you started.
3. Click the first option; “Blank Workbook”.

Excel for Windows vs Excel for Mac

The Excel for Windows and Excel for Mac software versions are very similar. Most of the features, tools and commands are available in both versions. There are, however, some differences with the Excel interface. There are also a few features that are not available in the Excel for Mac version. The screenshots and step-by-step instructions in this textbook are specific to Excel for Windows. We have attempted to provide alternate screenshots and instructions for the Mac version when the differences are significant. When you see this icon , it means we are providing information specific to Mac users.

The Excel Workbook

A workbook is an Excel file that contains one or more worksheets (referred to as spreadsheets). Excel will assign a file name to the workbook, such as **Book1**, **Book2**, **Book3**, and so on, depending on how many new workbooks are opened. **Figure 1.2** shows a blank workbook after starting Excel. Take some time to familiarize yourself with this screen. Your screen may be slightly different based on the version you’re using.

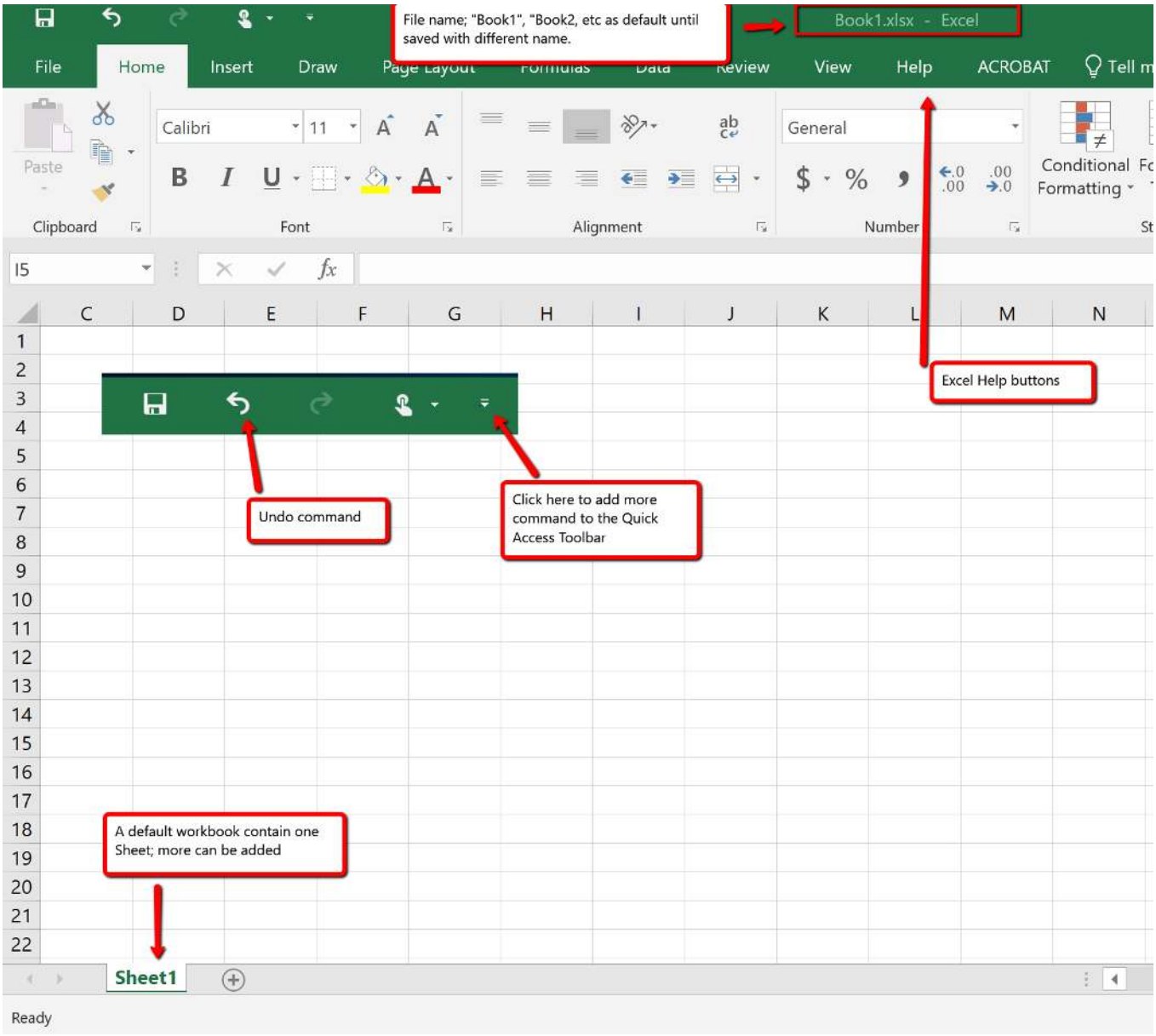


Figure 1.2 Blank Workbook

https://biz.libretexts.org/@go/page/150568

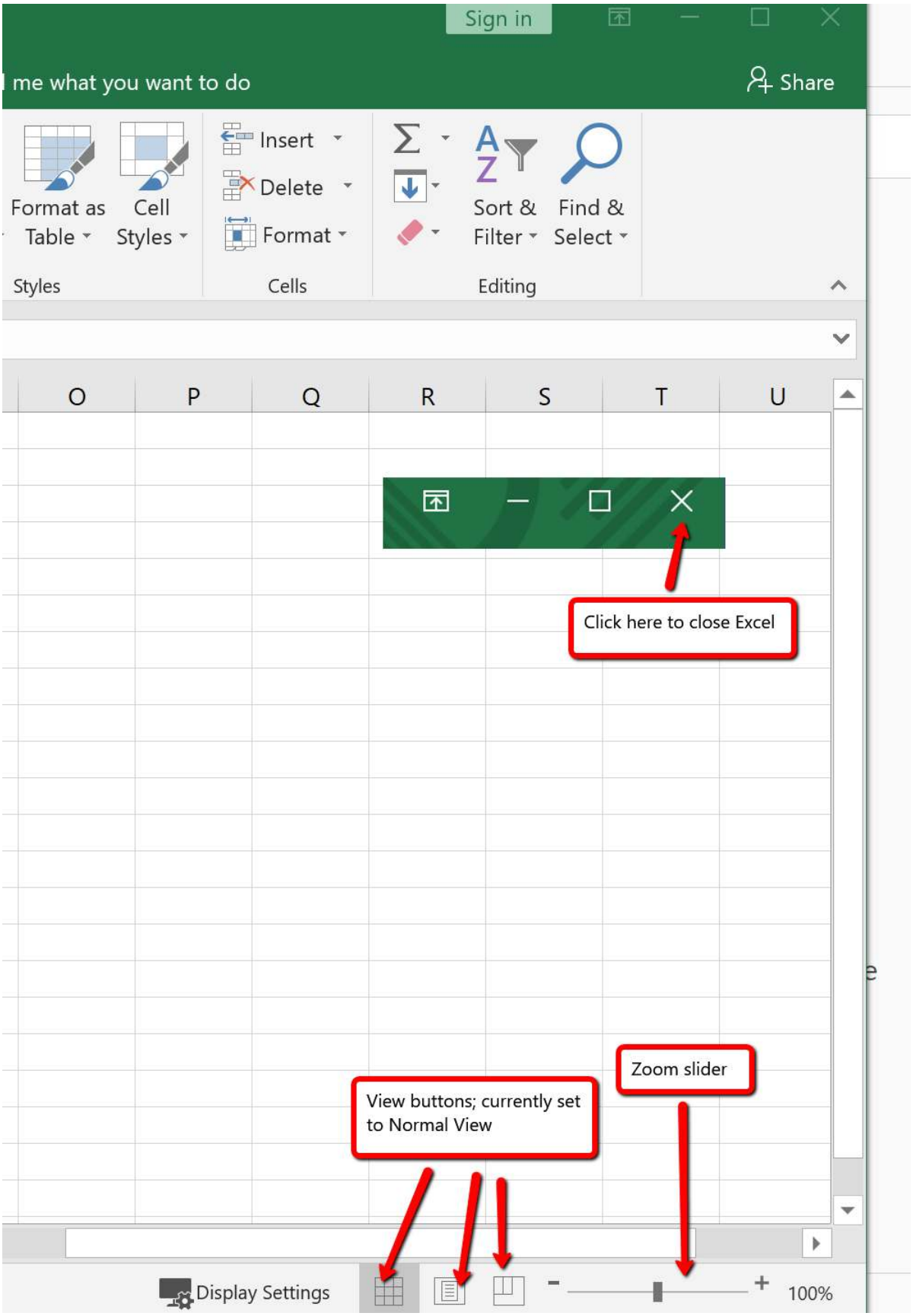


Figure 1.2a Blank Workbook (right-side)

Your workbook should already be maximized (or shown at full size) once Excel is started, as shown in **Figure 1.2**. However, if your screen looks like **Figure 1.3** after starting Excel, you should click the Maximize button, as shown in the figure.

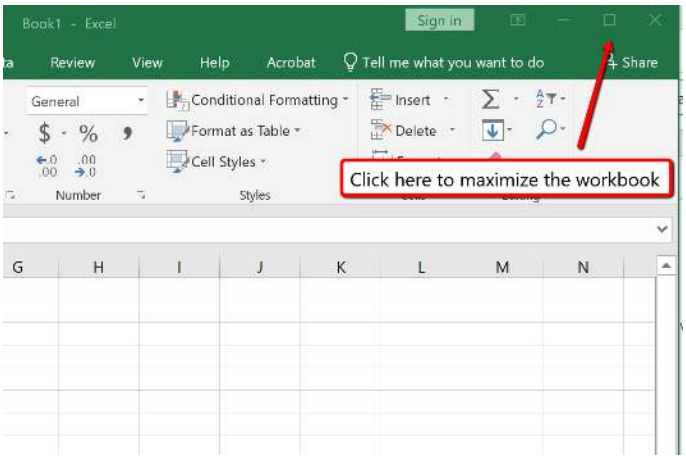


Figure 1.3 Restored Worksheet

Navigating Worksheets

Data are entered and managed in an Excel worksheet. The worksheet contains several rectangles called cells for entering numeric and non-numeric data. Each cell in an Excel worksheet contains an address, which is defined by a column letter followed by a row number. For example, the cell that is currently activated in **Figure 1.3** is **A1**. This would be referred to as cell location A1 or cell reference A1. The following steps explain how you can navigate in an Excel worksheet:

1. Place your mouse pointer over cell D5 and click.
2. Check to make sure column letter D and row number 5 are highlighted, as shown in **Figure 1.4**.

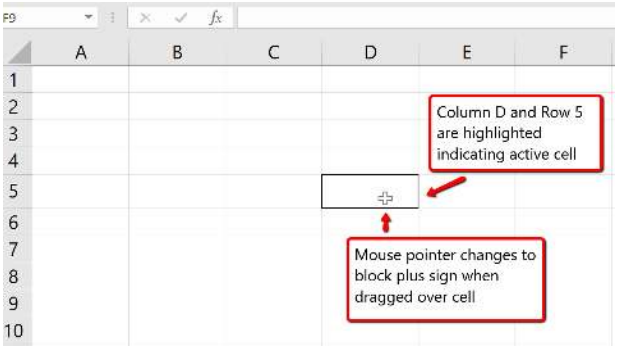


Figure 1.4 Activating a Cell Location

1. Move the mouse pointer to cell A1.
2. Click and hold the left mouse button and drag the mouse pointer back to cell D5.
3. Release the left mouse button. You should see several cells highlighted, as shown in **Figure 1.5**.

This is referred to as a ***cell range*** and is documented as follows: **A1:D5**. Any two cell locations separated by a colon are known as a cell range. The first cell is the top left corner of the range, and the second cell is the lower right corner of the range.

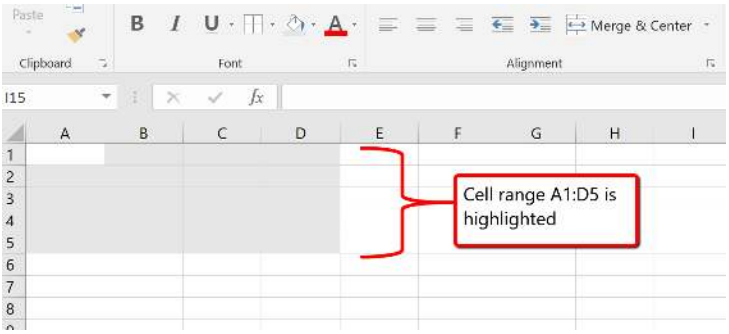


Figure 1.5 Highlighting a Range of Cells

1. At the bottom of the screen, you'll see a sheet tab indicated by "**Sheet1**". Clicking on the + adds additional worksheets. This is how you open or add a worksheets within a workbook. To see how this works, click on the + to add another worksheet so that you now have two sheets
2. Click the Sheet1 worksheet tab at the bottom of the worksheet to return to the worksheet shown in **Figure 1.5**.

Keyboard Shortcuts

Basic Worksheet Navigation

- Use the arrow keys on your keyboard to activate cells on the worksheet.
- Hold the SHIFT key and press the arrow keys on your keyboard to highlight a range of cells in a worksheet.
- Hold the CTRL key while pressing the PAGE DOWN or PAGE UP keys to open other worksheets in a workbook.
- Mac Users: Hold down the Fn and Command keys and press the left or right arrow keys

The Excel Ribbon

Excel's features and commands are found in the Ribbon, which is the upper area of the Excel screen that contains several tabs running across the top. Each tab provides access to a different set of Excel commands. **Figure 1.6** shows the commands available in the Home tab of the Ribbon. **Table 1.1 "Command Overview for Each Tab of the Ribbon"** provides an overview of the commands that are found in each tab of the Ribbon.

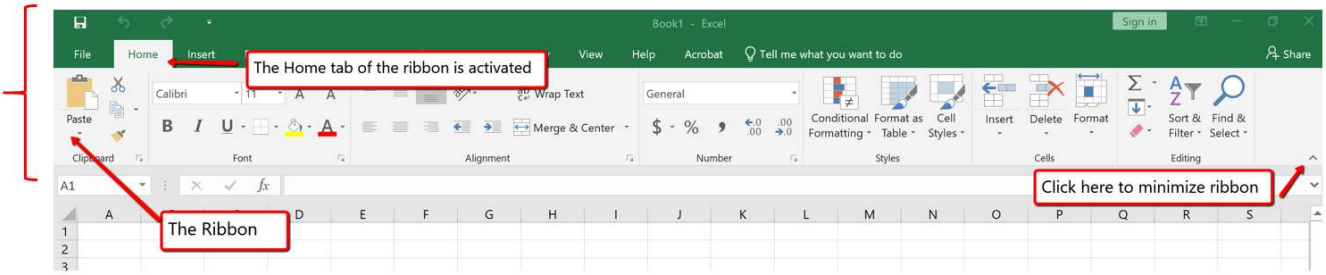


Figure 1.6 Home Tab of Ribbon

The Excel for Mac ribbon, as shown in **Figure 1.6a** below, has two primary differences:

- The older dropdown menu structure is still available with Excel for Mac.
- The specific commands and tools within each tab are slightly different between the two Excel Ribbons. Some of the commands found within the Excel for Windows Ribbon tabs are located within the dropdown menu structure in the Excel for Mac version. So, if you can't find the tool on the Excel for Mac Ribbon, then try to find the tool by looking through the dropdown menu instead.

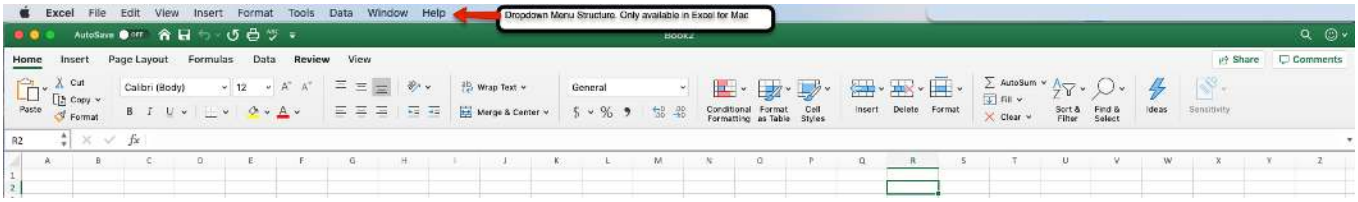


Figure 1.6a Home tab of Excel for Mac Ribbon with dropdown menu structure

Group Title Names on the Ribbon

If you look closely at the Excel Ribbon (See Figure 1.6 above), you will see that the Ribbon is separated in groups of tool buttons, and each group has a title name. On Home tab, the group title names are “Clipboard”, “Font”, “Alignment”, “Number”, “Styles”. “Cells”, “Editing”, etc. The tool buttons within each group are all related to the group title.

Mac Users Only: The default “View” for the Excel for Mac ribbon **does not display** these “group title names”. Notice in Figure 1.6a above, there are no group title names. It is a good idea to change this “view” so you can see the group title names. Here are the steps:

1. Click the **“Excel” menu option at top left above the Ribbon**
2. Choose **“Preferences”**
3. Click the **“View” button**
4. Scroll down and check the box for **“Group Titles”**
5. Close the “View” dialog box. The group title names should now display as shown in Figure 6.1 (not Figure 6.1a) above

Table 1.1 Command Overview for Each Tab of the Ribbon

Tab Name	Description of Commands
File	Also known as the Backstage view of the Excel workbook. Contains all commands for opening, closing, saving, and creating new Excel workbooks. Includes print commands, document properties, e-mailing options, and help features. The default settings and options are also found in this tab.
Home	Contains the most frequently used Excel commands. Formatting commands are found in this tab along with commands for cutting, copying, pasting, and for inserting and deleting rows and columns.
Insert	Used to insert objects such as charts, pictures, shapes, PivotTables, Internet links, symbols, or text boxes.
Page Layout	Contains commands used to prepare a worksheet for printing. Also includes commands used to show and print the gridlines on a worksheet.
Formulas	Includes commands for adding mathematical functions to a worksheet. Also contains tools for auditing mathematical formulas.
Data	Used when working with external data sources such as Microsoft Access, text files, or the Internet. Also contains sorting commands and access to scenario tools.
Review	Includes Spelling and Track Changes features. Also contains protection features to password protect worksheets or workbooks.
View	Used to adjust the visual appearance of a workbook. Common commands include the Zoom and Page Layout view.
Help	This tab provides access to help and support features such as contacting Microsoft support, sending feedback, suggesting a new feature, and community discussion groups.  Nordstrom, Inc. Income Statement Years Ended January 29, 2011 and January 30, 2010 (In millions) 2010 2009 Net sales $ 9,700 $8,627 Cost of goods sold 5,897 5,328 Gross margin $ 3,803 $3,299 Selling and administrative expenses 2,685 2,465 Operating income $ 1,118 $ 834 Interest expense 127 138 Income before taxes $ 991 $ 696 Income tax expense 378 255 Net income $ 613 $ 441 **This tab is not available with Excel for Mac.**
Draw	Provides drawing options for using a digital pen, mouse or finger depending on the type of device (laptop with touch screen, tablet, computer, etc). This tab is not visible by default. See below on how to customize the Ribbon to add or remove tabs.
Developer	Provides access to some advanced features such as macros, form controls, and XML commands. This tab is not visible by default. See below on how to customize the Ribbon to add or remove tabs.

The Ribbon shown in **Figure 1.6 and Figure 1.6a** (above) is full, or maximized. The benefit of having a full Ribbon is that the commands are always visible while you are developing a worksheet. However, depending on the screen dimensions of your

computer, you may find that the Ribbon takes up too much vertical space on your worksheet. If this is the case, you can minimize the Ribbon by clicking the button shown in **Figure 1.6**. When minimized, the Ribbon will show only the tabs and not the command buttons. When you click on a tab, the command buttons will appear until you select a command or click anywhere on your worksheet.

To hide the Ribbon with Excel for Mac you can use the keyboard shortcut:

Hold down the “Command and Option” keys and tap the “R” key

The same keyboard shortcut will unhide the Ribbon as well.

How to Customize the Excel Ribbon

Here are the steps to add additional tabs to the Excel Ribbon

1. Click the File tab and choose Options
2. Click on “Customize Ribbon” at the left side of the Options screen
3. Click the checkbox next to the Tab name that you want to add (See Figure 1.7 below)

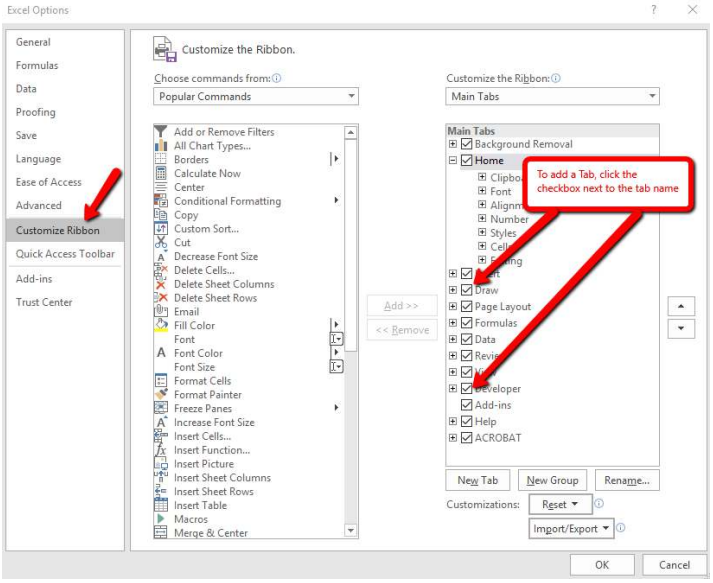


Figure 1.7 Customize the Ribbon Dialog Box

Keyboard Shortcuts

Minimizing or Maximizing the Ribbon

- Hold down the CTRL key and press the F1 key.
- Hold down the CTRL key and press the F1 key again to maximize the Ribbon.
- Mac Users: Hold down the Command and Option keys and press R

Quick Access Toolbar and Right-Click Menu

The Quick Access Toolbar is found at the upper left side of the Excel screen above the Ribbon, as shown in **Figure 1.7**. This area provides access to the most frequently used commands, such as Save and Undo. You also can customize the Quick Access Toolbar by adding commands that you use on a regular basis. By placing these commands in the Quick Access Toolbar, you do not have to navigate through the Ribbon to find them. To customize the Quick Access Toolbar, click the down arrow as shown in **Figure 1.8**. This will open a menu of commands that you can add to the Quick Access Toolbar. If you do not see the command you are looking for on the list, select the More Commands option.

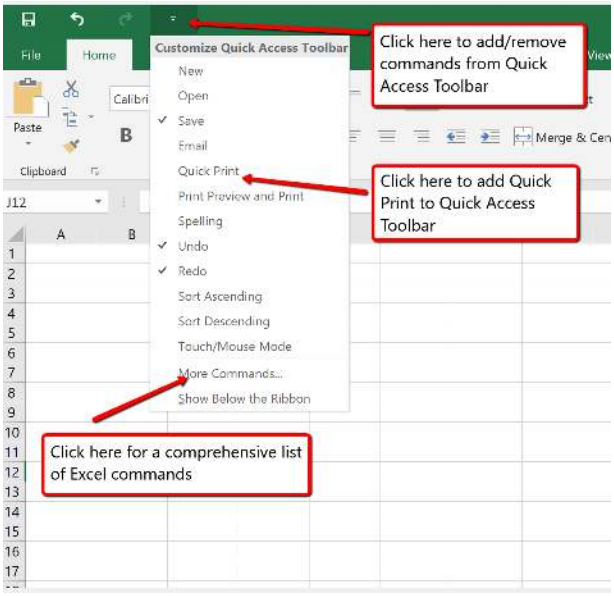


Figure 1.8 Customizing the Quick Access Toolbar

In addition to the Ribbon and Quick Access Toolbar, you can also access many commands by right clicking anywhere on the worksheet. **Figure 1.9** shows an example of the commands available in the right-click menu.

There is no "Right-click" option for Excel for Mac. To access the same commands with Excel for Mac, hold down the Control key and click the mouse button.

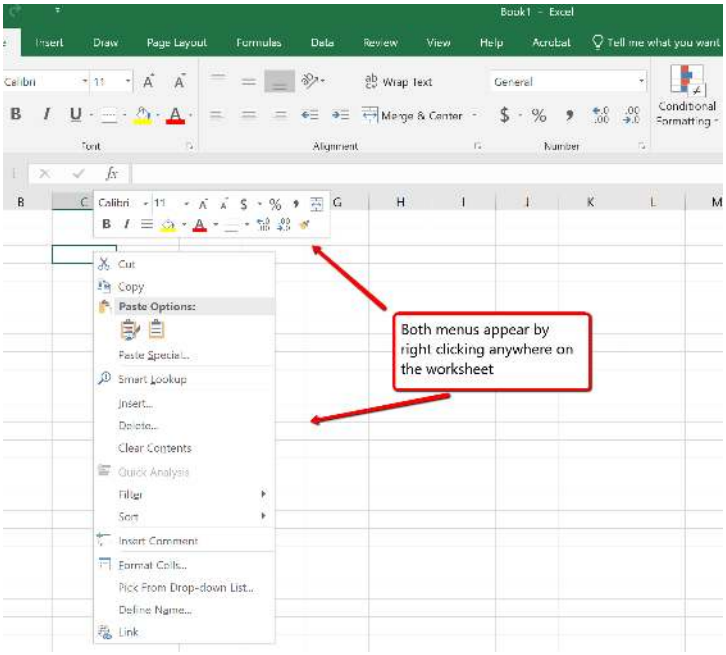


Figure 1.9 Right-Click Menu

The File Tab

The File tab is also known as the **Backstage** view of the workbook. It contains a variety of features and commands related to the workbook that is currently open, new workbooks, or workbooks stored in other locations on your computer or network. **Figure 1.10** shows the options available in the File tab or Backstage view.

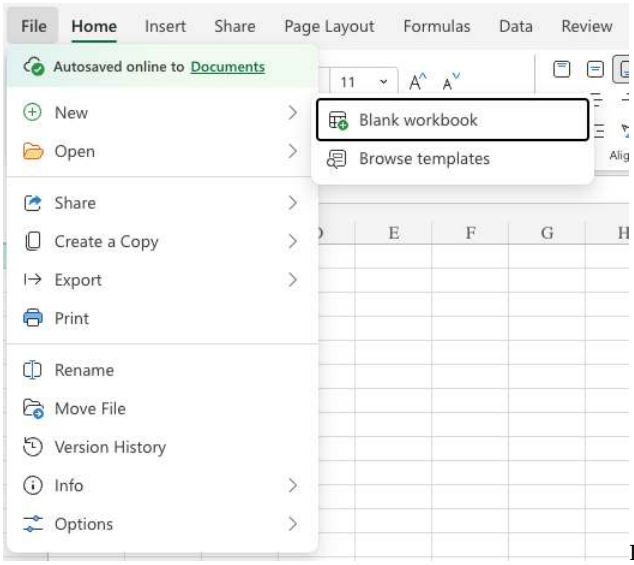


Figure 1.10 File Tab or Backstage View of a Workbook

Included in the File tab are the default settings for the Excel application that can be accessed and modified by clicking the Options button. **Figure 1.11** shows the Excel Options window, which gives you access to settings such as the default font style, font size, and the number of worksheets that appear in new workbooks.

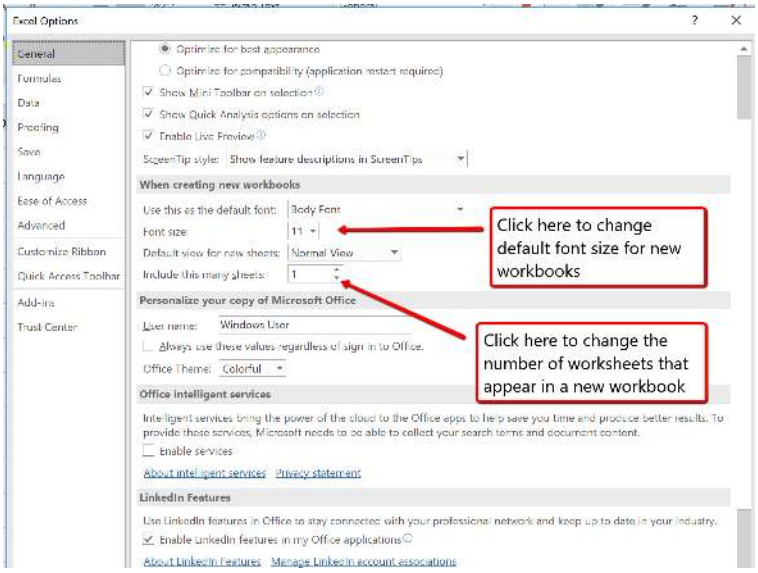


Figure 1.11 Excel Options Window

To access these same options in Excel for Mac, you must click the “Excel” menu option and choose “Preferences” (see **Figure 1.12** below)



Figure 1.12 The Excel for Mac "Excel" menu option

Saving Workbooks (Save As)

Once you create a new workbook, you will need to change the file name and choose a location on your computer or network to save that file. It is important to remember where you save this workbook on your computer or network, as you will be using this file in the **Section 1.2 "Entering, Editing, and Managing Data"** to construct the workbook shown in **Figure 1.1**. The process of saving can be different with different versions of Excel. Please be sure you follow the steps for the version of Excel you are using. The following steps explain how to save a new workbook and assign it a file name.

Saving Workbooks in Excel 365

1. If you have not done so already, open a blank workbook in Excel.
2. Click the File tab and then the **Save As** button in the left side of the Backstage view window. This will open the **Save As** dialog box.
3. Determine a location for saving on your computer by clicking **Browse** on the left side to open the **Save As** dialog box.
4. Click in the File Name box near the bottom of the **Save As** dialog box. Type the new file name: **CH1 Merchandise City Sales Data**
5. Review the settings in the screen for correctness and click the Save button.

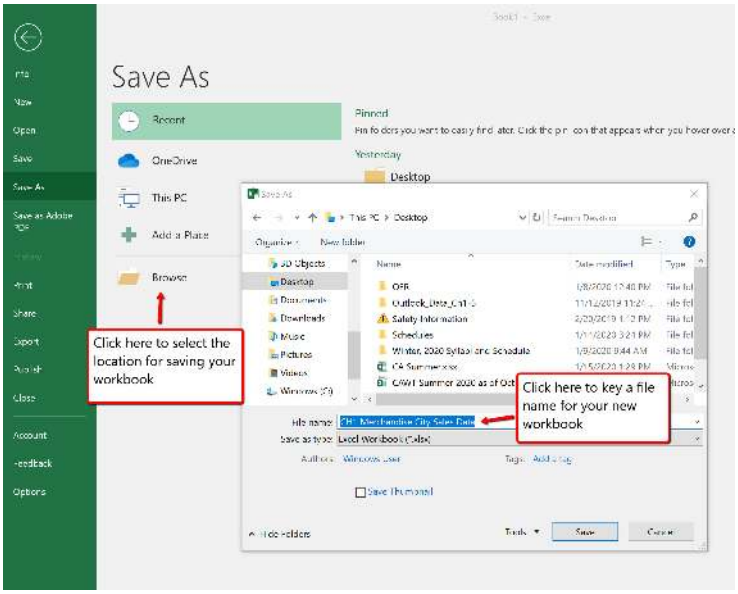


Figure 1.13 Save As Dialog entries for Excel 365

Keyboard Shortcuts

Save As

- Press the F12 key and use the tab and arrow keys to navigate around the Save As dialog box. Use the ENTER key to make a selection.

- Or press the ALT key on your keyboard. You will see letters and numbers, called Key Tips, appear on the Ribbon. Press the F key on your keyboard for the File tab and then the A key. This will open the Save As dialog box.
- The Mac shortcut is: Hold down the Command and Shift keys and press S

Skill Refresher

Saving Workbooks (Save As)

1. Click the File tab on the Ribbon.
2. Click the Save As option.
3. Click on Browse to select a location on your PC to save.
4. Click in the File name box and type a new file name if needed.
5. Click the down arrow next to the “Save as type” box and select the appropriate file type if needed. Excel will default to the file type of .xlsx
6. Click the Save button.

The Status Bar

The Status Bar is located below the worksheet tabs on the Excel screen (**see Figure 1.13**). It displays a variety of information, such as the status of certain keys on your keyboard (e.g., CAPS LOCK), the available views for a workbook, the magnification of the screen, and mathematical functions that can be performed when data are highlighted on a worksheet. You can customize the Status Bar as follows:

1. Place the mouse pointer over any area of the Status Bar and right click to display the “Customize Status Bar” list of options (**see Figure 1.14**).
   Mac Users: use “Control-click” on the Status Bar to display the “Customize Status Bar” options.
2. Select the Caps Lock option from the menu (see **Figure 1.14**).
3. Press the CAPS LOCK key on your keyboard. You will see the Caps Lock indicator on the lower right side of the Status Bar.
4. Press the CAPS LOCK on your keyboard again. The indicator on the Status Bar goes away.

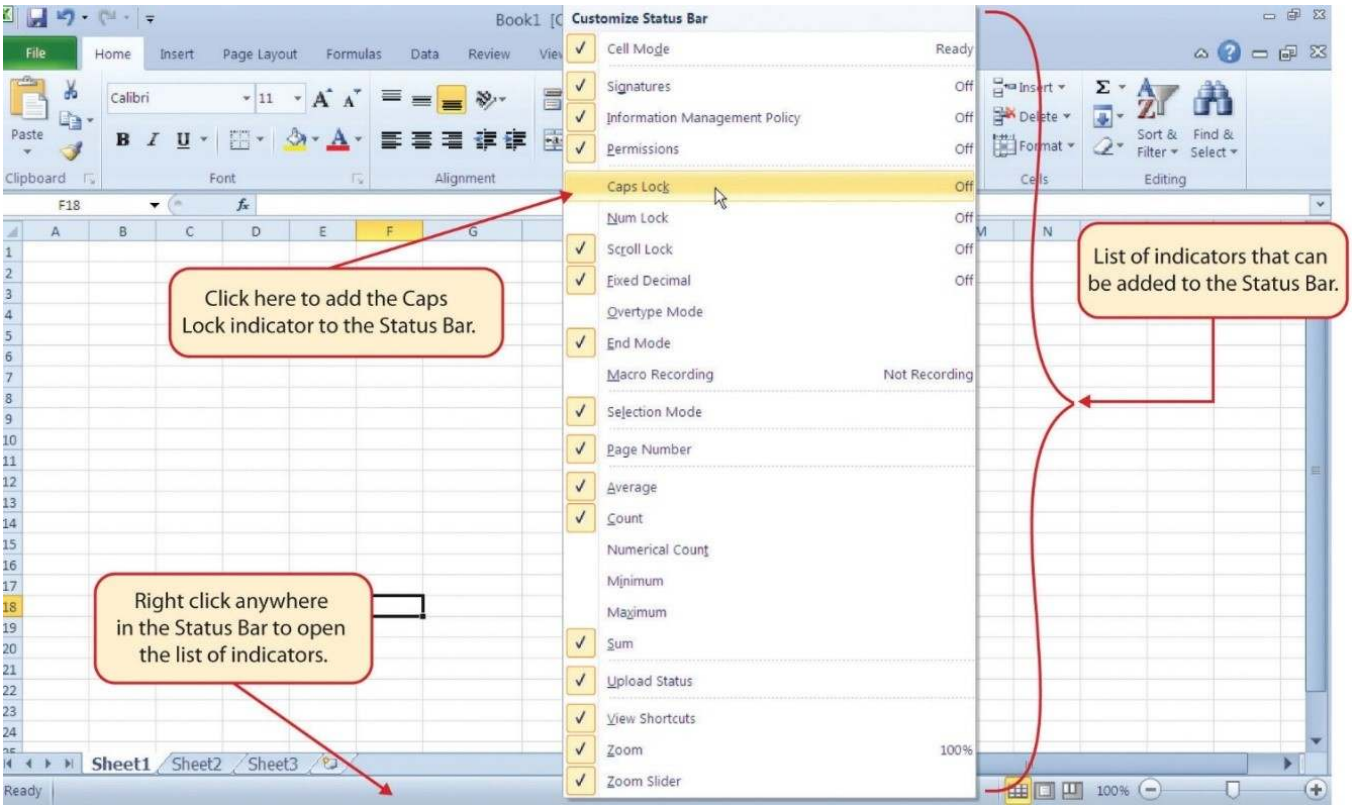


Figure 1.14 Customizing the Status Bar

Excel Help

The Help feature provides extensive information about the Excel application. Although some of this information may be stored on your computer, the Help window will automatically connect to the Internet, if you have a live connection, to provide you with resources that can answer most of your questions. You can open the Excel Help window by clicking the question mark in the upper right area of the screen or ribbon. With newer versions of Excel, use the query box to enter your question and select from helpful option links or select the question mark from the dropdown list to launch Excel Help windows.

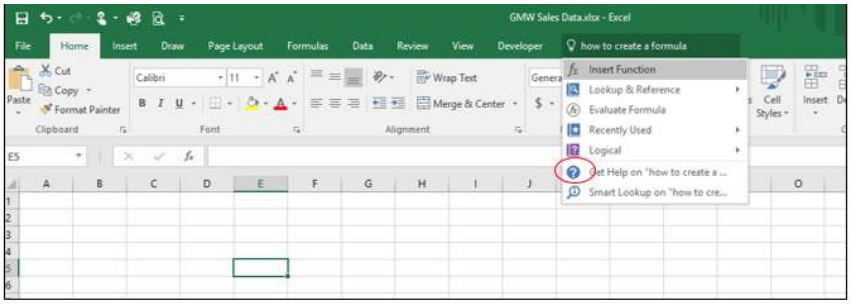


Figure 1.15 Excel Help Window

Keyboard Shortcuts

Excel Help

- Press the F1 key on your keyboard.
- Mac Users: Press F1 or hold down the Command key and press /

Key Takeaways

- Excel is a powerful tool for processing data for the purposes of making decisions.
- You can find Excel commands throughout the tabs in the Ribbon.
- You can customize the Quick Access Toolbar by adding commands you frequently use.
- You can add or remove the information that is displayed on the Status Bar.
- The Help window provides you with extensive information about Excel.

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5.2: Entering, Editing, and Managing Data

This page is a draft and is under active development.

Learning Objectives

- Understand how to enter data into a worksheet.
- Examine how to edit data in a worksheet.
- Examine how Auto Fill is used when entering data.
- Understand how to delete data from a worksheet and use the Undo command.
- Examine how to adjust column widths and row heights in a worksheet.
- Understand how to hide columns and rows in a worksheet.
- Examine how to insert columns and rows into a worksheet.
- Understand how to delete columns and rows from a worksheet.
- Learn how to move data to different locations in a worksheet.

In this section, we will begin developing the workbook shown in **Figure 1.1**. The skills covered in this section are typically used in the early stages of developing one or more worksheets in a workbook.

Entering Data

You will begin building the workbook shown in **Figure 1.1** by manually entering data into the worksheet. The following steps explain how the column headings in Row 2 are typed into the worksheet:

1. Click cell location A2 on the worksheet.
2. Type the word **Month**.
3. Press the RIGHT ARROW key. This will enter the word into cell A2 and activate the next cell to the right.
4. Type **Unit Sales** and press the RIGHT ARROW key.
5. Repeat step 4 for the words **Average Price** and then again for **Sales Dollars**.

Figure 1.15 shows how your worksheet should appear after you have typed the column headings into Row 2. Notice that the word **Price** in cell location C2 is not visible. This is because the column is too narrow to fit the entry you typed. We will examine formatting techniques to correct this problem in the next section.

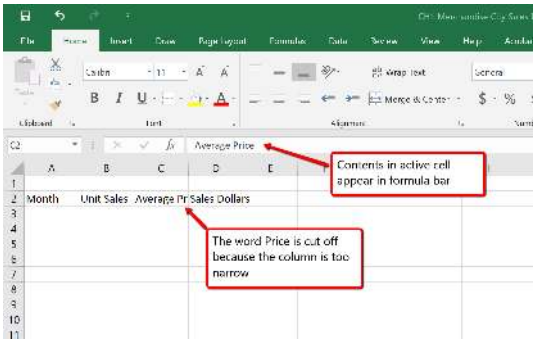


Figure 1.15 Entering Column Headings into a Worksheet

Integrity Check

Column Headings

It is critical to include column headings that accurately describe the data in each column of a worksheet. In professional environments, you will likely be sharing Excel workbooks with coworkers. Good column headings reduce the chance of someone misinterpreting the data contained in a worksheet, which could lead to costly errors depending on your career.

1. Click cell B3.
2. Type the number **2670** and press the ENTER key. After you press the ENTER key, cell B4 will be activated. Using the ENTER key is an efficient way to enter data vertically down a column.
3. Enter the following numbers in cells B4 through B14: **2160**, **515, 590, 1030, 2875, 2700, 900, 775, 1180, 1800**, and **4560**.
4. Click cell C3.
5. Type the number **9.99** and press the ENTER key.
6. Enter the following numbers in cells C4 through C14: **12.49, 14.99, 17.49, 14.99, 12.49, 9.99, 19.99, 19.99, 19.99, 17.49**, and **14.99**.
7. Click cell D3.
8. Type the number 26685 and press the ENTER key.
9. Enter the following numbers in cells D4 through D14: **26937, 7701, 10269, 15405, 35916, 26937, 17958, 15708, 23562, 31416**, and **75125**.
10. When finished, check that the data you entered matches **Figure 1.16**.

Why?

Avoid Formatting Symbols When Entering Numbers

When typing numbers into an Excel worksheet, it is best to avoid adding any formatting symbols such as dollar signs and commas. Although Excel allows you to add these symbols while typing numbers, it slows down the process of entering data. It is more efficient to use Excel's formatting features to add these symbols to numbers after you type them into a worksheet.

Integrity Check

Data Entry

It is very important to proofread your worksheet carefully, especially when you have entered numbers. Transposing numbers when entering data manually into a worksheet is a common error. For example, the number **563** could be transposed to **536.** Such errors can seriously compromise the integrity of your workbook.

Figure 1.16 shows how your worksheet should appear after entering the data. Check your numbers carefully to make sure they are accurately entered into the worksheet.

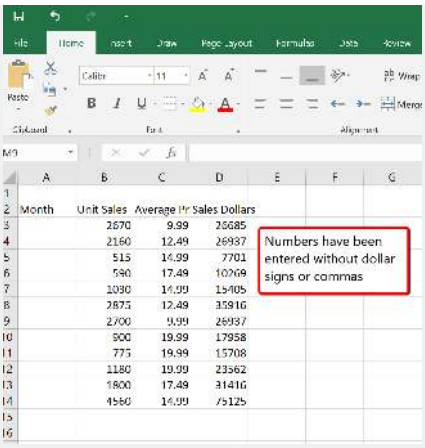


Figure 1.16 Completed Data Entry for Columns B, C, and D

Editing Data

Data entered in a cell can be changed by double-clicking the cell or using the Formula Bar. You may have noticed that as you were typing data into a cell location, the data you typed appeared in the Formula Bar. The Formula Bar can be used for entering data into cells as well as for editing data that already exists in a cell. The following steps provide an example of entering and then editing data that has been entered into a cell location:

1. Click cell A15 in the Sheet1 worksheet.
2. Type the abbreviation **Tot** and press the ENTER key.
3. Click cell A15.
4. Move the mouse pointer up to the Formula Bar. You will see the pointer turn into a cursor. Move the cursor to the end of the abbreviation **Tot** and left click.
5. Type the letters **al** to complete the word Total.
6. Click the check mark to the left of the Formula Bar (see **Figure 1.17**). This will enter the change into the cell.

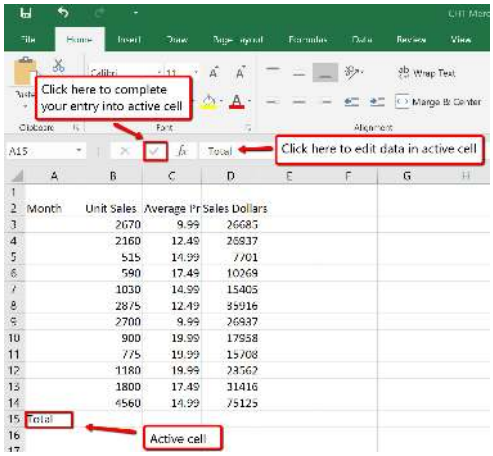


Figure 1.17 Using the Formula Bar to Edit and Enter Data

1. Double-click cell A15.
2. Add a space after the word Total and type the word **Sales**.
3. Press the ENTER key.

Keyboard Shortcuts

Editing Data in a Cell

- Activate the cell that is to be edited and press the F2 key on your keyboard.
  - Same for Mac Users

Auto Fill

The Auto Fill feature is a valuable tool when manually entering data into a worksheet. This feature has many uses, but it is most beneficial when you are entering data in a defined sequence, such as the numbers 2, 4, 6, 8, and so on, or non-numeric data such as the days of the week or months of the year. The following steps demonstrate how Auto Fill can be used to enter the months of the year in Column A:

1. Click cell A3 in the Sheet1 worksheet.
2. Type the word **January** and press the ENTER key.
3. Click cell A3 again.
4. Move the mouse pointer to the lower right corner of cell A3. You will see a small square in this corner of the cell; this is called the Fill Handle (See **Figure 1.18**) When the mouse pointer gets close to the Fill Handle, the white block plus sign will turn into a black plus (+) sign.

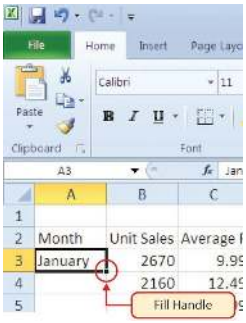


Figure 1.18 Fill Handle

Left click and drag the Fill Handle to cell A14. Notice that the Auto Fill tip box indicates what month will be placed into each cell (see **Figure 1.19**). Release the mouse button when the tip box reads "December."

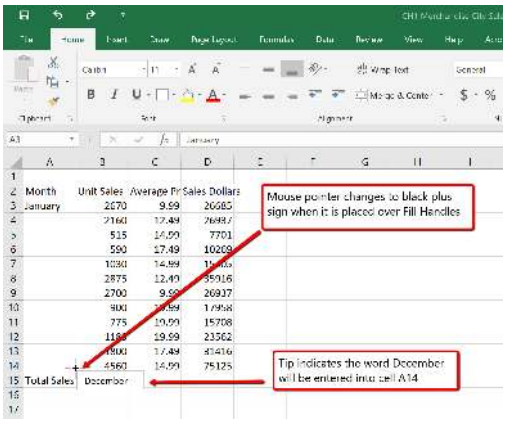


Figure 1.19 Using Auto Fill to Enter the Months of the Year

Once you release the left mouse button, all twelve months of the year should appear in the cell range A3:A14, as shown in **Figure 1.20**. You will also see the Auto Fill Options button. By clicking this button, you have several options for inserting data into a group of cells.

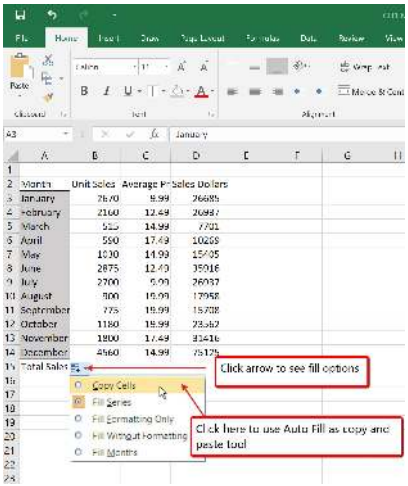


Figure 1.20 Auto Fill Options Button

1. Click the Auto Fill Options button.
2. Click the Copy Cells option. This will change the months in the range A4:A14 to January.
3. Click the Auto Fill Options button again.
4. Click the Fill Months option to return the months of the year to the cell range A4:A14. The Fill Series option will provide the same result.

Deleting Data and the Undo Command

There are several methods for removing data from a worksheet, a few of which are demonstrated here. With each method, you use the Undo command. This is a helpful command in the event you mistakenly remove data from your worksheet. The following steps demonstrate how you can delete data from a cell or range of cells:

1. Click cell C2.
2. Press the **DELETE** key on your keyboard. This removes the contents of the cell.
   - Mac Users: Hold down the Fn key and press the Delete key
3. Highlight the range C3:C14. Then left click and drag the mouse pointer down to cell C14.
4. Place the mouse pointer over the Fill Handle. You will see the white block plus sign change to a black plus sign (+).
5. Click and drag the mouse pointer up to cell C3 (see **Figure 1.21**). Release the mouse button. The contents in the range C3:C14 will be removed.

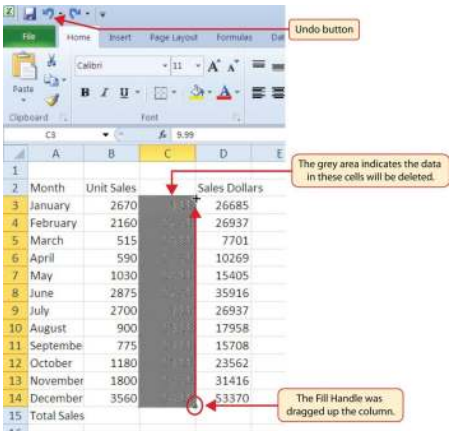


Figure 1.21 Using Auto Fill to Delete Contents of Cell

1. Click the Undo button in the Quick Access Toolbar (see **Figure 1.2**). This should replace the data in the range C3:C14.
2. Click the Undo button again. This should replace the data in cell C2.

Keyboard Shortcuts

Undo Command

- Hold down the CTRL key while pressing the letter Z on your keyboard.
  - Same for Mac Users.
- Highlight the range C2:C14 by placing the mouse pointer over cell C2. Then left click and drag the mouse pointer down to cell C14.
- Click the Clear button in the Home tab of the Ribbon, which is next to the Cells group of commands (see **Figure 1.22**). This opens a drop-down menu that contains several options for removing or clearing data from a cell. Notice that you also have options for clearing just the formats in a cell or the hyperlinks in a cell.
- Click the Clear All option. This removes the data in the cell range.
- Click the Undo button. This replaces the data in the range C2:C14.



Figure 1.22 Clear Command Drop-Down Menu

Adjusting Columns and Rows

There are a few entries in the worksheet that appear cut off. For example, the last letter of the word September cannot be seen in cell A11. This is because the column is too narrow for this word. The columns and rows on an Excel worksheet can be adjusted to accommodate the data that is being entered into a cell using three different methods. The following steps explain how to adjust the column widths and row heights in a worksheet:

1. Bring the mouse pointer between Column A and Column B in the Sheet1 worksheet, as shown in **Figure 1.23**. You will see the white block plus sign turn into double arrows.
2. Click and drag the column to the right so the entire word September in cell A11 can be seen. As you drag the column, you will see the column width tip box. This box displays the number of characters that will fit into the column using the Calibri 11-point font which is the default setting for font/size.
3. Release the left mouse button.

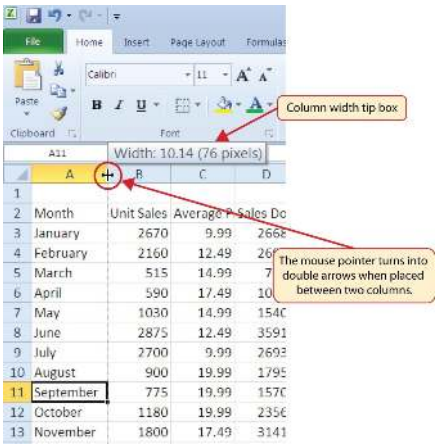


Figure 1.23 Adjusting Column Widths

You may find that using the click-and-drag method is inefficient if you need to set a specific character width for one or more columns. Steps 1 through 6 illustrate a second method for adjusting column widths when using a specific number of characters:

1. Click any cell location in Column A by moving the mouse pointer over a cell location and clicking the left mouse button. You can highlight cell locations in multiple columns if you are setting the same character width for more than one column.
2. In the Home tab of the Ribbon, left click the Format button in the Cells group.
3. Click the Column Width option from the drop-down menu. This will open the Column Width dialog box.
4. Type the number **13** and click the OK button on the Column Width dialog box. This will set Column A to this character width (see **Figure 1.24**).
5. Once again bring the mouse pointer between Column A and Column B so that the double arrow pointer displays and then double-click to activate AutoFit. This features adjusts the column width based on the longest entry in the column.
6. Use the Column Width dialog box (step 6 above) to reset the width to 13.

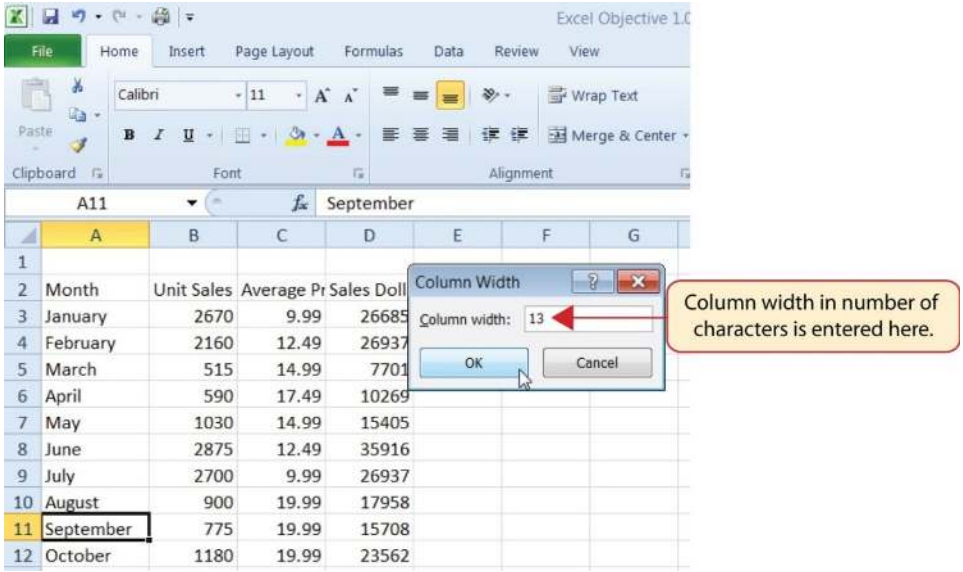


Figure 1.24 Column Width Dialog Box

Keyboard Shortcuts

Column Width

- Press the ALT key on your keyboard, then press the letters H, O, and W one at a time.
- This keyboard shortcut is not available for Excel for Mac

Steps 1 through 4 demonstrate how to adjust row height, which is similar to adjusting column width:

1. Click cell A15.
2. In the Home tab of the Ribbon, left click the Format button in the Cells group.
3. Click the Row Height option from the drop-down menu. This will open the Row Height dialog box.
4. Type the number **24** and click the OK button on the Row Height dialog box. This will set Row 15 to a height of 24 points. A point is equivalent to approximately 1/72 of an inch. This adjustment in row height was made to create space between the totals for this worksheet and the rest of the data.

Keyboard Shortcuts

Row Height

- Press the ALT key on your keyboard, then press the letters H, O, and H one at a time.
- This keyboard shortcut is not available for Excel for Mac

Figure 1.25 shows the appearance of the worksheet after Column A and Row 15 are adjusted.

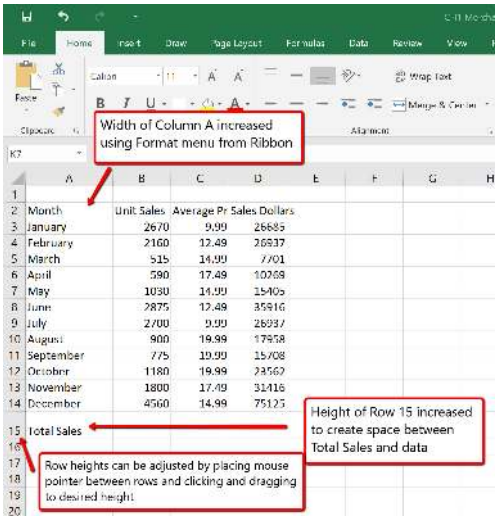


Figure 1.25 Sales Data with Column A and Row 15 Adjusted

Skill Refresher

Adjusting Columns and Rows

1. Activate at least one cell in the row or column you are adjusting.
2. Click the Home tab of the Ribbon.
3. Click the Format button in the Cells group.
4. Click either Row Height or Column Width from the drop-down menu.
5. Enter the Row Height in points or Column Width in characters in the dialog box.
6. Click the OK button.

Hiding Columns and Rows

In addition to adjusting the columns and rows on a worksheet, you can also hide columns and rows. This is a useful technique for enhancing the visual appearance of a worksheet that contains data that is not necessary to display. These features will be demonstrated using the GMW Sales Data workbook. However, there is no need to have hidden columns or rows for this worksheet. The use of these skills here will be for demonstration purposes only.

1. Click cell C1.
2. Click the Format button in the Home tab of the Ribbon.
3. Place the mouse pointer over the Hide & Unhide option in the drop-down menu. This will open a submenu of options.
4. Click the Hide Columns option in the submenu of options (see **Figure 1.26**). This will hide Column C.

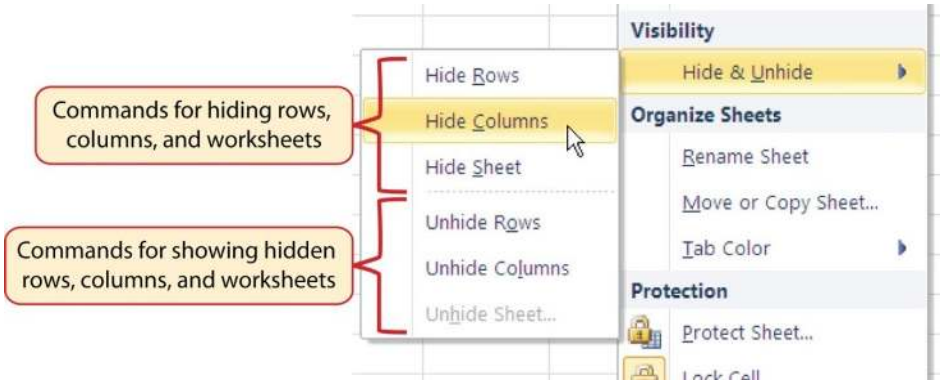


Figure 1.26 Hide & Unhide Submenu

Keyboard Shortcuts

Hiding Columns

- Hold down the CTRL key while pressing the number 0 on your keyboard.
  - Same for Mac Users

Figure 1.27 shows the workbook with Column C hidden in the Sheet1 worksheet. You can tell a column is hidden by the missing letter C.

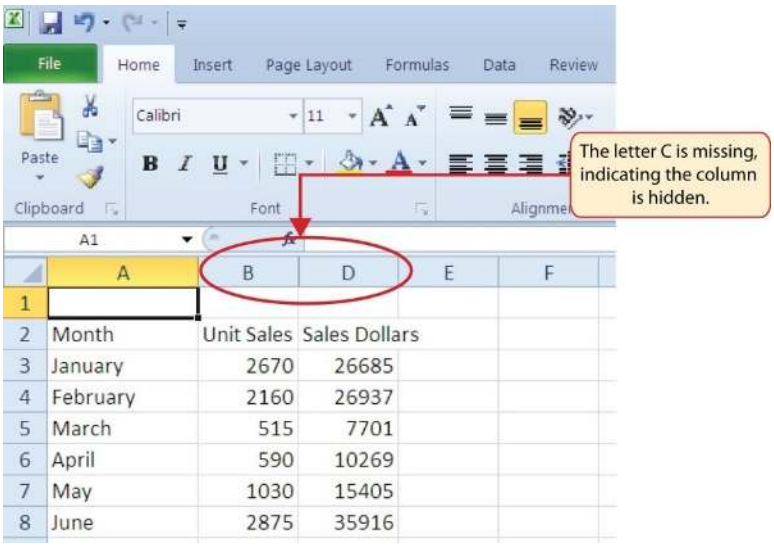


Figure 1.27 Hidden Column

To unhide a column, follow these steps:

1. Select the range B1:D1.
2. Click the Format button in the Home tab of the Ribbon.
3. Place the mouse pointer over the Hide & Unhide option in the drop-down menu.
4. Click the Unhide Columns option in the submenu of options. Column C will now be visible on the worksheet.

Keyboard Shortcuts

Unhiding Columns

- Highlight cells on either side of the hidden column(s), then hold down the CTRL key and the SHIFT key while pressing the close parenthesis key ()) on your keyboard.
- Mac Users: Hold down Control and Shift keys and press the number 0

The following steps demonstrate how to hide rows, which is similar to hiding columns:

1. Click cell A3.
2. Click the Format button in the Home tab of the Ribbon.
3. Place the mouse pointer over the Hide & Unhide option in the drop-down menu. This will open a submenu of options.
4. Click the Hide Rows option in the submenu of options. This will hide Row 3.

Keyboard Shortcuts

Hiding Rows

- Hold down the CTRL key while pressing the number 9 key on your keyboard.
  - Same for Mac Users

To unhide a row, follow these steps:

1. Select the range A2:A4.
2. Click the Format button in the Home tab of the Ribbon.
3. Place the mouse pointer over the Hide & Unhide option in the drop-down menu.
4. Click the Unhide Rows option in the submenu of options. Row 3 will now be visible on the worksheet.

Keyboard Shortcuts

Unhiding Rows

- Highlight cells above and below the hidden row(s), then hold down the CTRL key and the SHIFT key while pressing the open parenthesis key (() on your keyboard.
- Mac Users: Hold down Control and Shift keys and press the number 9

Integrity Check

Hidden Rows and Columns

In most careers, it is common for professionals to use Excel workbooks that have been designed by a coworker. Before you use a workbook developed by someone else, always check for hidden rows and columns. You can quickly see whether a row or column is hidden if a row number or column letter is missing.

Skill Refresher

Hiding Columns and Rows

1. Activate at least one cell in the row(s) or column(s) you are hiding.
2. Click the Home tab of the Ribbon.
3. Click the Format button in the Cells group.
4. Place the mouse pointer over the Hide & Unhide option.
5. Click either the Hide Rows or Hide Columns option.

Unhiding Columns and Rows

1. Highlight the cells above and below the hidden row(s) or to the left and right of the hidden column(s).
2. Click the Home tab of the Ribbon.
3. Click the Format button in the Cells group.
4. Place the mouse pointer over the Hide & Unhide option.
5. Click either the Unhide Rows or Unhide Columns option.

Inserting Columns and Rows

Using Excel workbooks that have been created by others is a very efficient way to work because it eliminates the need to create data worksheets from scratch. However, you may find that to accomplish your goals, you need to add additional columns or rows of data. In this case, you can insert blank columns or rows into a worksheet. The following steps demonstrate how to do this:

1. Click cell C1.
2. Click the down arrow on the Insert button in the Home tab of the Ribbon (see **Figure 1.28**).

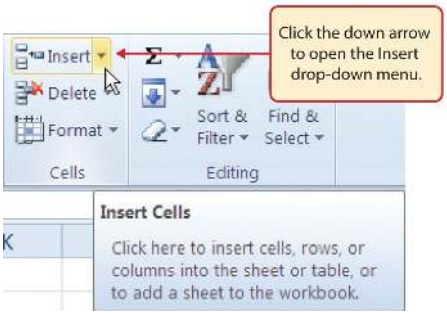


Figure 1.28 Insert Button (Down Arrow)

3. Click the Insert Sheet Columns option from the drop-down menu (see **Figure 1.29**). A blank column will be inserted to the left of Column C. The contents that were previously in Column C now appear in Column D. Note that columns are always inserted to the left of the activated cell.

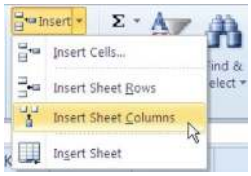


Figure 1.29 Insert Drop-Down Menu

Keyboard Shortcuts

Inserting Columns

- Press the ALT key and then the letters H, I, and C one at a time. A column will be inserted to the left of the activated cell.
- Mac Users: First hold down the Control key and press the spacebar to select the column; then hold down the Shift and Controls keys and press the + symbol

4. Click cell A3.
5. Click the down arrow on the Insert button in the Home tab of the Ribbon (see **Figure 1.28**).
6. Click the Insert Sheet Rows option from the drop-down menu (see **Figure 1.29**). A blank row will be inserted above Row 3. The contents that were previously in Row 3 now appear in Row 4. Note that rows are always inserted above the activated cell.

Keyboard Shortcuts

Inserting Rows

- Press the ALT key and then the letters H, I, and R one at a time. A row will be inserted above the activated cell.
- Mac Users: First hold down the Shift key and press the spacebar to select the row; then hold down the Shift and Controls keys and press the + symbol

Skill Refresher

Inserting Columns and Rows

1. Activate the cell to the right of the desired blank column or below the desired blank row.
2. Click the Home tab of the Ribbon.
3. Click the down arrow on the Insert button in the Cells group.
4. Click either the Insert Sheet Columns or Insert Sheet Rows option.

Moving Data

Once data are entered into a worksheet, you have the ability to move it to different locations. The following steps demonstrate how to move data to different locations on a worksheet:

1. Select the range D2:D15.
2. Bring the mouse pointer to the left edge of cell D2. You will see the white block plus sign change to cross arrows (see **Figure 1.30**). This indicates that you can left click and drag the data to a new location.

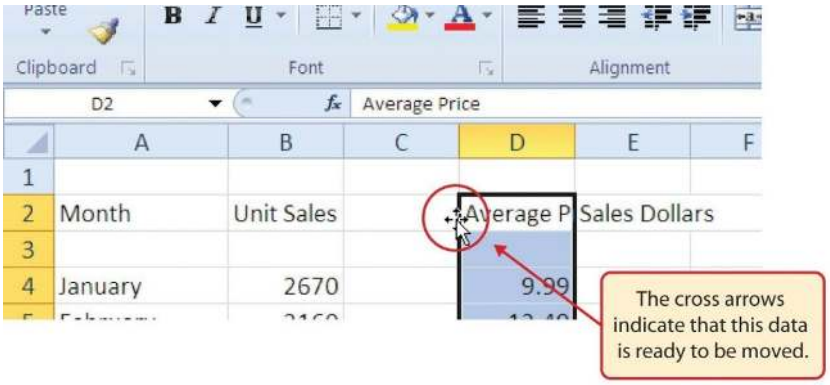


Figure 1.30 Moving Data

- Mac Users: when the mouse hovers over the left edge of cell D2, the pointer will turn into a small hand that looks like this:

3. Left Click and drag the mouse pointer to cell C2.
4. Release the left mouse button. The data now appears in Column C.
5. Click the Undo button in the Quick Access Toolbar. This moves the data back to Column D.

Integrity Check

Moving Data

Before moving data on a worksheet, make sure you identify all the components that belong with the series you are moving. For example, if you are moving a column of data, make sure the column heading is included. Also, make sure all values are highlighted in the column before moving it.

Deleting Columns and Rows

You may need to delete entire columns or rows of data from a worksheet. This need may arise if you need to remove either blank columns or rows from a worksheet or columns and rows that contain data. The methods for removing cell contents were covered earlier and can be used to delete unwanted data. However, if you do not want a blank row or column in your workbook, you can delete it using the following steps:

1. Click cell A3.
2. Click the down arrow on the Delete button in the Cells group in the Home tab of the Ribbon.
3. Click the Delete Sheet Rows option from the drop-down menu (see **Figure 1.31**). This removes Row 3 and shifts all the data (below Row 2) in the worksheet up one row.

Keyboard Shortcuts

Deleting Rows

- Press the ALT key and then the letters H, D, and R one at a time. The row with the activated cell will be deleted.
- Mac Users: First hold down the Shift key and press the spacebar to select the row; then hold down Control key and press the – symbol

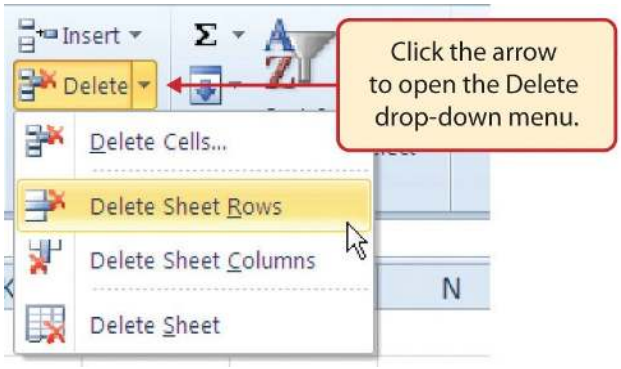


Figure 1.31 Delete Drop-Down Menu

4. Click cell C1.
5. Click the down arrow on the Delete button in the Cells group in the Home tab of the Ribbon.
6. Click the Delete Sheet Columns option from the drop-down menu (see **Figure 1.31**). This removes Column C and shifts all the data in the worksheet (to the right of Column B) over one column to the left.
7. Save the changes to your workbook by clicking either the **Save** button on the Home ribbon; or by selecting the **Save** option from the File menu.

Keyboard Shortcuts

Deleting Columns

- Press the ALT key and then the letters H, D, and C one at a time. The column with the activated cell will be deleted.
- Mac Users: First hold down the Control key and press the spacebar to select the column; then hold down Control key and press the – symbol

Skill Refresher

Deleting Columns and Rows

1. Activate any cell in the row or column that is to be deleted.
2. Click the Home tab of the Ribbon.

3. Click the down arrow on the Delete button in the Cells group.
4. Click either the Delete Sheet Columns or the Delete Sheet Rows option.

Key Takeaways

- Column headings should be used in a worksheet and should accurately describe the data contained in each column.
- Using symbols such as dollar signs when entering numbers into a worksheet can slow down the data entry process.
- Worksheets must be carefully proofread when data has been manually entered.
- The Undo command is a valuable tool for recovering data that was deleted from a worksheet.
- When using a worksheet that was developed by someone else, look carefully for hidden columns or rows.

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5.3: Formatting and Data Analysis

This page is a draft and is under active development.

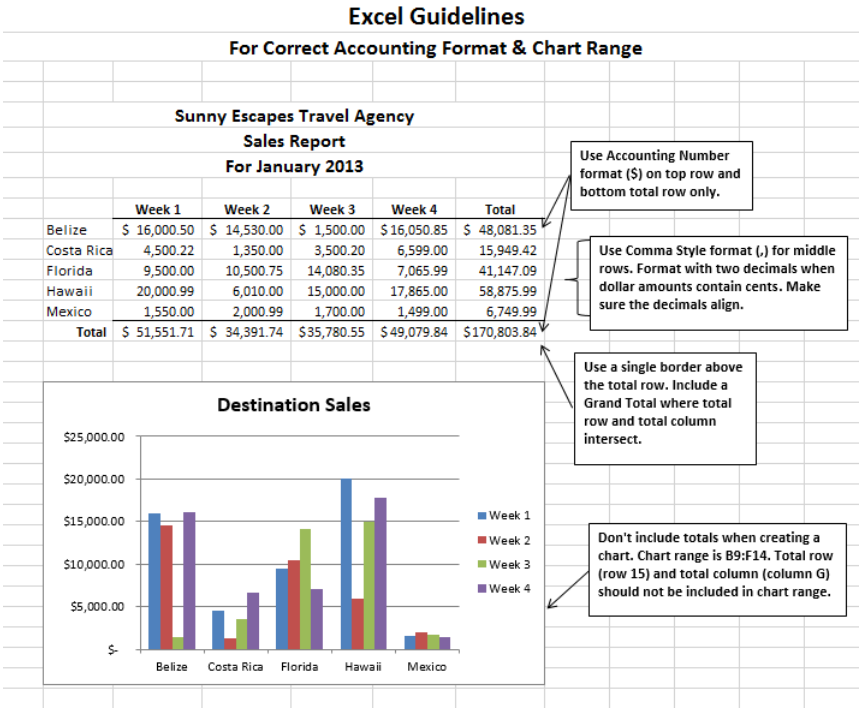
Learning Objectives

- Use formatting techniques as introduced in the Excel Spreadsheet Guidelines to enhance the appearance of a worksheet.
- Understand how to align data in cell locations.
- Examine how to enter multiple lines of text in a cell location.
- Understand how to add borders to a worksheet.
- Examine how to use the AutoSum feature to calculate totals.
- Use the Cut, Copy, and Paste commands to manipulate the data on a worksheet.
- Understand how to move, rename, insert, and delete worksheet tabs.

This section addresses formatting commands that can be used to enhance the visual appearance of a worksheet. It also provides an introduction to mathematical calculations. The skills introduced in this section will give you powerful tools for analyzing the data that we have been working with in this workbook and will highlight how Excel is used to make key decisions in virtually any career. Additionally, Excel Spreadsheet Guidelines for format and appearance will be introduced as a format for the course and spreadsheets submitted.

Formatting Data and Cells

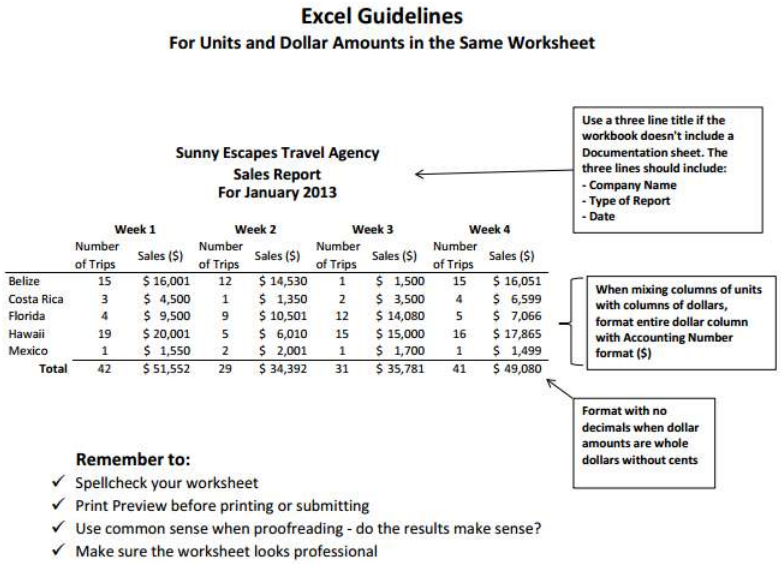
Enhancing the visual appearance of a worksheet is a critical step in creating a valuable tool for you or your coworkers when making key decisions. There are accepted professional formatting standards when spreadsheets contain only currency data. For this course, we will use the following Excel Guidelines for Formatting. The first figure displays how to use the Accounting number format when ALL figures are currency. Only the first row of data and the totals should be formatted with the Accounting format. The other data should be formatted with Comma style. There also needs to be a Top Border above the numbers in the total row. If any of the numbers have cents, you need to format all of the data with two decimal places.



	Week 1	Week 2	Week 3	Week 4	Total
Belize	$ 16,000.50	$ 14,530.00	$ 1,500.00	$ 16,050.85	$ 48,081.35
Costa Rica	4,500.22	1,350.00	3,500.20	6,599.00	15,949.42
Florida	9,500.00	10,500.75	14,080.35	7,065.99	41,147.09
Hawaii	20,000.99	6,010.00	15,000.00	17,865.00	58,875.99
Mexico	1,550.00	2,000.99	1,700.00	1,499.00	6,749.99
Total	$ 51,551.71	$ 34,391.74	$35,780.55	$ 49,079.84	$170,803.84

Figure 1.31a

Often, your Excel spreadsheet will contain values that are both currency and non-currency in nature. When that is the case, you'll want to use the guidelines in the following figure:



	Week 1		Week 2		Week 3		Week 4	
	Number of Trips	Sales ($)	Number of Trips	Sales ($)	Number of Trips	Sales ($)	Number of Trips	Sales ($)
Belize	15	$ 16,001	12	$ 14,530	1	$ 1,500	15	$ 16,051
Costa Rica	3	$ 4,500	1	$ 1,350	2	$ 3,500	4	$ 6,599
Florida	4	$ 9,500	9	$ 10,501	12	$ 14,080	5	$ 7,066
Hawaii	19	$ 20,001	5	$ 6,010	15	$ 15,000	16	$ 17,865
Mexico	1	$ 1,550	2	$ 2,001	1	$ 1,700	1	$ 1,499
Total	42	$ 51,552	29	$ 34,392	31	$ 35,781	41	$ 49,080

Figure 1.31b

The following steps demonstrate several fundamental formatting skills that will be applied to the workbook that we are developing for this chapter. Several of these formatting skills are identical to ones that you may have already used in other Microsoft applications such as Microsoft Word or Microsoft PowerPoint.

1. Select the range A2:D2. Click the Bold button in the Font group of commands in the Home tab of the ribbon.
2. Click the Border button in the Font group of commands in the Home tab of the Ribbon (see Figure 1.32). Select the Bottom Border option from the list to achieve the goal of a border on the bottom of row 2 below the column headings.

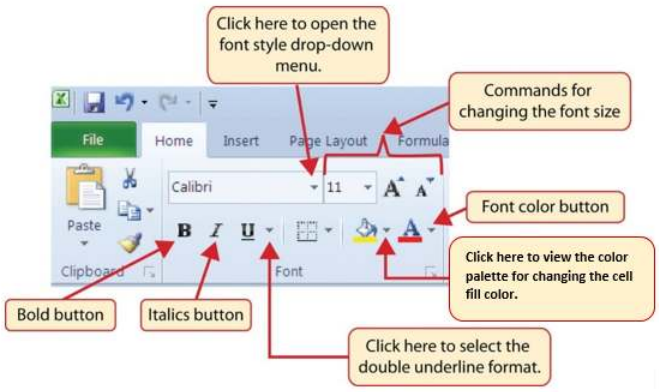


Figure 1.32 Font Group of Commands

Keyboard Shortcuts

Bold Format

- Hold down the CTRL key while pressing the letter B on your keyboard.
- Mac Users: Hold the Control key and press the letter B **or** hold down the Command key and press the letter B

1. Select the range A15:D15.
2. Click the Bold button in the Font group of commands in the Home tab of the Ribbon.

3. Click the Border button in the Font group of commands in the Home tab of the Ribbon (see **Figure 1.32**). Select the Top Border option from the list to achieve the goal of a border on the top of row 15 where totals will eventually display.

Keyboard Shortcuts

Italics Format

- Hold the CTRL key while pressing the letter I on your keyboard.
- Mac Users: Hold the Control key and press the letter I **or** hold down the Command key and press the letter I

Keyboard Shortcuts

Underline Format

- Hold the CTRL key while pressing the letter U on your keyboard.
- Mac Users: Hold the Control key and press the letter U **or** hold down the Command key and press the letter U

Why?

Format Column Headings and Totals

Applying formatting enhancements to the column headings and column totals in a worksheet is a very important technique, especially if you are sharing a workbook with other people. These formatting techniques allow users of the worksheet to clearly see the column headings that define the data. In addition, the column totals usually contain the most important data on a worksheet with respect to making decisions, and formatting techniques allow users to quickly see this information.

1. Select the range B3:B14.
2. Click the Comma Style button in the Number group of commands in the Home tab of the Ribbon. This feature adds a comma as well as two decimal places. (see **Figure 1.33**).
   quot;)." width="448" height="226"/>
   Figure 1.33 Number Group of Commands
3. Since the figures in this range do not include cents, click the Decrease Decimal button in the Number group of commands in the Home tab of the Ribbon two times (see **Figure 1.33**).
4. The numbers will also be reduced to zero decimal places.
5. Select the range C3:C14.
6. Click the Accounting Number Format button in the Number group of commands in the Home tab of the Ribbon (see **Figure 1.33**). This will add the US currency symbol and two decimal places to the values. This format is common when working with pricing data. As discussed above in the Formatting Data and Cells section, you will want to use Accounting format on all values in this range since the worksheet contains non-currency as well as currency data.
7. Select the range D3:D14.
8. Again, select the Accounting Number Format; this will add the US currency symbol to the values as well as two decimal places.
9. Click the Decrease Decimal button in the Number group of commands in the Home tab of the Ribbon.
10. This will add the US currency symbol to the values and reduce the decimal places to zero since there are no cents in these figures.
11. Select the range A1:D1.
12. Click the down arrow next to the Fill Color button in the Font group of commands in the Home tab of the Ribbon (see **Figure 1.34**). This will add background fill color the range for a worksheet title when entered.

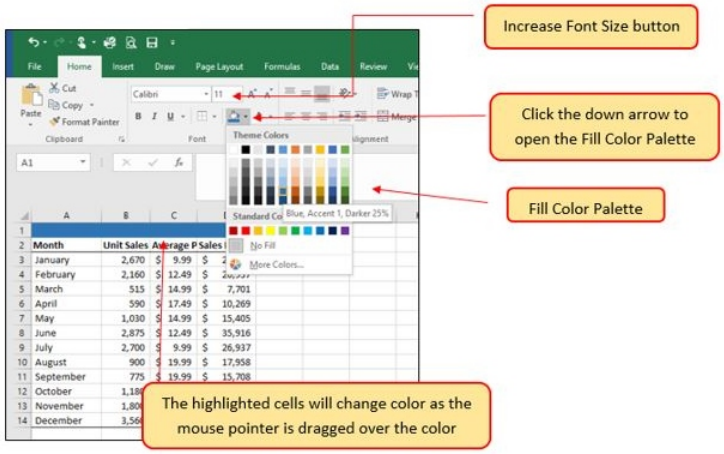


Figure 1.34 Fill Color Palette

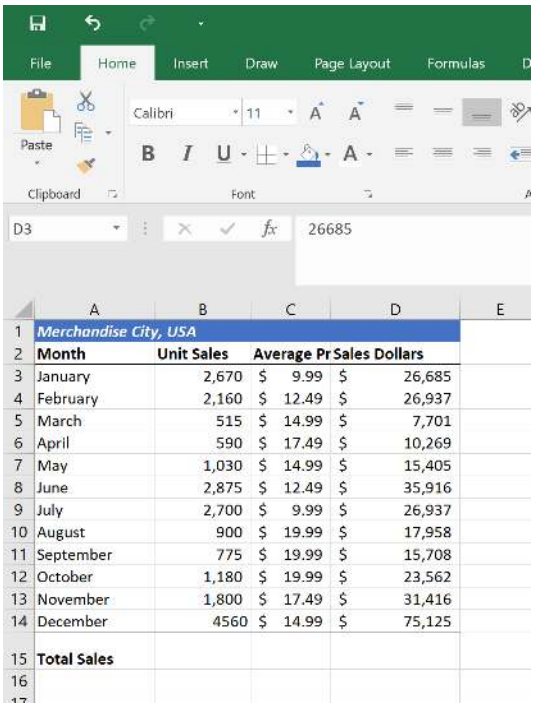
13. Click the Blue, Accent 1, Darker 25% color from the palette (see **Figure 1.34**). Notice that as you move the mouse pointer over the color palette, you will see a preview of how the color will appear in the highlighted cells. Experiment with this feature.
14. Click on A1 and enter the worksheet title: **Merchandise City, USA** and click on the check mark in the formula bar to enter this information.
15. Since the black font is difficult to read on the blue background, you'll change the font color to be more visible. Click the down arrow next to the Font Color button in the Font group of commands in the Home tab of the Ribbon; select **White** as the font color for this range (see **Figure 1.32**).
16. Select the range A1:D1 and format for **Italics** by clicking on "I" in the Font group.
17. Click the drop-down arrow on the right side of the Font button in the Home tab of the Ribbon; select Arial as the font for this range and format for **Bold** click on "B**"** in the Font group. (see **Figure 1.32**).
18. Notice that as you move the mouse pointer over the font style options, you can see the font change in the highlighted cells.
19. Expand the column width of Column D to 14 characters.

Why?

Pound Signs (####) Appear in Columns

When a column is too narrow for a long number, Excel will automatically convert the number to a series of pound signs (####). In the case of words or text data, Excel will only show the characters that fit in the column. However, this is not the case with numeric data because it can give the appearance of a number that is much smaller than what is actually in the cell. To remove the pound signs, increase the width of the column.

Figure 1.35 shows how the Sheet1 worksheet should appear after the formatting techniques are applied.



	A	B	C	D	E
1	*Merchandise City, USA*				
2	**Month**	**Unit Sales**	**Average Pr**	**Sales Dollars**	
3	January	2,670	$ 9.99	$ 26,685	
4	February	2,160	$ 12.49	$ 26,937	
5	March	515	$ 14.99	$ 7,701	
6	April	590	$ 17.49	$ 10,269	
7	May	1,030	$ 14.99	$ 15,405	
8	June	2,875	$ 12.49	$ 35,916	
9	July	2,700	$ 9.99	$ 26,937	
10	August	900	$ 19.99	$ 17,958	
11	September	775	$ 19.99	$ 15,708	
12	October	1,180	$ 19.99	$ 23,562	
13	November	1,800	$ 17.49	$ 31,416	
14	December	4560	$ 14.99	$ 75,125	
15	**Total Sales**				
16					

Figure 1.35 Formatting Techniques Applied

Data Alignment (Wrap Text, Merge Cells, and Center)

The skills presented in this segment show how data are aligned within cell locations. For example, text and numbers can be centered in a cell location, left justified, right justified, and so on. In some cases you may want to stack multiword text entries vertically in a cell instead of expanding the width of a column. This is referred to as wrapping text. These skills are demonstrated in the following steps:

1. Select the range A2:D2.
2. Click the Center button in the Alignment group of commands in the Home tab of the Ribbon (see **Figure 1.36**). This will center the column headings in each cell location.

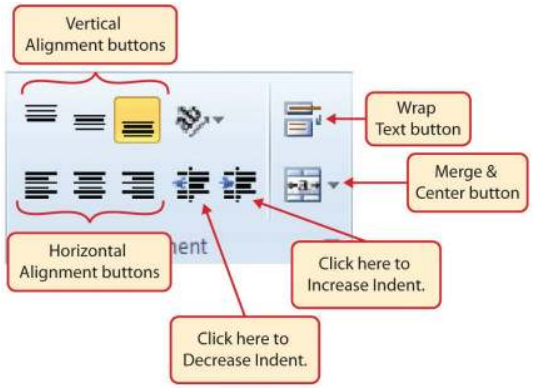


Figure 1.36 Alignment Group in Home Tab

3. Click the Wrap Text button in the Alignment group (see **Figure 1.36**). The height of Row 2 automatically expands, and the words that were cut off because the columns were too narrow are now stacked vertically.

Keyboard Shortcuts

Wrap Text

- Press the ALT key and then the letters H and W one at a time.
- There is no equivalent shortcut for Excel for Mac

Why?

Wrap Text

The benefit of using the Wrap Text command is that it significantly reduces the need to expand the column width to accommodate multiword column headings. The problem with increasing the column width is that you may reduce the amount of data that can fit on a piece of paper or one screen. This makes it cumbersome to analyze the data in the worksheet and could increase the time it takes to make a decision.

4. Select the range A1:D1.
5. Click the down arrow on the right side of the Merge & Center button in the Alignment group of commands in the Home tab of the Ribbon.
6. Click the Merge & Center option (see **Figure 1.37**). This will create one large cell location running across the top of the data set and center the text in that cell.

Keyboard Shortcuts

Merge Commands

- Merge & Center: Press the ALT key and then the letters H, M, and C one at a time.
- Merge Cells: Press the ALT key and then the letters H, M, and M one at a time.
- Unmerge Cells: Press the ALT key and then the letters H, M, and U one at a time.
  - There are no equivalent shortcuts for Excel for Mac

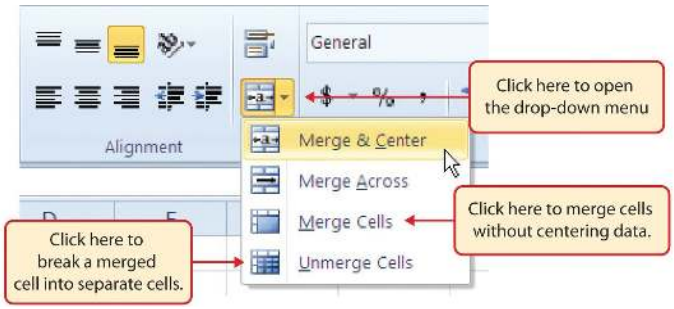


Figure 1.37 Merge Cell Drop-Down Menu

Why?

Merge & Center

One of the most common reasons the Merge & Center command is used is to center the title of a worksheet directly above the columns of data. Once the cells above the column headings are merged, a title can be centered above the columns of data. It is very difficult to center the title over the columns of data if the cells are not merged.

Figure 1.38 shows the Sheet1 worksheet with the data alignment commands applied. The reason for merging the cells in the range A1:D1 will become apparent in the next segment.

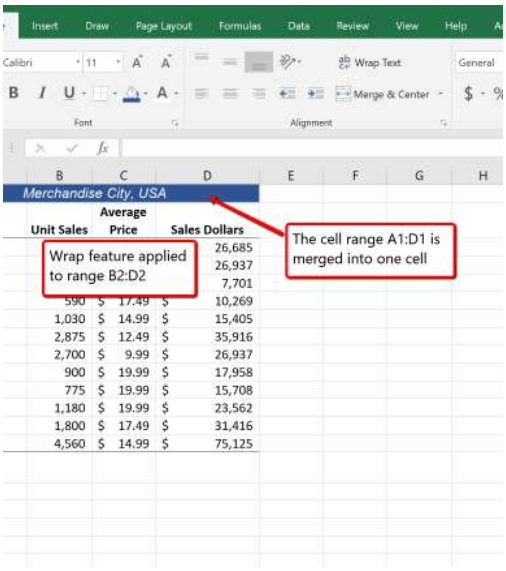


Figure 1.38 Data Alignment Features Added

Skill Refresher

Wrap Text

1. Activate the cell or range of cells that contain text data.
2. Click the Home tab of the Ribbon.
3. Click the Wrap Text button.

Merge Cells

1. Highlight a range of cells that will be merged.
2. Click the Home tab of the Ribbon.
3. Click the down arrow next to the Merge & Center button.
4. Select an option from the Merge & Center list.

Entering Multiple Lines of Text

In the Sheet1 worksheet, the cells in the range A1:D1 were merged for the purposes of adding a title to the worksheet. This worksheet will contain both a title and a subtitle. The following steps explain how you can enter text into a cell and determine where you want the second line of text to begin:

1. Click cell A1. Since the cells were merged, clicking cell A1 will automatically activate the range A1:D1. Position your mouse to the end of the title, directly after the “A” in the word “USA” and double-click to get a cursor (flashing I-beam).
2. Hold down the ALT key and press the ENTER key. This will start a new line of text in this cell location.
3. Type the text **Retail Sales** and press the ENTER key.
4. Select cell A1. Then click the Bold buttons in the Font group of commands in the Home tab of the Ribbon so that the titles are now in Bold and Italics.
5. Increase the height of Row 1 to 30 points. Once the row height is increased, all the text typed into the cell will be visible (see **Figure 1.39**).

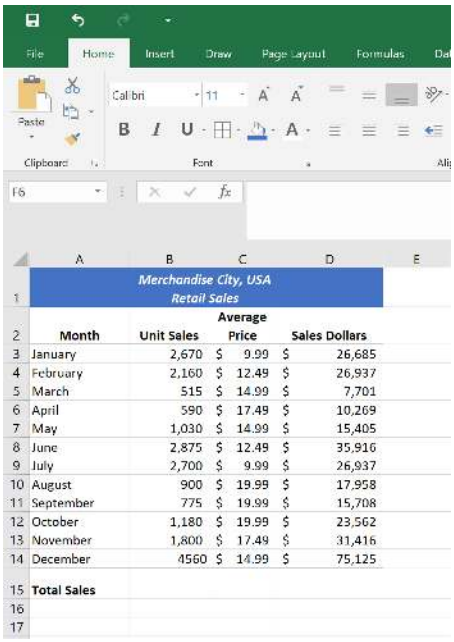


Figure 1.39 Title & Subtitle Added to the Worksheet

Skill Refresher

Entering Multiple Lines of Text

1. Activate a cell location.
2. Type the first line of text.
3. Hold down the ALT key and press the ENTER key.
4. Type the second line of text and press the ENTER key.

Borders (Adding Lines to a Worksheet)

In Excel, adding custom lines to a worksheet is known as adding borders. Borders are different from the grid lines that appear on a worksheet and that define the perimeter of the cell locations. The Borders command lets you add a variety of line styles to a worksheet that can make reading the worksheet much easier. The following steps illustrate methods for adding preset borders and custom borders to a worksheet:

1. Click the down arrow to the right of the Borders button in the Font group of commands in the Home page of the Ribbon to view border options. (see **Figure 1.40**).

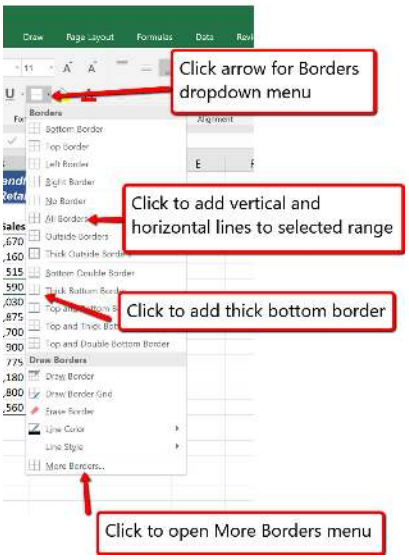


Figure 1.40 Borders Dropdown Menu

2. Select the range A1:D15. Left click the All Borders option from the Borders drop-down menu (see **Figure 1.40**). This will add vertical and horizontal lines to the range A1:D15.
3. Select the range A2:D2 .
4. Click the down arrow to the right of the Borders button.
5. Left click the Thick Bottom Border option from the Borders drop-down menu.
6. Select the range A14:D14 and apply a Thick Bottom Border from the drop-down menu. The thick border will help maintain the Excel Formatting Guidelines.
7. Select the range A1:D15.
8. Click the down arrow to the right of the Borders button.
9. Click More Borders… at the bottom of the List.
10. This will open the Format Cells dialog box (see **Figure 1.41**). You can access all formatting commands in Excel through this dialog box.
11. In the Style section of the Borders tab, click the thickest line style (see **Figure 1.41**).
12. Click the Outline button in the Presets section (see **Figure 1.41**).
13. Click the OK button at the bottom of the dialog box (see **Figure 1.41**).

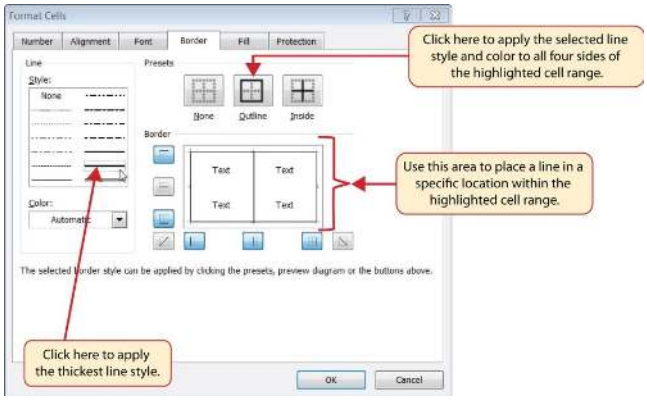
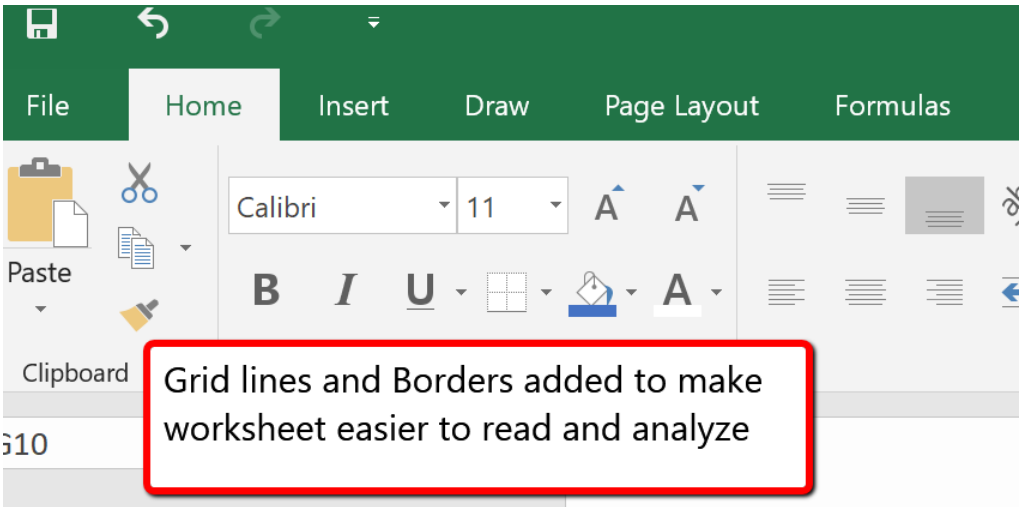


Figure 1.41 Borders Tab of the Format Cells Dialog Box



	A	B	C	D
1	***Merchandise City, USA Retail Sales***			
2	**Month**	**Unit Sales**	**Average Price**	**Sales Dollars**
3	January	2,670	$ 9.99	$ 26,685
4	February	2,160	$ 12.49	$ 26,937
5	March	515	$ 14.99	$ 7,701
6	April	590	$ 17.49	$ 10,269
7	May	1,030	$ 14.99	$ 15,405
8	June	2,875	$ 12.49	$ 35,916
9	July	2,700	$ 9.99	$ 26,937
10	August	900	$ 19.99	$ 17,958
11	September	775	$ 19.99	$ 15,708
12	October	1,180	$ 19.99	$ 23,562
13	November	1,800	$ 17.49	$ 31,416
14	December	4,560	$ 14.99	$ 75,125
15	**Total Sales**			
16				

Figure 1.42 Borders Added to the Worksheet

Skill Refresher

Preset Borders

1. Highlight a range of cells that require borders.
2. Click the Home tab of the Ribbon.
3. Click the down arrow next to the Borders button.
4. Select an option from the preset borders list.

Custom Borders

1. Highlight a range of cells that require borders.
2. Click the Home tab of the Ribbon.
3. Click the down arrow next to the Borders button.
4. Select the More Borders option at the bottom of the options list.
5. Select a line style and line color.
6. Select a placement option.
7. Click the OK button on the dialog box.

AutoSum

You will see at the bottom of Figure 1.42 that Row 15 is intended to show the totals for the data in this worksheet. Applying mathematical computations to a range of cells is accomplished through functions in Excel. Chapter 2 will review mathematical formulas and functions in detail. However, the following steps will demonstrate how you can quickly sum the values in a column of data using the AutoSum command:

1. Click cell B15 in the Sheet1 worksheet.
2. Click the Formulas tab of the Ribbon.
3. Click the down arrow below the AutoSum button in the Function Library group of commands (see **Figure 1.43**). ***Note that the AutoSum button can also be found in the Editing group of commands in the Home tab of the Ribbon.***

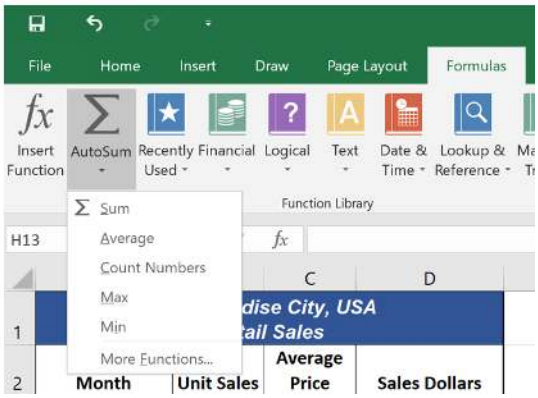


Figure 1.43 AutoSum List

4. Click the Sum option from the AutoSum drop down menu. The first click will display a flashing marquee around the range. Click the check mark next to the Formula bar to complete the function.
5. Excel will provide a total for the values in the Unit Sales column.
6. Click cell D15. It would not make sense to total the averages in column C so C15 will be left blank.
7. Repeat steps 3 through 5 to sum the values in the Sales Dollars column (see **Figure 1.44**).
8. Click cell C15 to explore other AutoSum selections. Select the COUNT function from the list; Excel will return “12” for the number of months (rows). Excel will also display indicators of a green arrow in the corner of C15 and an exclamation point in yellow. These indicate that the function in this cell varies from the other functions in row 15. They can be ignored and do not print.
9. Click cell C15 again; this time selecting the MAX option from the list. Excel will display $19.99. This reflects the Maximum Average Price in column C.

10. Click cell C15 and delete the contents in this cell.

	A	B	C	D
	Merchandise City, USA Retail Sales			
	Month	**Unit Sales**	**Average Price**	**Sales Dollars**
	January	2,670	$ 9.99	$ 26,685
	February	2,160	$ 12.49	$ 26,937
	March	515	$ 14.99	$ 7,701
	April	590	$ 17.49	$ 10,269
	May	1,030	$ 14.99	$ 15,405
	June	2,875	$ 12.49	$ 35,916
	July	2,700	$ 9.99	$ 26,937
10	August	900	$ 19.99	$ 17,958
11	September	775	$ 19.99	$ 15,708
12	October	1,180	$ 19.99	$ 23,562
13	November	1,800	$ 17.49	$ 31,416
14	December	4,560	$ 14.99	$ 75,125
15	**Total Sales**	21,755		$ 313,619
16				

Figure 1.44 Totals Added to the Sheet1 Worksheet

Skill Refresher

AutoSum

1. Highlight a cell location below or to the right of a range of cells that contain numeric values.
2. Click the Formulas tab of the Ribbon.
3. Click the down arrow below the AutoSum button.
4. Select a mathematical function from the list.

Moving, Renaming, Inserting, and Deleting Worksheets

The default names for the worksheet tabs at the bottom of workbook are Sheet1, Sheet2, and so on. However, you can change the worksheet tab names to identify the data you are using in a workbook. Additionally, you can change the order in which the worksheet tabs appear in the workbook. The following steps explain how to rename and move the worksheets in a workbook:

1. Double click the Sheet1 worksheet tab at the bottom of the workbook (see **Figure 1.45**). Type the name **Sales by Month**.
2. Press the ENTER key on your keyboard.
3. Click the + to the right of the newly named worksheet.
4. Type the name **Unit Sales Rank** to prepare the worksheet for future use.
5. Press the ENTER key on your keyboard.

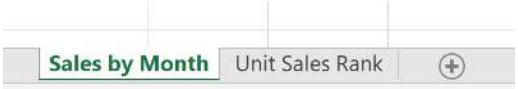


Figure 1.45 Renaming a Worksheet Tab

1. Click the + to add another worksheet tab.
2. Click the Home tab of the Ribbon.
3. Click the down arrow on the Delete button in the Cells group of commands.
4. Click the Delete Sheet option from the drop-down list. This removes the unneeded worksheet.
5. Click the Delete button on the Delete warning box (if a warning box appears).
6. Complete the steps above to delete the newly named **Unit Sales Rank** worksheet since it's decided that worksheet is also unnecessary so that you are left with just one worksheet.

7. Excel incorporates **Spell Check** which is located on the **Review** Ribbon. Clicking on the tool will allow Excel to check Spelling of alphabetic entries and allow for corrections. It's a good habit to always use Spell Check your work before saving/printing.



Figure 1.45a Spell Check Tool

8. Save the changes to your workbook by clicking either the **Save** button on the Home ribbon; or by selecting the **Save** option from the File menu.

Integrity Check

Deleting Worksheets

Be very cautious when deleting worksheets that contain data. Once a worksheet is deleted, you cannot use the Undo command to bring the sheet back. Deleting a worksheet is a permanent command.

Keyboard Shortcuts

Inserting New Worksheets

- Press the SHIFT key and then the F11 key on your keyboard. Same for Excel for Mac.

Figure 1.46 shows the final appearance of the Merchandise City, USA workbook.

	A	B	C	D
1	*Merchandise City, USA Retail Sales*			
2	**Month**	**Unit Sales**	**Average Price**	**Sales Dollars**
3	January	2,670	$ 9.99	$ 26,685
4	February	2,160	$ 12.49	$ 26,937
5	March	515	$ 14.99	$ 7,701
6	April	590	$ 17.49	$ 10,269
7	May	1,030	$ 14.99	$ 15,405
8	June	2,875	$ 12.49	$ 35,916
9	July	2,700	$ 9.99	$ 26,937
10	August	900	$ 19.99	$ 17,958
11	September	775	$ 19.99	$ 15,708
12	October	1,180	$ 19.99	$ 23,562
13	November	1,800	$ 17.49	$ 31,416
14	December	4,560	$ 14.99	$ 75,125
15	**Total Sales**	21,755		$ 313,619
16				
17				

Figure 1.46 Final Appearance of the Merchandise City, USA Workbook

Skill Refresher

Renaming Worksheets

1. Double click the worksheet tab.
2. Type the new name.
3. Press the ENTER key.

Moving Worksheets

1. Left click the worksheet tab.
2. Drag it to the desired position.

Deleting Worksheets

1. Open the worksheet to be deleted.
2. Click the Home tab of the Ribbon.
3. Click the down arrow on the Delete button.
4. Select the Delete Sheet option.
5. Click Delete on the warning box.

Key Takeaways

- Formatting skills are critical for creating worksheets that are easy to read and have a professional appearance.
- A series of pound signs (####) in a cell location indicates that the column is too narrow to display the number entered.
- Using the Wrap Text command allows you to stack multiword column headings vertically in a cell location, reducing the need to expand column widths.
- Use the Merge & Center command to center the title of a worksheet directly over the columns that contain data.
- Adding borders or lines will make your worksheet easier to read and helps to separate the data in each column and row.
- You cannot use the Undo command to bring back a worksheet that has been deleted.

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5.4: Formulas

This page is a draft and is under active development.

Learning Objectives

- Learn how to create basic formulas.
- Understand relative referencing when copying and pasting formulas.
- Work with complex formulas by controlling the order of mathematical operations.
- Understand formula auditing tools.

This section reviews the fundamental skills for entering formulas into an Excel worksheet. The example used for this chapter is the construction of a personal budget. Most financial advisors recommend that all households construct and maintain a personal budget to achieve and maintain strong financial health. Organizing and maintaining a personal budget is a skill you can practice at any point in your life. Whether you are managing your expenses during college or maintaining the finances of a family of four, a personal budget can be a vital tool when making financial decisions. Excel can make managing your money a fun and rewarding exercise.

Open the Data File

Download Data File: CH2 Data

1. Open the Data file named **CH2 Data** and use the File/Save As command to save it with the new name **CH2 Personal Budget**.

Figure 2.1 shows the completed workbook that will be demonstrated in this chapter. Notice that this workbook contains four worksheets. The first worksheet, **Budget Summary**, serves as an overview of the data that was entered and calculated in the second and third worksheets, **Budget Detail** and **Loan Payments**. The second worksheet, **Budget Detail**, provides a detailed list of all the expenses and the third worksheet, **Loan Payments**, provides information regarding car payment and mortgage payment amounts. The last worksheet, **Prepare to Print**, has data that is unrelated to the budget worksheets but will be used in Section 2.4 – Preparing to Print.

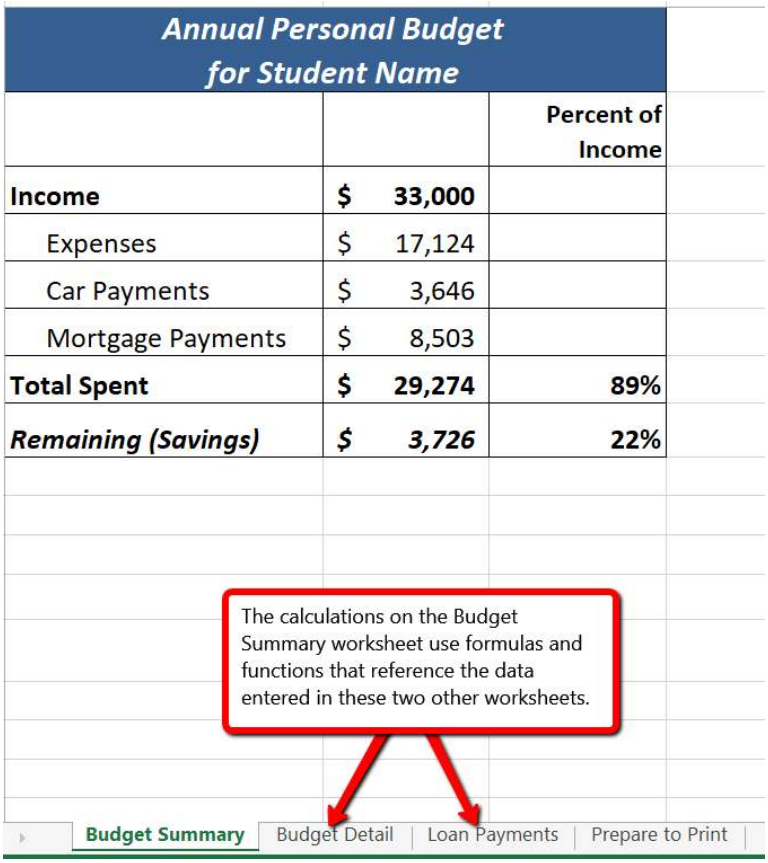


Figure 2.1 – The completed Budget Summary worksheet

Creating a Basic Formula

When formulas and cell references are used Excel will automatically recalculate when data is changed

Formulas are used to calculate a variety of mathematical outputs in Excel and can be used to create virtually any custom calculation required for your objective. Furthermore, when constructing a formula in Excel, you use cell addresses that, when added to a formula, become cell references. This means that Excel uses, or references, the number entered into the cell location when performing the calculation. As a result, when the numbers in the cells that are referenced are changed, Excel automatically recalculates the formula and produces a new result. This is what gives Excel the ability to create a variety of what-if scenarios, which will be explained later in the chapter.

To demonstrate the construction of a basic formula, we will begin working on the **Budget Detail** worksheet, which is shown in **Figure 2.2**. To complete this worksheet, we will enter some data, and then create several formulas and functions. **Table 2.1** provides definitions for each of the spend categories listed in the range A3:A11. When you develop a personal budget, these categories are defined on the basis of how you spend your money. It is likely that every person could have different categories or define the same categories differently. Therefore, it is important to review the definitions in **Table 2.1** to understand how we are defining these categories before proceeding.

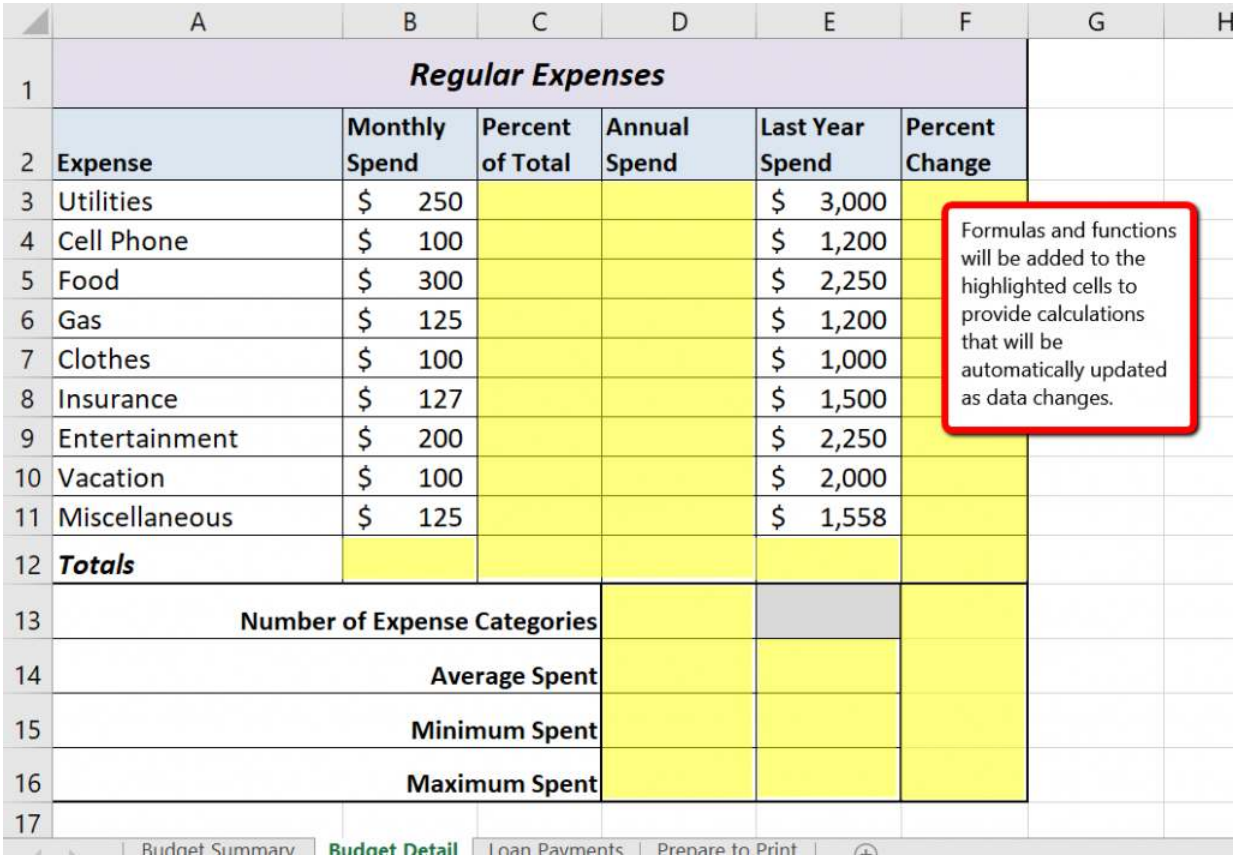


Figure 2.2 Budget Detail Worksheet

Table 2.1 Spend Category Definitions

Category	Definition
Utilities	Electricity, heat, water, home phone, cable, Internet access
Cell Phone	Cell phone plan and equipment charges
Food	Groceries
Gas	Cost of gas for vehicle
Clothes	Clothes, shoes, and accessories
Insurance	Renter, homeowner, and/or car insurance
Entertainment	Activities like dining out, movie and theater tickets, parties, and so on
Vacation	Vacation expenses
Miscellaneous	Any other spending categories

The amount of money spent each month for each category, as well as the amount of money spent last year, is already entered into the worksheet. We will write formulas that will calculate the annual (yearly) amount spent, the percent of the total spent each category represents, as well as the percent change from last year's spending to the current year.

The first formula will calculate the Annual Spend values. The formula will be constructed so that it takes the values in the Monthly Spend column and multiplies them by 12 (the number of months in a year). This will show how much money will be spent per year

for each of the categories listed in Column A. Since the first category is **Utilities**, we will start by creating the formula to multiply the Monthly Spend amount in B3 by 12. This formula will be created in D3 – the Annual Spend cell for the Utilities category. This formula will be written as: **=B3*12**

Formulas always start with the equal sign. This signifies to Excel that the contents of the cell should be calculated, not just displayed as basic text or numbers.

1. Switch to the **Budget Detail** worksheet if needed. Click cell **D3**.
2. Type an equal sign = *When the first character entered into a cell is an equal sign, it signals Excel to perform a calculation.*
3. Type **B3**. *This adds B3 to the formula, which is now a cell reference. Excel will use whatever value is entered into cell B3 in the calculation.*
4. Type the * . *This is the symbol for multiplication in Excel. As shown in **Table 2.2** the mathematical operators in Excel are slightly different from those found on a typical calculator.*
5. Type the number **12**. *This multiplies the value in cell B3 by 12. In this formula, a number, or constant, is used instead of a cell reference because it will not change. In other words, there will always be 12 months in a year.*
6. Press the **ENTER** key. *This enters the formula into the cell.*

Table 2.2 Excel Mathematical Operators (move up)

Symbol	Operation
+	Addition
–	Subtraction
/	Division
*	Multiplication
^	Power/Exponent

Why?

Use Cell References

Cell references enable Excel to automatically recalculate when one or more inputs in the referenced cells are changed. Cell references also allow you to trace how results are being calculated in a formula. You should **never** use a calculator to determine a mathematical output and type it into the cell location of a worksheet. Doing so eliminates Excel's cell-referencing benefits as well as your ability to trace a formula to determine how results are being calculated.

Use Universal Constants

There will be times when you are writing formulas that you will need to use universal constants, or numbers that do not change, such as the number of days in a week, weeks or months in a year, and so on. For example, if you are calculating the monthly cost of an item when you know the yearly cost, you will always divide by 12 since there are 12 months in a year. In this case, you use the constant of 12 instead of a cell reference because the number of months in a year never changes.

Figure 2.3 shows how the formula appears in cell D3 before you press the ENTER key. **Figure 2.4** shows the result of the formula after you press the ENTER key, as well as the **formula bar** which displays the formula as it was entered in the cell.

The Annual Spend for Utilities is $3,000 because the formula is taking the Monthly Spend in cell B3 and multiplying it by 12. If the value in cell B3 is changed, the formula automatically produces a new result.

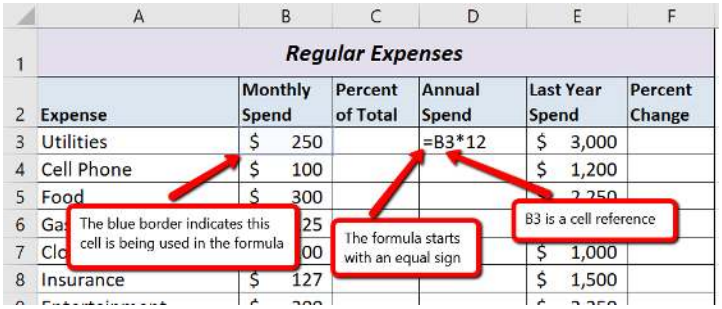


Figure 2.3 Adding a Formula to a Worksheet

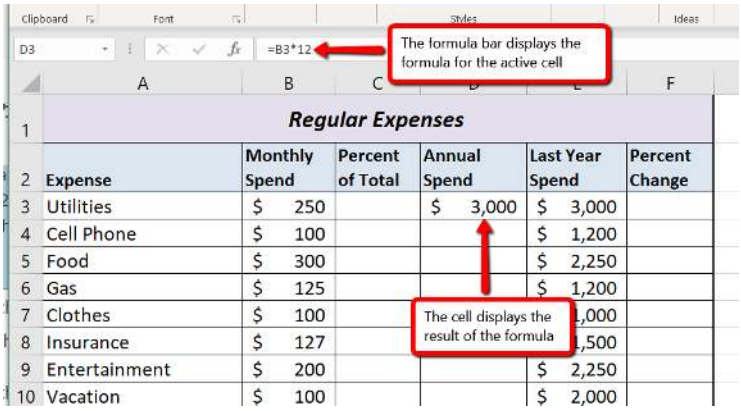


Figure 2.4 Formula Output for Annual Spend

Relative References (Copying and Pasting Formulas)

Once a formula is typed into a worksheet, it can be copied and pasted to other cell locations. For example, in cell D3 we have calculated the annual spend for the Utilities category, but this calculation needs to be performed for the rest of the cell locations in Column D. Since we used the B3 cell reference in the formula, Excel automatically adjusts that cell reference when the formula is copied and pasted into the rest of the cell locations in the column. This is called relative referencing and is demonstrated as follows:

1. Click cell D3.
2. Place the mouse pointer over the Auto Fill Handle in the bottom right corner of the cell.
3. When the mouse pointer turns from a white block plus sign to a black plus sign, click and drag down to cell D11. This pastes the formula into the range D4:D11.
4. Double click cell D6. Notice that the cell reference in the formula is automatically changed to B6.
5. Press the ENTER key.

Figure 2.5 shows the results added to the rest of the cell locations in the Annual Spend column. For each row, the formula takes the value in the Monthly Spend column and multiplies it by 12. You will also see that cell D6 has been double clicked to show the formula. Notice that Excel automatically changed the original cell reference of B3 to B6. This is the result of relative referencing, which means Excel automatically adjusts a cell reference relative to its original location when it is pasted into new cell locations. In this example, the formula was pasted into eight cell locations below the original cell location. As a result, Excel increased the row number of the original cell reference by a value of one for each row it was pasted into.

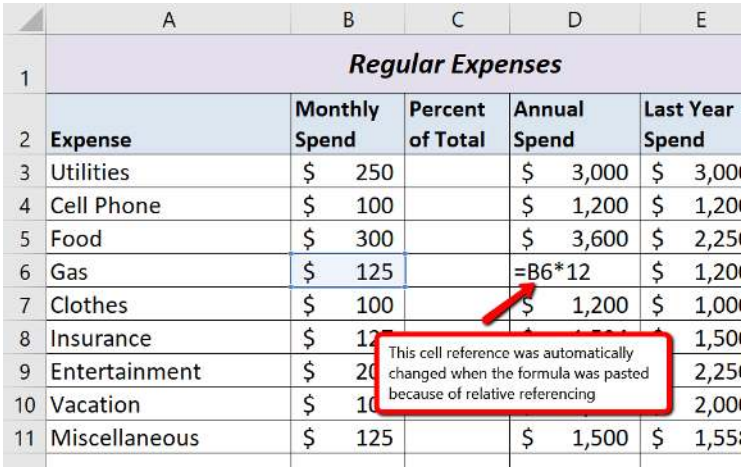


Figure 2.5 Relative Reference Example

Why?

Use Relative Referencing

Relative referencing is a convenient feature in Excel. When you use cell references in a formula, Excel automatically adjusts the cell references when the formula is pasted into new cell locations. If this feature were not available, you would have to manually retype the formula when you want the same calculation applied to other cell locations in a column or row.

Creating Complex Formulas (Controlling the Order of Operations)

The next formula to be added to the Personal Budget workbook is the percent change over last year (Column F). This formula determines the difference between this year's Annual Spend values (Column D) and the values in the Last Year Spend column (Column E) and shows the difference in terms of a percentage. This requires that the order of mathematical operations be controlled to get an accurate result.

Excel uses the standard mathematical order of operations, as defined in Table 2.3. When writing complex formulas it is important to remember this **order of operations.** You want to be sure that your formulas will calculate in the order you intend. To help you remember which operations will be performed first, you can use the acronym PEMDAS.

P – parentheses
E – exponents
MD – multiplication and division
AS – addition and subtraction

Table 2.3 shows the standard order of operations (PEMDAS) for a typical formula. To change the order of operations shown in the table, you can use parentheses to process certain mathematical calculations first.

Table 2.3 Standard Order of Mathematical Operations (PEMDAS)

Symbol	Order
( )	Any calculation inside parentheses will be done first. If there are layers of parentheses used in a formula, Excel computes the innermost parentheses first and the outermost parentheses last.
^	Excel executes any exponential computations next.
* or /	Excel performs any multiplication or division computations next. When there are multiple instances of these computations in a formula, they are executed in order from left to right.
+ or −	Excel performs any addition or subtraction computations last. When there are multiple instances of these computations in a formula, they are executed in order from left to right.

To create the Percent Change formula, we will need to use parentheses to control the order of the calculations. We need the difference of the two values to be found before the division is done, so we will use parentheses around the subtraction portion of the formula to indicate that calculation needs to be done first. This formula is added to the worksheet as follows:

1. Click cell F3 in the **Budget Detail** worksheet.
2. Type an equal sign =.
3. Type an open parenthesis **(**.
4. Click cell D3. This will add a cell reference to cell D3 to the formula. *When building formulas, you can click cell locations instead of typing them.*
5. Type a minus sign −.
6. Click cell E3 to add this cell reference to the formula.
7. Type a closing parenthesis **)**.
8. Type the slash / symbol for division.
9. Click cell E3. This completes the formula that will calculate the percent change of last year's actual spent dollars vs. this year's budgeted spend dollars (**see Figure 2.6**).
10. Press the ENTER key.
11. Click cell F3 to activate it.
12. Place the mouse pointer over the Auto Fill Handle.
13. When the mouse pointer turns from a white block plus sign to a black plus sign, click and drag down to cell F11. This pastes the formula into the range F4:F11.

Figure 2.6 shows the formula that was added to the **Budget Detail** worksheet to calculate the percent change in spending. The parentheses were added to this formula to control the order of operations. Any mathematical computations placed in parentheses are executed first before the standard order of mathematical operations (see **Table 2.3)**. In this case, if parentheses were not used, Excel would produce an erroneous result for this worksheet.

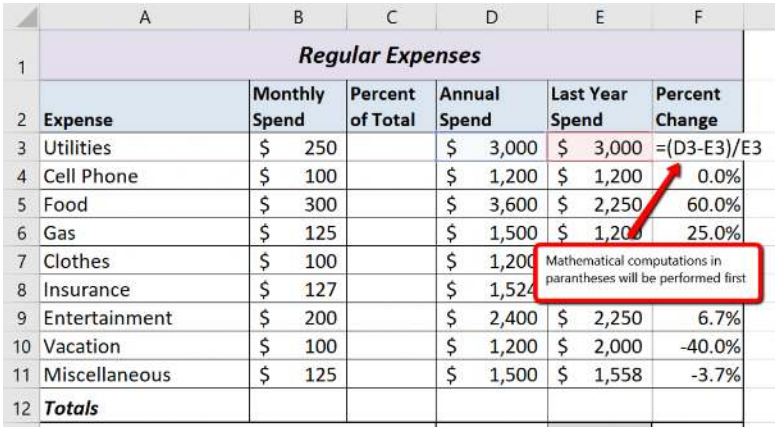


Figure 2.6 Adding the Percent Change Formula

Figure 2.7 shows the result of the percent change formula if the parentheses are removed. The formula produces a result of a 299900% increase. Since there is no change between the LY spend and the budget Annual Spend, the result should be 0%. However, without the parentheses, Excel is following the standard order of operations. This means the value in cell E3 will be divided by E3 first (3,000/3,000), which is 1. Then, the value of 1 will be subtracted from the value in cell D3 (3,000−1), which is 2,999. Since cell F3 is formatted as a percentage, Excel expresses the output as an increase of 299900%.

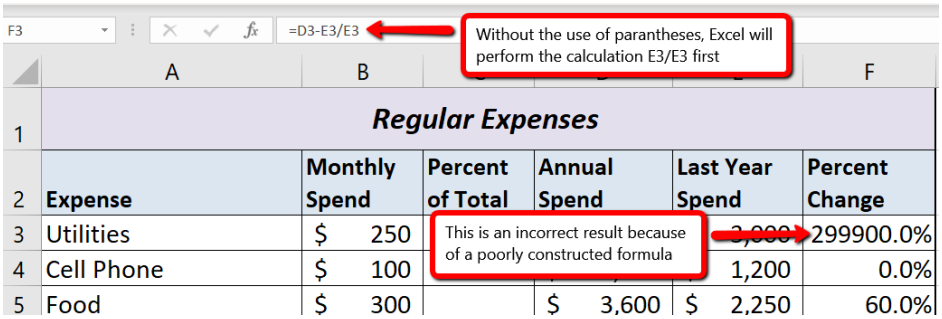


Figure 2.7 Removing the Parentheses from the Percent Change Formula

Integrity Check

Does the Output of Your Formula Make Sense?

It is important to note that the accuracy of the output produced by a formula depends on how it is constructed. Therefore, always check the result of your formula to see whether it makes sense with data in your worksheet. As shown in **Figure 2.7**, a poorly constructed formula can give you an inaccurate result. In other words, you can see that there is no change between the Annual Spend and LY Spend for Household Utilities. Therefore, the result of the formula should be 0%. However, since the parentheses were removed in this case, the formula is clearly producing an erroneous result.

Skill Refresher

Formulas

1. Type an equal sign =.
2. Click or type a cell location. If using constants, type a number.
3. Type a mathematical operator.
4. Click or type a cell location. If using constants, type a number.
5. Use parentheses where necessary to control the order of operations.
6. Press the ENTER key.

Auditing Formulas

Excel provides a few tools that you can use to review the formulas entered into a worksheet. For example, instead of showing the outputs for the formulas used in a worksheet, you can have Excel show the formula as it was entered in the cell locations. This is demonstrated as follows:

1. With the **Budget Detail** worksheet open, click the Formulas tab of the Ribbon.
2. Click the Show Formulas button in the Formula Auditing group of commands. This displays the formulas in the worksheet instead of showing the mathematical outputs.
3. Click the Show Formulas button again. The worksheet returns to showing the output of the formulas.

You can also toggle Show Formulas on and off using the keyboard. Hold down the CTRL key while pressing the ` key.

Figure 2.8 shows the **Budget Detail** worksheet after activating the Show Formulas command in the Formulas tab of the Ribbon. As shown in the figure, this command allows you to view and check all the formulas in a worksheet without having to click each cell individually. After activating this command, the column widths in your worksheet increase significantly. The column widths were adjusted for the worksheet shown in **Figure 2.8** so all columns can be seen. The column widths return to their previous width when the Show Formulas command is deactivated.

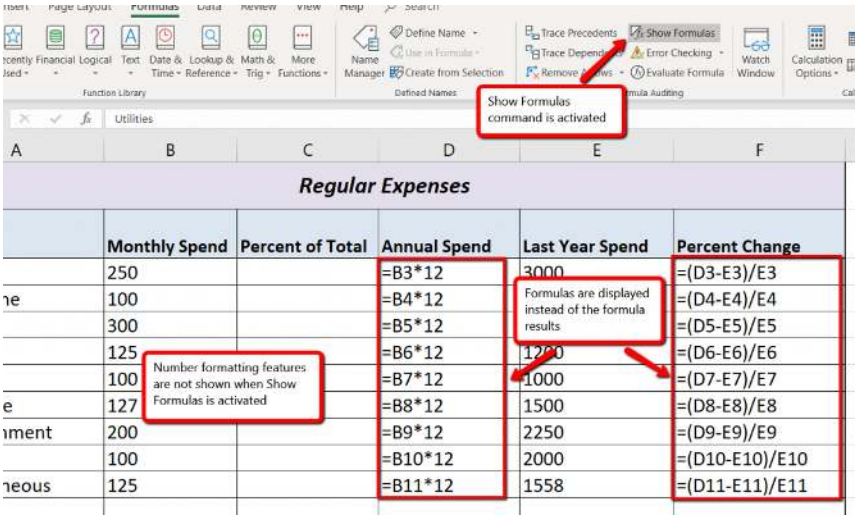


Figure 2.8 Show Formulas Command

Skill Refresher

Show Formulas

1. Click the Formulas tab on the Ribbon.
2. Click the Show Formulas button in the Formula Auditing group of commands.
3. Click the Show Formulas button again to show formula outputs.

Keyboard Shortcuts

Show Formulas

- Hold down the CTRL key while pressing the accent symbol `. Same for Excel for Mac.

Two other tools in the Formula Auditing group of commands are the **Trace Precedents** and **Trace Dependents** commands. These commands are used to trace the cell references used in a formula. A precedent cell is a cell whose value is used in other cells. The Trace Precedents command shows an arrow to indicate the cells or ranges (precedents) which affect the active cell's value. A dependent cell is a cell whose value depends on the values of other cells in the workbook. The Trace Dependents command shows where any given cell is referenced in a formula. The following is a demonstration of these commands:

1. Click cell D3.

2. Click the Trace Dependents button in the Formula Auditing group of commands in the Formulas tab of the Ribbon. A blue arrow appears, pointing to cell F3 (see **Figure 2.9**). This indicates that cell D3 is referenced in a formula entered in cell F3.
3. Click the Remove Arrows command in the Formula Auditing group of commands in the Formulas tab of the Ribbon. This removes the Trace Dependents arrow.
4. Click cell F3.
5. Click the Trace Precedents button in the Formula Auditing group of commands in the Formulas tab of the Ribbon. A blue arrow with dots in cells D3 and E3, and pointing to cell F3 appears (see **Figure 2.10**). This indicates that cells D3 and E3 are references in a formula entered in cell F3.
6. Click the Remove Arrows command in the Formula Auditing group of commands in the Formulas tab of the Ribbon. This removes the Trace Precedents arrow.
7. Save the **CH2 Personal Budget** file.

Figure 2.9 shows the Trace Dependents arrow on the **Budget Detail** worksheet. The blue dot represents the activated cell. The arrows indicate where the cell is referenced in formulas.

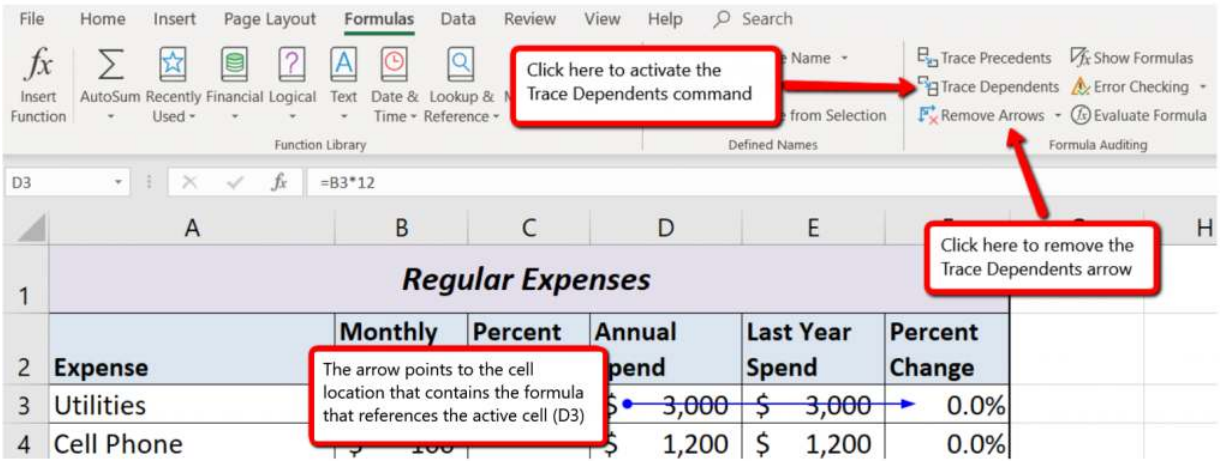


Figure 2.9 Trace Dependents Example

Figure 2.10 shows the Trace Precedents arrow on the **Budget Detail** worksheet. The blue dots on this arrow indicate the cells that are referenced in the formula contained in the activated cell. The arrow is pointing to the activated cell location that contains the formula.

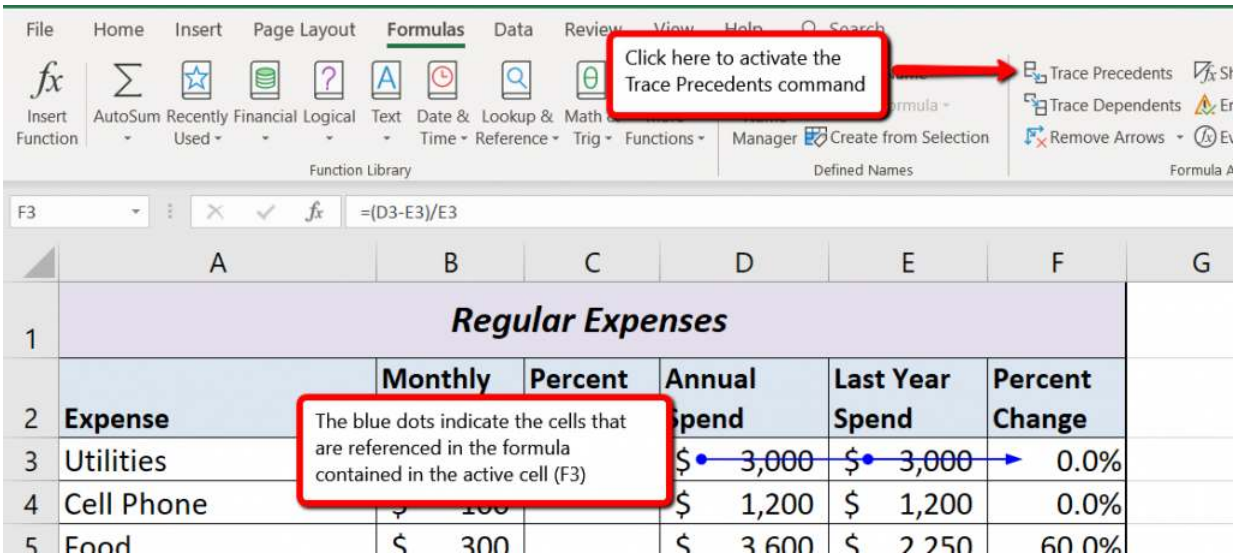


Figure 2.10 Trace Precedents Example

Skill Refresher

Trace Dependents

1. Click a cell location that contains a number or formula.
2. Click the Formulas tab on the Ribbon.
3. Click the Trace Dependents button in the Formula Auditing group of commands.
4. Use the arrow(s) to determine where the cell is referenced in formulas and functions.
5. Click the Remove Arrows button to remove the arrows from the worksheet.

Trace Precedents

1. Click a cell location that contains a formula or function.
2. Click the Formulas tab on the Ribbon.
3. Click the Trace Precedents button in the Formula Auditing group of commands.
4. Use the dot(s) along the line to determine what cells are referenced in the formula or function.
5. Click the Remove Arrows button to remove the line with the dots.

Key Takeaways

- Mathematical computations are conducted through formulas and functions.
- An equal sign = precedes all formulas and functions.
- Formulas and functions must be created with cell references to conduct what-if scenarios where mathematical outputs are recalculated when one or more inputs are changed.
- Mathematical operators on a typical calculator are different from those used in Excel. **Table 2.2** "Excel Mathematical Operators" lists Excel mathematical operators.
- When using numerical values in formulas and functions, only use universal constants that do not change, such as days in a week, months in a year, and so on.
- Relative referencing automatically adjusts the cell references in formulas and functions when they are pasted into new locations on a worksheet. This eliminates the need to retype formulas and functions when they are needed in multiple rows or columns on a worksheet.
- Parentheses must be used to control the order of operations when necessary for complex formulas.
- Formula auditing tools such as Trace Dependents, Trace Precedents, and Show Formulas should be used to check the integrity of formulas that have been entered into a worksheet.

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5.5: Introductory Statistical Functions

This page is a draft and is under active development.

Learning Objectives

- Use the SUM function to calculate totals.
- Use the COUNT function to count cell locations with numerical values.
- Use the AVERAGE function to calculate the arithmetic mean.
- Use the MAX and MIN functions to find the highest and lowest values in a range of cells.
- Learn how to copy and paste formulas without formats applied to a cell location.
- Use absolute references to calculate percent of totals.
- Learn how to set a multiple level sort sequence for data sets that have duplicate values or outputs.

In addition to formulas, another way to conduct mathematical computations in Excel is through functions. Excel functions apply a mathematical process to a group of cells in a worksheet. For example, the SUM function is used to add the values contained in a range of cells. Functions are more efficient than formulas when you are applying a mathematical process to a group of cells. If you use a formula to add the values in a range of cells, you would have to add each cell location to the formula one at a time. This can be very time-consuming if you have to add the values in a few hundred cell locations. However, when you use a function, you can highlight all the cells that contain values you wish to sum in just one step.

The components of a function are as follows:

=FunctionName(Arguments)

Functions are a type of formula, therefore they start with an equal sign. The next component is the name of the function. A list of commonly used functions is shown in **Table 2.4**. After the function name comes the arguments for the function, which are always enclosed in parentheses. The arguments are the cell locations and/or values that will be used in the function. The number and type of arguments varies based on the the function being used, although in this section we will only work with a range of cells for the function arguments. Some examples of different functions with their arguments are:

=SUM(B2:B15) – adds the values in B2 through B15
=SQRT(A5) – finds the square root of the value in A5
=COUNTA(A1:A20) – finds the number of cells from A1 through A20 that contain text or a number

Throughout Section 2.2 we will add a variety of mathematical functions to the Personal Budget workbook. In addition to creating functions, this section also reviews percent of total calculations and the use of absolute references.

Table 2.4 Commonly Used Functions

Function	Output
ABS	The absolute value of a number
AVERAGE	The average or arithmetic mean for a group of numbers
COUNT	The number of cell locations in a range that contain a numeric value
COUNTA	The number of cell locations in a range that contain text or a numeric value
MAX	The highest numeric value in a group of numbers
MEDIAN	The middle number in a group of numbers (half the numbers in the group are higher than the median and half the numbers in the group are lower than the median)
MIN	The lowest numeric value in a group of numbers
MODE	The number that appears most frequently in a group of numbers
PRODUCT	The result of multiplying all the values in a range of cell locations
SQRT	The positive square root of a number
SUM	The total of all numeric values in a group

It is important to note that there are several methods for adding a function to a worksheet, and we will explore each of them throughout this section.

- Typing the function directly into a cell
- Selecting from the function list
- Using the Function Library on the ribbon
- Using the Insert Function button

The SUM Function

The SUM function is used when you need to calculate totals for a range of cells or a group of selected cells on a worksheet. With regard to the **Budget Detail** worksheet, we will use the SUM function to calculate the totals in row 12, starting with the Monthly Spend total in B12. The following illustrates how a function can be added to a worksheet by typing it into a cell location:

1. Switch to the **Budget Detail** worksheet if needed.
2. Click cell B12.
3. Type an equal sign =.
4. Type the function name **SUM**.
5. Type an open parenthesis **(**.
6. Click cell B3 and drag down to cell B11. This places the range B3:B11 into the function.
7. Type a closing parenthesis **)**.
8. Press the ENTER key. The function calculates the total for the Monthly Spend column, which is $1,427.

Figure 2.11 shows the appearance of the SUM function added to the **Budget Detail** worksheet before pressing the ENTER key.

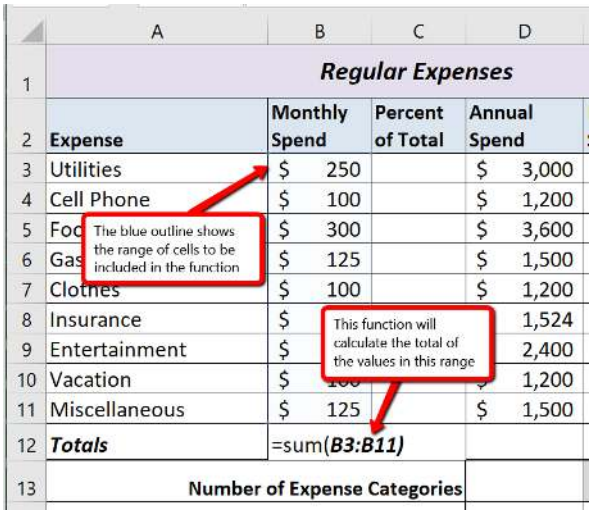


Figure 2.11 Adding the SUM Function to the Budget Detail Worksheet

As shown in **Figure 2.11**, the SUM function was added to cell B12. However, this function is also needed to calculate the totals in the Annual Spend and Last Year Spend columns. The function can be copied and pasted into these cell locations because of relative referencing. Relative referencing serves the same purpose for functions as it does for formulas. To complete the Totals in row 12, we need to copy and paste the SUM function into D12 and E12. Since we will then have totals in D12 and E12, we can paste the percent change formula into F12.

1. Click cell B12 in the **Budget Detail** worksheet.
2. Click the Copy button in the Home tab of the Ribbon.
3. Highlight cells D12 and E12.
4. Click the Paste button in the Home tab of the Ribbon. This pastes the SUM function into cells D12 and E12 and calculates the totals for these columns.
5. Click cell F11.
6. Click the Copy button in the Home tab of the Ribbon.
7. Click cell F12, then click the Paste button in the Home tab of the Ribbon.

Figure 2.12 shows the output of the SUM function that was added to cells B12, D12, and E12. In addition, the percent change formula was copied and pasted into cell F12. Notice that this version of the budget is planning an increase in spending compared to last year.

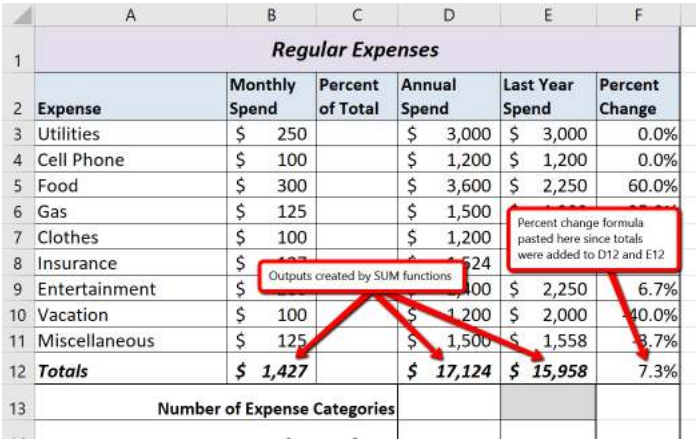


Figure 2.12 Results of the SUM Function in the Budget Detail worksheet

Integrity Check

Cell Ranges in Functions

When you intend to use a function on a range of cells in a worksheet, make sure there are two cell locations separated by a **colon** and not a comma. If you enter two cell locations separated by a comma, the function will calculate only the two cell locations listed instead of an entire range of cells. For example, the SUM function shown in **Figure 2.13** will add only the values in cells C3 and C11, not the range C3:C11.

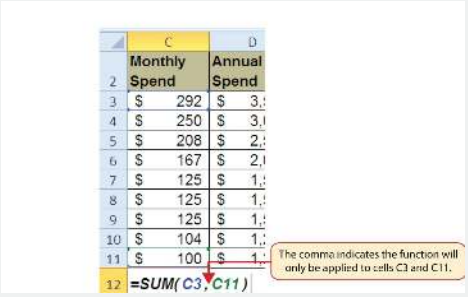


Figure 2.13 SUM Function Adding Two Cell Locations

The COUNT Function

Data file: Continue with CH2 Personal Budget.

The next function that we will add to the **Budget Detail** worksheet is the COUNT function. The COUNT function is used to determine how many cells in a range contain a numeric entry. The COUNT function will not work for counting text or other non-numeric entries. If you want to count text instead of, or in addition to, numeric entries you use the COUNTA function. For the **Budget Detail** worksheet, we will use the COUNT function to count the number of items that are planned in the Annual Spend column (Column D). The following explains how the COUNT function is added to the worksheet by selecting from the function list:

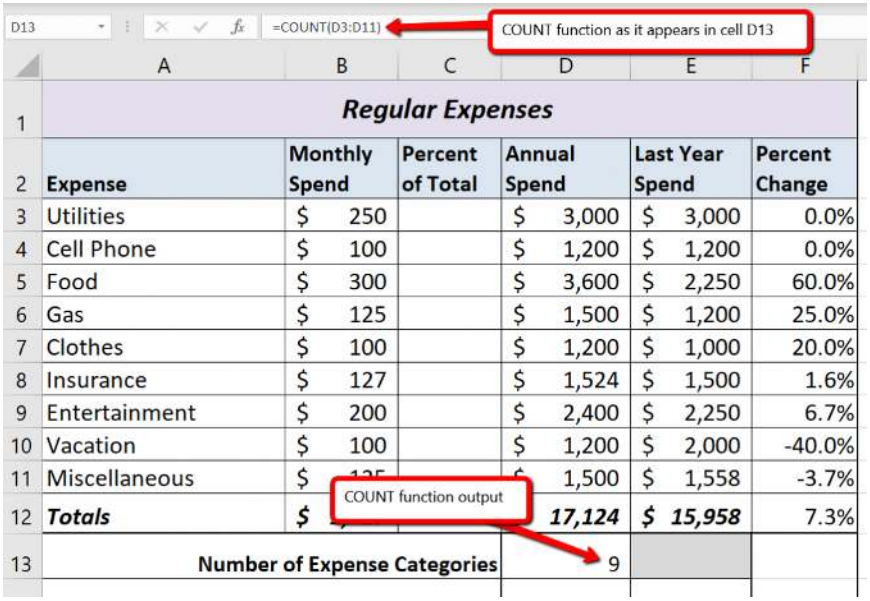
1. Click cell D13.
2. Type an equal sign =.
3. Type the letter **C** (to start spelling the name of the function).
4. Click the down arrow on the scroll bar of the function list (see **Figure 2.14**) and find the word COUNT.
   - Mac Users can scroll down with touchpad or mouse to find COUNT
5. Double click the word COUNT from the function list.
   - Mac Users should single click the word “COUNT” do not double-click
6. Highlight the range D3:D11.
7. You can type a closing parenthesis **)** and then press the ENTER key, or simply press the ENTER key and Excel will close the function for you. The function produces an output of 9 since there are 9 items planned on the worksheet.

Figure 2.14 shows the function list box that appears after completing steps 2 and 3 for the COUNT function. The function list provides an alternative method for adding a function to a worksheet.

	Job 298	Job 299	Job 300
Direct material	$2,228	$23,945	$ 4,231
Direct labor	2,391	23,492	3,413
Overhead	?	?	?
Total	$8,803	$88,548	$13,617

Figure 2.14 Using the Function List to Add the COUNT Function

Figure 2.15 shows the output of the COUNT function after pressing the ENTER key. The function counts the number of cells in the range D3:D11 that contain a numeric value. The result of 9 indicates that there are 9 categories planned for this budget.



	A	B	C	D	E	F
1	***Regular Expenses***					
2	**Expense**	**Monthly Spend**	**Percent of Total**	**Annual Spend**	**Last Year Spend**	**Percent Change**
3	Utilities	$ 250		$ 3,000	$ 3,000	0.0%
4	Cell Phone	$ 100		$ 1,200	$ 1,200	0.0%
5	Food	$ 300		$ 3,600	$ 2,250	60.0%
6	Gas	$ 125		$ 1,500	$ 1,200	25.0%
7	Clothes	$ 100		$ 1,200	$ 1,000	20.0%
8	Insurance	$ 127		$ 1,524	$ 1,500	1.6%
9	Entertainment	$ 200		$ 2,400	$ 2,250	6.7%
10	Vacation	$ 100		$ 1,200	$ 2,000	-40.0%
11	Miscellaneous	$		$ 1,500	$ 1,558	-3.7%
12	***Totals***	***$***		***17,124***	***$ 15,958***	7.3%
13	**Number of Expense Categories**			9		

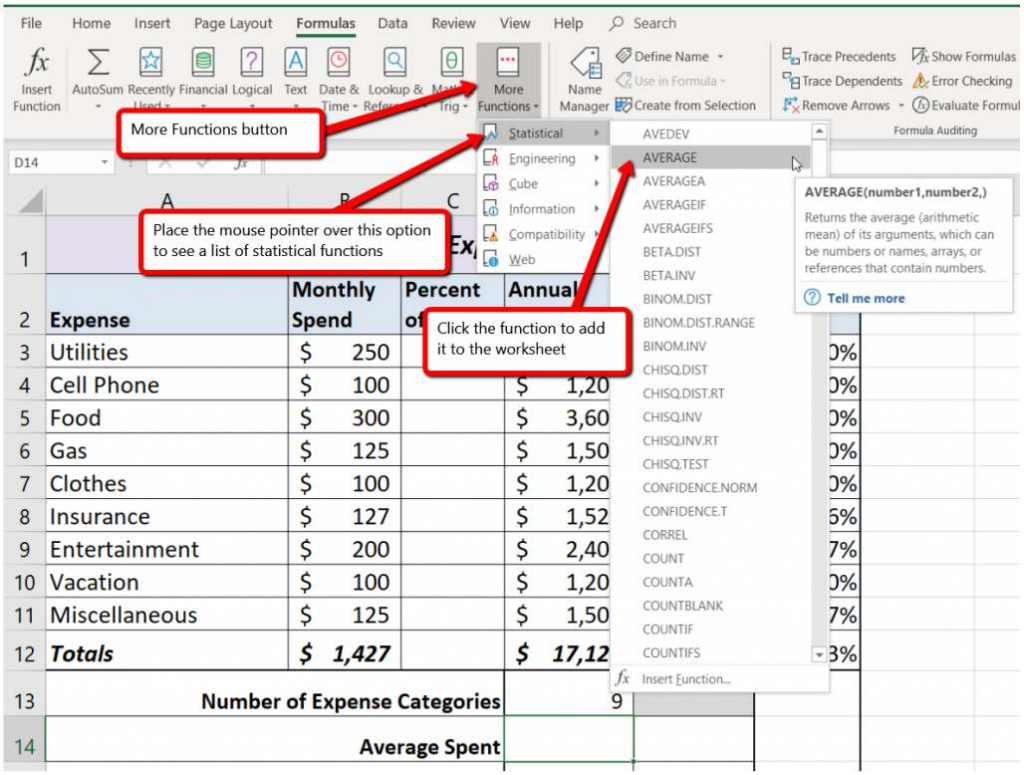
Figure 2.15 Completed COUNT Function in the Budget Detail Worksheet

The AVERAGE Function

The next function we will add to the **Budget Detail** worksheet is the AVERAGE function. This function is used to calculate the arithmetic mean for a group of numbers. For the **Budget Detail** worksheet, we will use the function to calculate the average of the values in the Annual Spend column. We will add this to the worksheet by using the Function Library on the Formulas ribbon. The following steps explain how this is accomplished:

1. Click cell D14 in the **Budget Detail** worksheet.
2. Click the Formulas tab on the Ribbon.
3. Click the More Functions button in the Function Library group of commands.
4. Place the mouse pointer over the Statistical option from the drop-down list of options.
5. Click the AVERAGE function name from the list of functions that appear in the menu (see **Figure 2.16**). This opens the Function Arguments dialog box.
6. Click the Collapse Dialog button in the Function Arguments dialog box (see **Figure 2.17**).
   - For Mac Users, the Collapse Dialog button may not collapse. Just continue with Step 7 and press Enter after selecting the range.
7. Highlight the range D3:D11.
8. Click the Expand Dialog button in the Function Arguments dialog box (see **Figure 2.18**). You can also press the ENTER key to get the same result.
9. Click the OK button on the Function Arguments dialog box. This adds the AVERAGE function to the worksheet.
   - Mac Users should click the **DONE** button

Figure 2.16 illustrates how a function is selected from the Function Library in the Formulas tab of the Ribbon.



	Expense	Monthly Spend	Percent of	Annual
3	Utilities	$ 250		
4	Cell Phone	$ 100		$ 1,20
5	Food	$ 300		$ 3,60
6	Gas	$ 125		$ 1,50
7	Clothes	$ 100		$ 1,20
8	Insurance	$ 127		$ 1,52
9	Entertainment	$ 200		$ 2,40
10	Vacation	$ 100		$ 1,20
11	Miscellaneous	$ 125		$ 1,50
12	***Totals***	***$ 1,427***		***$ 17,12***
13		**Number of Expense Categories**		9
14		**Average Spent**		

Figure 2.16 Selecting the AVERAGE function from the Function Library

Figure 2.17 shows the Function Arguments dialog box. This appears after a function is selected from the Function Library. The Collapse Dialog button is used to hide the dialog box so a range of cells can be highlighted on the worksheet and then added to the function.

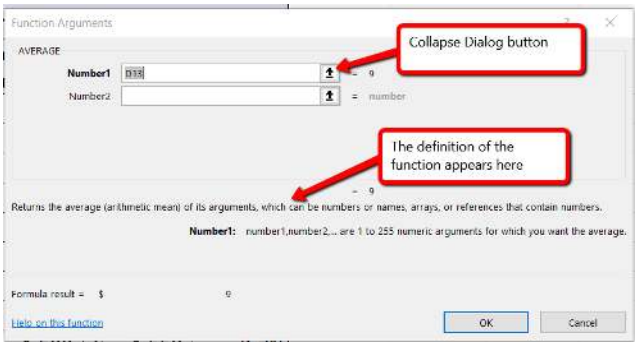


Figure 2.17 Function Arguments Dialog Box

Figure 2.18 shows how a range of cells can be selected from the Function Arguments dialog box once it has been collapsed.

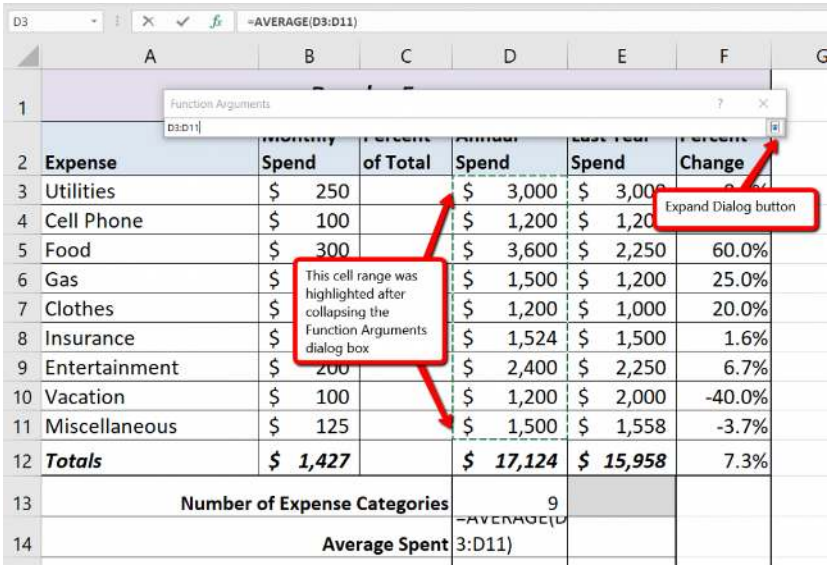


Figure 2.18 Selecting a range from the Function Arguments Dialog Box

Figure 2.19 shows the Function Arguments dialog box after the cell range is defined for the AVERAGE function. The dialog box shows the result of the function before it is added to the cell location. This allows you to assess the function output to determine whether it makes sense before adding it to the worksheet.

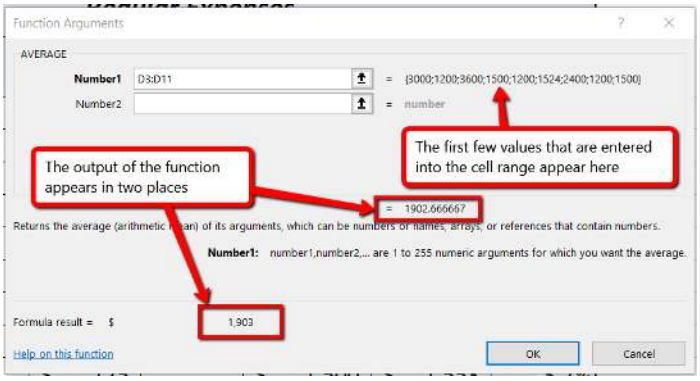
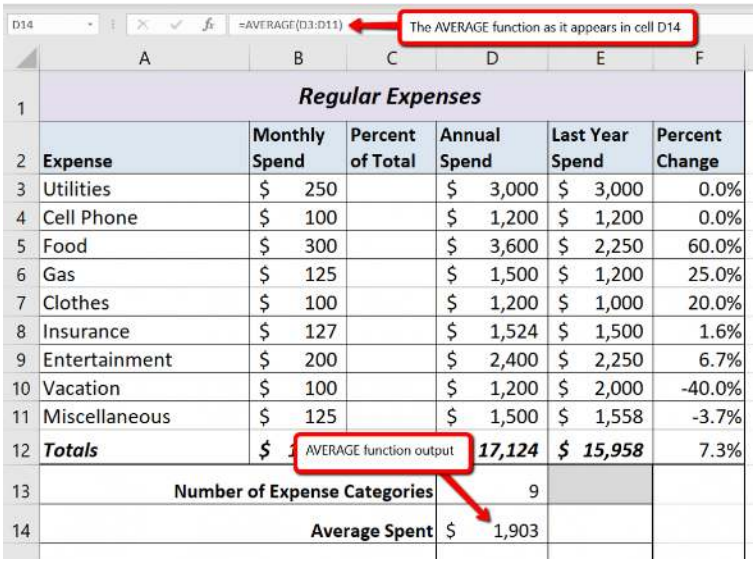


Figure 2.19 Function Arguments Dialog Box after a Cell Range Is Defined for a Function

Figure 2.20 shows the completed AVERAGE function in the **Budget Detail** worksheet. The output of the function shows that on average we expect to spend $1,903 for each of the categories listed in Column A of the budget. This average spend calculation per category can be used as an indicator to determine which categories are costing more or less than the average budgeted spend dollars.



	A	B	C	D	E	F
1	***Regular Expenses***					
2	**Expense**	**Monthly Spend**	**Percent of Total**	**Annual Spend**	**Last Year Spend**	**Percent Change**
3	Utilities	$ 250		$ 3,000	$ 3,000	0.0%
4	Cell Phone	$ 100		$ 1,200	$ 1,200	0.0%
5	Food	$ 300		$ 3,600	$ 2,250	60.0%
6	Gas	$ 125		$ 1,500	$ 1,200	25.0%
7	Clothes	$ 100		$ 1,200	$ 1,000	20.0%
8	Insurance	$ 127		$ 1,524	$ 1,500	1.6%
9	Entertainment	$ 200		$ 2,400	$ 2,250	6.7%
10	Vacation	$ 100		$ 1,200	$ 2,000	-40.0%
11	Miscellaneous	$ 125		$ 1,500	$ 1,558	-3.7%
12	***Totals***	***$ 1***		***17,124***	***$ 15,958***	7.3%
13			**Number of Expense Categories**	9		
14			**Average Spent**	$ 1,903		

Figure 2.20 Completed AVERAGE function

The MAX and MIN Functions

Data file: Continue with CH2 Personal Budget.

The final two statistical functions that we will add to the **Budget Detail** worksheet are the MAX and MIN functions. These functions identify the highest and lowest values in a range of cells. The following steps explain how to add these functions to the **Budget Detail** worksheet using the Insert Function button:

1. Click cell D15 in the **Budget Det**ail worksheet.
2. Click the Insert Function button on the Formulas ribbon. (see **Figure 2.21**)
3. This brings up the Insert Function dialog box. Type the word **MIN** in the search box and then click the Go button. (see **Figure 2.22**)
4. Double-click MIN in the list. This opens the Function Arguments dialog box.
5. Click the Collapse Dialog button in the Function Arguments dialog box.
6. Highlight the range D3:D11.
7. Click the Expand Dialog button in the Function Arguments dialog box.
8. Click the OK button on the Function Arguments dialog box. This adds the MIN function to the worksheet. (see **Figure 2.23)**
9. Click cell D16.
10. Repeat steps 2-8 (using MAX instead of MIN) to add the MAX function to the worksheet. (see **Figure 2.24**)

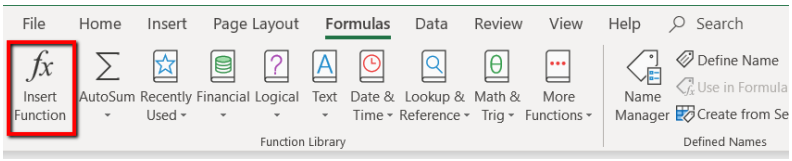


Figure 2.21 Insert Function button on the Formulas Ribbon

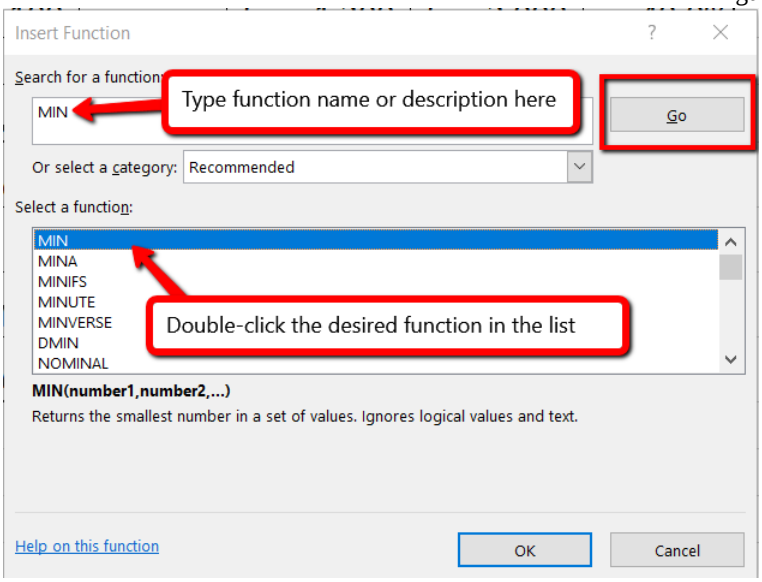
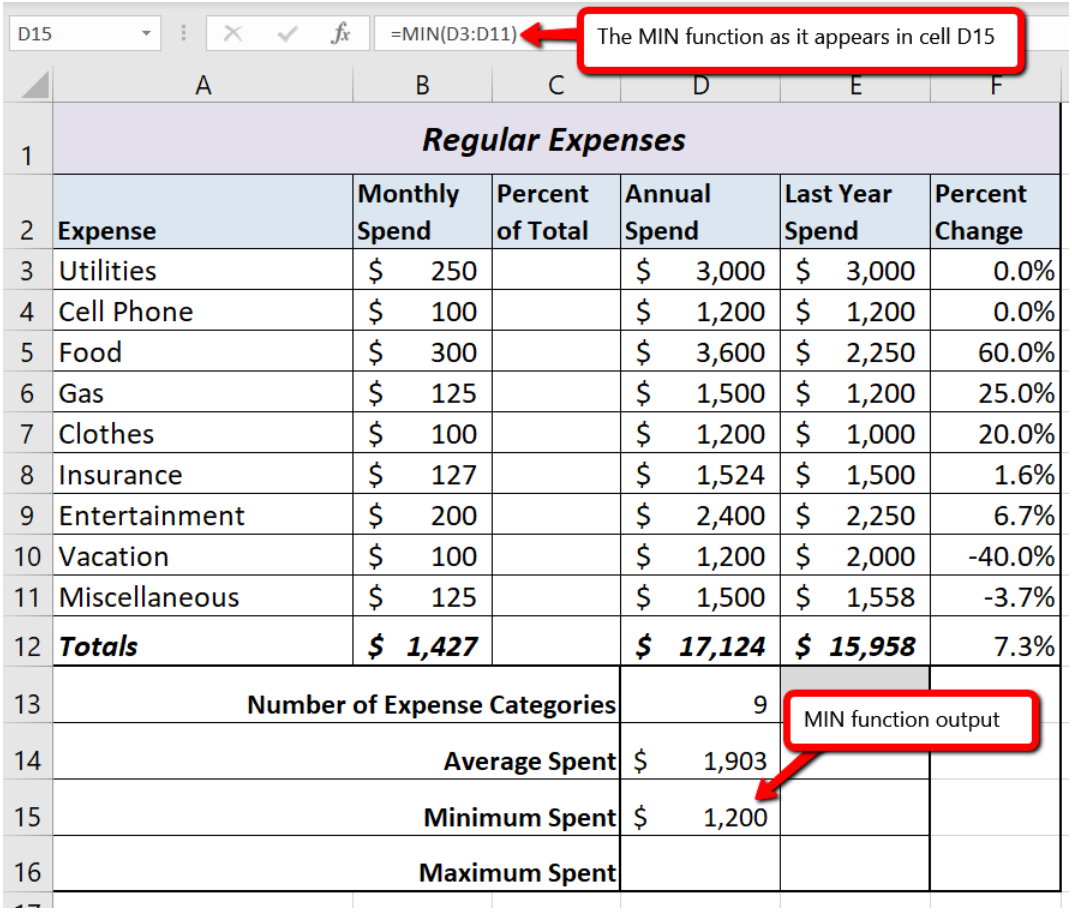
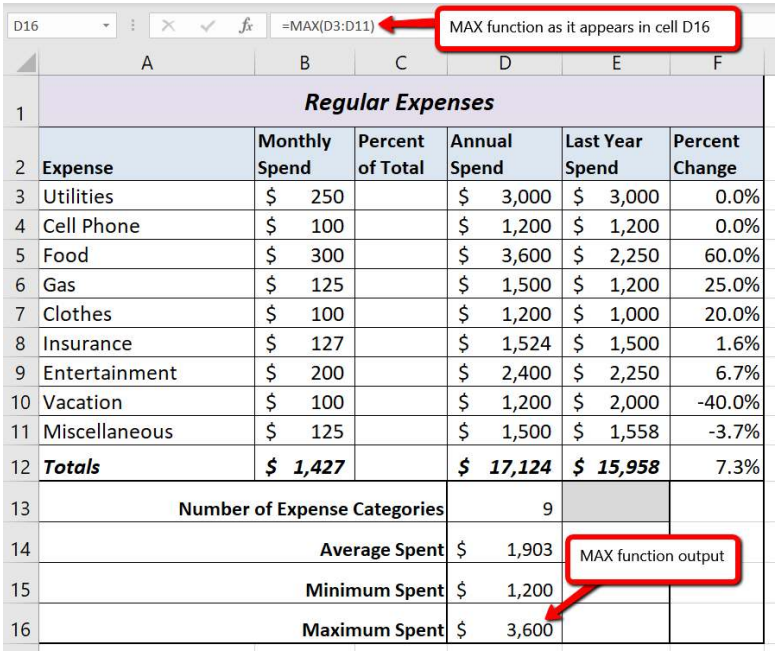


Figure 2.22 Insert Function Dialog Box



	A	B	C	D	E	F
1	***Regular Expenses***					
2	**Expense**	**Monthly Spend**	**Percent of Total**	**Annual Spend**	**Last Year Spend**	**Percent Change**
3	Utilities	$ 250		$ 3,000	$ 3,000	0.0%
4	Cell Phone	$ 100		$ 1,200	$ 1,200	0.0%
5	Food	$ 300		$ 3,600	$ 2,250	60.0%
6	Gas	$ 125		$ 1,500	$ 1,200	25.0%
7	Clothes	$ 100		$ 1,200	$ 1,000	20.0%
8	Insurance	$ 127		$ 1,524	$ 1,500	1.6%
9	Entertainment	$ 200		$ 2,400	$ 2,250	6.7%
10	Vacation	$ 100		$ 1,200	$ 2,000	-40.0%
11	Miscellaneous	$ 125		$ 1,500	$ 1,558	-3.7%
12	***Totals***	***$ 1,427***		***$ 17,124***	***$ 15,958***	7.3%
13	**Number of Expense Categories**			9		
14	**Average Spent**			$ 1,903		
15	**Minimum Spent**			$ 1,200		
16	**Maximum Spent**					

2.23 MIN function added



	A	B	C	D	E	F
1	***Regular Expenses***					
2	**Expense**	**Monthly Spend**	**Percent of Total**	**Annual Spend**	**Last Year Spend**	**Percent Change**
3	Utilities	$ 250		$ 3,000	$ 3,000	0.0%
4	Cell Phone	$ 100		$ 1,200	$ 1,200	0.0%
5	Food	$ 300		$ 3,600	$ 2,250	60.0%
6	Gas	$ 125		$ 1,500	$ 1,200	25.0%
7	Clothes	$ 100		$ 1,200	$ 1,000	20.0%
8	Insurance	$ 127		$ 1,524	$ 1,500	1.6%
9	Entertainment	$ 200		$ 2,400	$ 2,250	6.7%
10	Vacation	$ 100		$ 1,200	$ 2,000	-40.0%
11	Miscellaneous	$ 125		$ 1,500	$ 1,558	-3.7%
12	***Totals***	***$ 1,427***		***$ 17,124***	***$ 15,958***	7.3%
13			**Number of Expense Categories**	9		
14			**Average Spent**	$ 1,903		
15			**Minimum Spent**	$ 1,200		
16			**Maximum Spent**	$ 3,600		

to the Budget Detail worksheet Figure 2.24 MAX function added to the Budget Detail worksheet

Skill Refresher

Typing a function or selecting from the function list

1. Type an equal sign =.
2. Type the function name followed by an open parenthesis **(** or double click the function name from the function list.
3. Highlight the range of cells to use or click individual cell locations followed by commas.
4. Type a closing parenthesis **)** and press the ENTER key or press the ENTER key to close the function.

Inserting a function using the ribbon

1. On the Formulas ribbon, select the correct category in the Function Library. Click the desired function in the list.
2. In the Function Dialog box, click the Collapse Dialog button and highlight the range of cells to use.
3. Click the Expand Dialog button and then click the OK button in the Function Arguments dialog box.

Inserting (and searching for) a function using the Insert Function button

1. On the Formulas ribbon, click the Insert Function button and search for the function to use. Double-click on the desired function in the list.
2. In the Function Dialog box, click the Collapse Dialog button and highlight the range of cells to use.
3. Click the Expand Dialog button and then click the OK button in the Function Arguments dialog box.

Copy and Paste Formulas (Pasting without Formats)

Data file: Continue with CH2 Personal Budget.

As shown in **Figure 2.24**, the COUNT, AVERAGE, MIN, and MAX functions are summarizing the data in the Annual Spend column. You will also notice that there is space to copy and paste these functions under the Last Year Spend column. This allows us to compare what we spent last year and what we are planning to spend this year. Normally, we would simply copy and paste these functions into the range E14:E16. However, you may have noticed the thicker style border that was used around the perimeter of the range D13:E16. If we used the regular Paste command, the thick line on the right side of the range D13:E16 would be replaced with a single line. Therefore, we are going to use one of the Paste Special commands to paste only the functions without any of the formatting treatments. This is accomplished through the following steps:

1. Highlight the range D14:D16 in the **Budget Detail** worksheet.

2. Click the Copy button in the Home tab of the Ribbon.
3. Click cell E14.
4. Click the down arrow below the Paste button in the Home tab of the Ribbon.
5. Click the Formulas option from the drop-down list of buttons (see **Figure 2.25**).

Figure 2.25 shows the list of buttons that appear when you click the down arrow below the Paste button in the Home tab of the Ribbon. One thing to note about these options is that you can preview them before you make a selection by dragging the mouse pointer over the options. When the mouse pointer is placed over the Formulas button, you can see how the functions will appear before making a selection. Notice that the thick line border does not change when this option is previewed. That is why this selection is made instead of the regular Paste option.

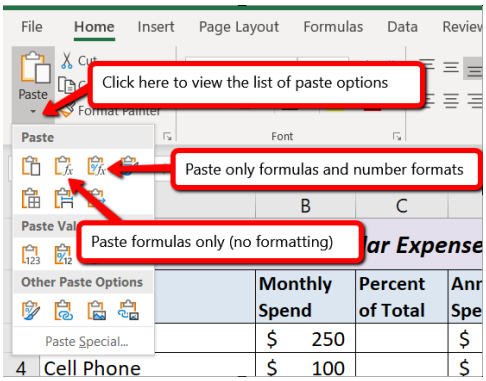


Figure 2.25 Paste Formulas Option

Skill Refresher

Paste Formulas without formatting

1. Click a cell location containing a formula or function.
2. Click the Copy button in the Home tab of the Ribbon.
3. Click the cell location or cell range where the formula or function will be pasted.
4. Click the down arrow below the Paste button in the Home tab of the Ribbon.
5. Click the Formulas button under the Paste group of buttons.

Absolute References (Calculating Percent of Totals)

Data file: Continue with CH2 Personal Budget.

To further analyze your budget, you want to see what percentage of your total monthly spending is spent in each category. Since totals were added to row 12 of the **Budget Detail** worksheet, a percent of total calculation can be added to Column C beginning in cell C3. The percent of total calculation shows the percentage for each value in the Monthly Spend column with respect to the total in cell B12. However, after the formula is created, it will be necessary to turn off Excel's relative referencing feature before copying and pasting the formula to the rest of the cell locations in the column. Turning off Excel's relative referencing feature is accomplished through an absolute reference.

First we will create the formula, which needs needs to divide the amount in B3 by the total monthly spend in B12.

1. Click cell C3 in the **Budget Detail** worksheet.
2. Type an equal sign =.
3. Click cell B3.
4. Type a forward slash /.
5. Click cell B12.
6. Press the ENTER key. You will see that Utilities represent about 17.5% of the Monthly Spend budget (see **Figure 2.26**).

	Budget	Actual
Overhead	$450,000	$452,000
Direct labor hours	75,000	77,000
Direct materials		$195,000
Direct labor		$333,865

Figure 2.26 Adding a Formula to Calculate the Percent of Total

Figure 2.26 shows the completed formula that is calculating the percentage that Utilities represents to the total Monthly Spend for the budget (see cell C3). Normally, we would copy this formula and paste it into the range C4:C11. However, because of relative referencing, both cell references will increase by one row as the formula is pasted into the cells below C3. This is fine for the first cell reference in the formula (C3) but not for the second cell reference (C12).

Figure 2.27 illustrates what happens if we paste the formula into the range C4:C12 in its current state. Notice that Excel produces the **#DIV/0** error code. This means that Excel is trying to divide a number by zero, which is impossible. Looking at the formula in cell C4, you see that the first cell reference was changed from B3 to B4. This is fine because we now want to divide the Monthly Spend for Cell Phone (cell B4) by the total Monthly Spend in cell B12. However, Excel has also changed the B12 cell reference to B13. Because cell location B13 does not contain a number, the formula produces the #DIV/0 error code.



Figure 2.27 #DIV/0 Error from Relative Referencing

To eliminate the divide-by-zero error shown in **Figure 2.27** we must add an absolute reference to cell B12 in the formula. An absolute reference prevents relative referencing from changing a cell reference in a formula. This is also referred to as locking a cell. No matter where you copy a formula with an absolute reference, it will always refer back to the locked cell. An absolute reference is indicated by a $ sign in front of both the column letter and the row number. For example, **$A$15** is an absolute reference to cell A15.

$A$15 is an example of an absolute reference

We are going to modify the existing formula in C3 to make the reference to cell B12 an absolute reference. The following explains how this is accomplished:

1. Double click cell C3.
2. Place the mouse pointer in front of B12 and click. The blinking cursor should be in front of the B in the cell reference B12.
3. Press the F4 key. You will see a dollar sign ($) added in front of the column letter B and the row number 12. *You can also type the dollar signs in front of the column letter and row number if you prefer. The formula should appear as =B3/$B$12. The **F4** key is a cool shortcut for adding the dollar signs.*

   Mac Users: If the **F4** key does not insert the $ symbols, check the keyboard settings: click black Apple icon at top left of the screen, choose "**System Preferences**", click the **Keyboard icon**, make sure the checkbox is checked for the item that says: "Use F1, F2, etc. as standard function keys".
4. Press the ENTER key.
5. Click cell C3.
6. Use the AutoFill Handle or Copy and Paste to copy the formula from C3 to the range C4:C11.

Figure 2.28 shows the percent of total formula with an absolute reference added to B12. Notice that in cell C4, the cell reference remains B12 instead of changing to B13. Also, you will see that the percentages are being calculated in the rest of the cells in the column, and the divide-by-zero error is now eliminated.

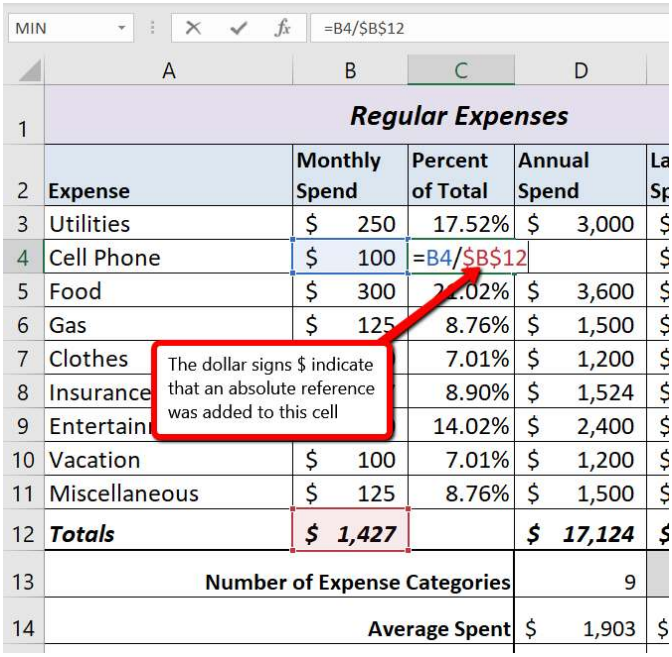


Figure 2.28 Adding an Absolute Reference to a Cell Reference in a Formula

Skill Refresher

Absolute References

1. Click in front of the column letter of a cell reference in a formula or function that you do not want altered when the formula or function is pasted into a new cell location.
2. Press the F4 key or type a dollar sign $ in front of the column letter and row number of the cell reference.

Sorting Data (Multiple Levels)

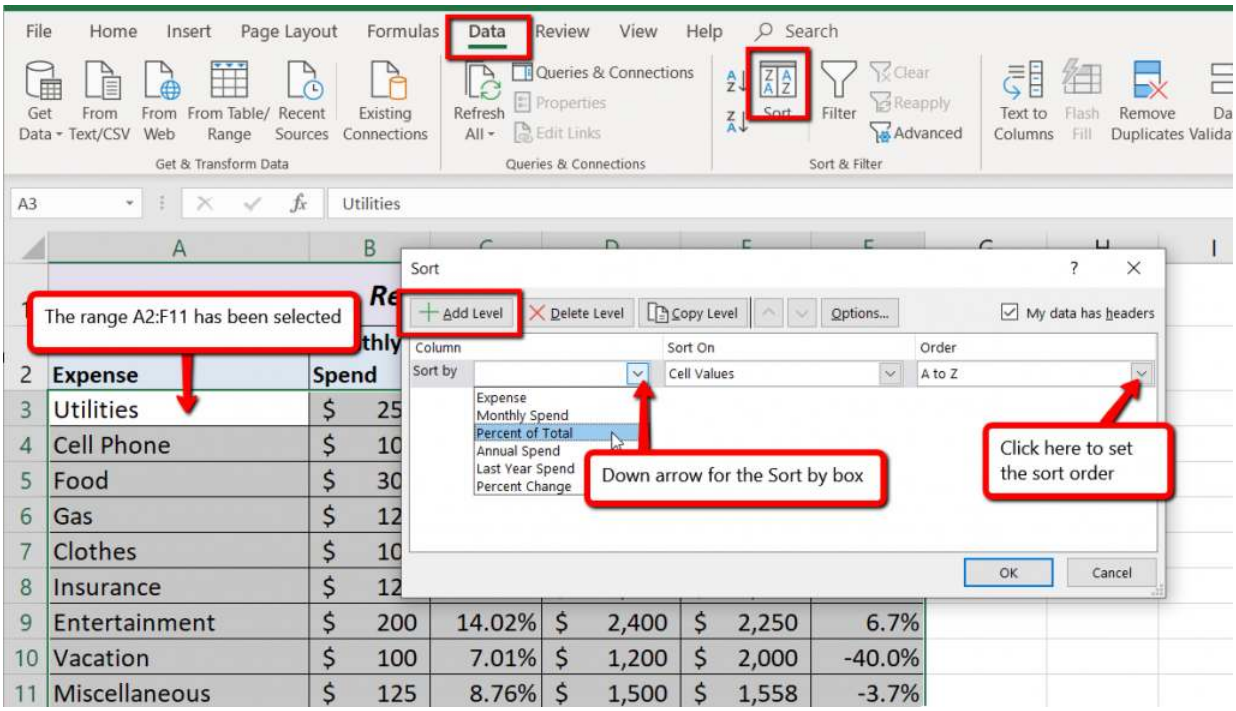
Data file: Continue with CH2 Personal Budget.

The **Budget Detail** worksheet shown in **Figure 2.28** is now producing several mathematical outputs through formulas and functions. The outputs allow you to analyze the details and identify trends as to how money is being budgeted and spent. Before we draw some conclusions from this worksheet, we will sort the data based on the Percent of Total column. Sorting is a powerful tool that enables you to analyze key trends in any data set. Sorting will be covered thoroughly in a later chapter, but will be briefly introduced here.

For the purposes of the **Budget Detail** worksheet, we want to set multiple levels for the sort order. We are going to sort first by the Percent of Total, and then by the Last Year Spend amount. Excel will first sort the items by the Percent of Total, and any items with the same Percent of Total will then be sorted by Last Year Spend. This is accomplished through the following steps:

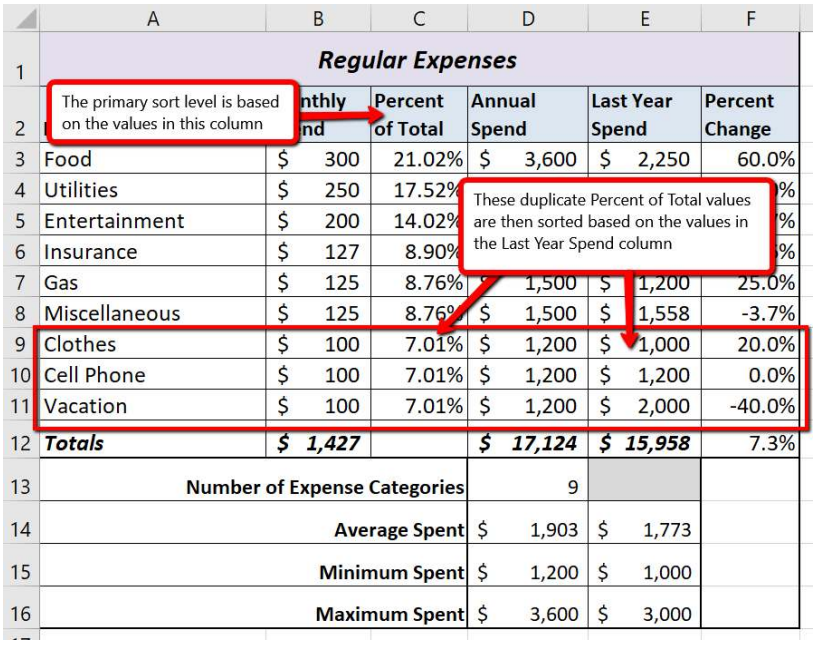
1. Highlight the range A2:F11.
2. Click the Data tab in the Ribbon.
3. Click the Sort button in the Sort & Filter group of commands. This opens the Sort dialog box, as shown in **Figure 2.29**.
4. Click the down arrow next to the “Sort by” box.
5. Click the Percent of Total option from the drop-down list.
6. Click the down arrow next to the sort Order box.
7. Click the Largest to Smallest option.
8. Click the Add Level button. This allows you to set a second level for any duplicate values in the Percent of Total column.
   the + symbol at bottom left corner is the “Add Level” button for Excel for Mac
9. Click the down arrow next to the “Then by” box.
10. Select the Last Year Spend option. Leave the Sort Order as Smallest to Largest

11. Click the OK button at the bottom of the Sort dialog box.
12. Save the **CH2 Personal Budget** file.



2.29 Sort Dialog Box

Figure 2.30 shows the **Budget Detail** worksheet after it has been sorted. Notice that there are three identical values in the Percent of Total column. This is why a second sort level had to be created for this worksheet. The second sort level arranges the values of 7.01% based on the values in the Last Year Spend column in ascending order. Excel gives you the option to set as many sort levels as necessary for the data contained in a worksheet.



	Expense	Monthly Spend	Percent of Total	Annual Spend	Last Year Spend	Percent Change
3	Food	$ 300	21.02%	$ 3,600	$ 2,250	60.0%
4	Utilities	$ 250	17.52%			
5	Entertainment	$ 200	14.02%			
6	Insurance	$ 127	8.90%			
7	Gas	$ 125	8.76%	$ 1,500	$ 1,200	25.0%
8	Miscellaneous	$ 125	8.76%	$ 1,500	$ 1,558	-3.7%
9	Clothes	$ 100	7.01%	$ 1,200	$ 1,000	20.0%
10	Cell Phone	$ 100	7.01%	$ 1,200	$ 1,200	0.0%
11	Vacation	$ 100	7.01%	$ 1,200	$ 2,000	-40.0%
12	***Totals***	***$ 1,427***		***$ 17,124***	***$ 15,958***	7.3%
13	**Number of Expense Categories**			9		
14	**Average Spent**			$ 1,903	$ 1,773	
15	**Minimum Spent**			$ 1,200	$ 1,000	
16	**Maximum Spent**			$ 3,600	$ 3,000	

Figure 2.30 Budget Detail Worksheet after Sorting

Skill Refresher

Sorting Data (Multiple Levels)

1. Highlight a range of cells to be sorted.
2. Click the Data tab of the Ribbon.
3. Click the Sort button in the Sort & Filter group.
4. Select a column from the “Sort by” drop-down list in the Sort dialog box.
5. Select a sort order from the Order drop-down list in the Sort dialog box.
6. Click the Add Level button in the Sort dialog box.
7. Repeat Steps 4 and 5.
8. Click the OK button on the Sort dialog box.

Key Takeaways

- Statistical functions are used when a mathematical process is required for a range of cells, such as summing the values in several cell locations. For these computations, functions are preferable to formulas because adding many cell locations one at a time to a formula can be very time-consuming.
- Statistical functions can be created using cell ranges or selected cell locations separated by commas. Make sure you use a cell range (two cell locations separated by a colon) when applying a statistical function to a contiguous range of cells.
- To prevent Excel from changing the cell references in a formula or function when they are pasted to a new cell location, you must use an absolute reference. You can do this by placing a dollar sign ($) in front of the column letter and row number of a cell reference.
- The #DIV/0 error appears if you create a formula that attempts to divide a constant or the value in a cell reference by zero.
- The Paste Formulas option is used when you need to paste formulas without any formatting treatments into cell locations that have already been formatted.
- You need to set multiple levels, or columns, in the Sort dialog box when sorting data that contains several duplicate values.

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5.6: Printing

This page is a draft and is under active development.

Learning Objectives

- Use the Page Layout tab to prepare a worksheet for printing.
- Add headers and footers to a printed worksheet.
- Examine how to print worksheets and workbooks.

Once you have completed a workbook, it is good practice to select the appropriate settings for printing. These settings are in the Page Layout tab of the Ribbon and discussed in this section of the chapter.

Page Setup

Before you can properly print the worksheets in a workbook, you must establish appropriate settings. The following steps explain several of the commands in the Page Layout tab of the Ribbon used to prepare a worksheet for printing:

1. Open the **CH1 Merchandise City Sales Data** workbook, if it is not already open.
2. Click the Page Layout tab of the Ribbon.
3. Click the Margins button in the Page Setup group of commands. This will open a drop-down list of options for setting the margins of your printed document.
4. Click the Wide option from the Margins drop-down list. (see **Figure 1.47**)
5. Click the Orientation button in the Page Setup and select Landscape.
6. Click on the arrow to the bottom right of the Page Setup category to launch the Page Setup options dialog box. Mac Users: there is no “arrow at the bottom right of the Page Setup category”. Simply click the Page Setup button 

on the Page Layout tab.
7. Click the Margins tab and locate “Center on Page”. Click the boxes to **Horizontally** and **Vertically** center the data on the worksheet. Click OK.

Why?

Use Print Settings

Because professionals often share Excel workbooks, it is a good practice to select the appropriate print settings in the Page Layout tab even if you do not intend to print the worksheets in a workbook. It can be extremely frustrating for recipients of a workbook who wish to print your worksheets to find that the necessary print settings have not been selected. This may reflect poorly on your attention to detail, especially if the recipient of the workbook is your boss.



Figure 1.47 Page Layout Commands for Printing

Table 1.2 Printing Resources: Purpose and Use for Page Setup Commands

Command	Purpose	Use
Margins	Sets the top, bottom, right, and left margin space for the printed document	1. Click the Page Layout tab of the Ribbon. 2. Click the Margin button. 3. Click one of the preset margin options or click Custom Margins.
Orientation	Sets the orientation of the printed document to either portrait or landscape	1. Click the Page Layout tab of the Ribbon. 2. Click the Orientation button. 3. Click one of the preset orientation options.
Size	Sets the paper size for the printed document	1. Click the Page Layout tab of the Ribbon. 2. Click the Size button. 3. Click one of the preset paper size options or click More Paper Sizes.
Print Area	Used for printing only a specific area or range of cells on a worksheet	1. Highlight the range of cells on a worksheet that you wish to print. 2. Click the Page Layout tab of the Ribbon. 3. Click the Print Area button. 4. Click the Set Print Area option from the drop-down list.
Breaks	Allows you to manually set the page breaks on a worksheet	1. Activate a cell on the worksheet where the page break should be placed. Breaks are created above and to the left of the activated cell. 2. Click the Page Layout tab of the Ribbon. 3. Click the Breaks button. 4. Click the Insert Page Break option from the drop-down list.
Background	Adds a picture behind the cell locations in a worksheet	1. Click the Page Layout tab of the Ribbon. 2. Click the Background button. 3. Select a picture stored on your computer or network.
Print Titles	Used when printing large data sets that are several pages long. This command will repeat the column headings at the top of each printed page.	1. Click the Page Layout tab of the Ribbon. 2. Click the Print Titles button. 3. Click in the Rows to Repeat at Top input box in the Page Setup dialog box. 4. Click any cell in the row that contains the column headings for your worksheet. 5. Click the OK button at the bottom of the Page Setup dialog box.

Headers and Footers

When printing worksheets from Excel, it is common to add headers and footers to the printed document. Information in the header or footer could include the date, page number, file name, company name, and so on. The following steps explain how to add headers and footers to the Merchandise City, USA Retail Sales worksheet.

1. Click the **Insert** Ribbon and click on **Header & Footer** at the right end of the ribbon (located in the **Text** group). You will see the Design tab added to the Ribbon; this is used for creating the headers and footers for the printed worksheet. Also, this will convert the view of the worksheet from Normal to Page Layout (see **Figure 1.48**). This Page Layout view makes adding Headers & Footers easy and provides key features to incorporate.
2. Click on the Current Date icon to add the date to the left section of the worksheet Header. The &[Date] symbols which will toggle to a Date format when you click outside of this area.

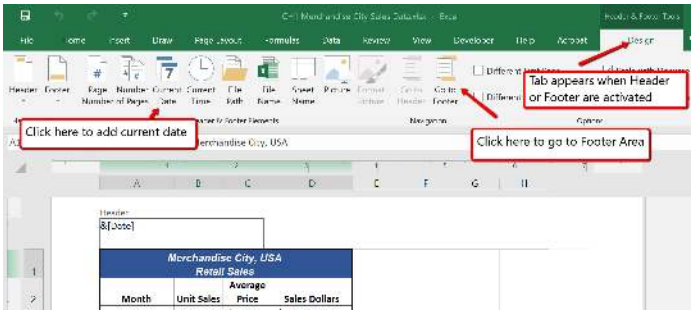


Figure 1.48 Design Tab for Creating Headers and Footers

3. Type your name in the center section of the Header.
4. Place the mouse pointer over the left section of the Header and left click (see **Figure 1.48**).
5. Click the Go to Footer button in the Navigation group of commands in the Design tab of the Ribbon.
6. Place the mouse pointer over the far right section of the footer and left click.
7. Click the Page Number button (you may need to click on the Design tab again) in the Header & Footer Elements group of commands in the Design tab of the Ribbon. This view will display as &[Page] until printed or until you return to normal view.
8. Click any cell location outside the header or footer area. The Design tab for creating headers and footers will disappear.
9. Click the Normal view button in the lower right side of the Status Bar (see **Figure 1.49**).

JOURNAL

Date	Account	Debit	Credit
	Cash	50	
	Diagnosis revenue		50
	Diagnosis of Sony Bravia for Job 4740325		
	Repair in process	42	
	Accounts Payable		42
	Purchase of new power cord for Job 4740325		
	Repair in process	75	
	Salaries Payable		75
	Assigning labor to Job 4740325		
	Repair in process	75	
	Operating overhead		75
	Assigning overhead costs to Job 4740325		
	Cost of completed repair	192	
	Repair in Process		192
	Completion of Job 4740325		
	Cash	310	
	Repair revenue		310
	Completion of Job 4740325		

Figure 1.49 Worksheet in Page Layout View

Printing Worksheets and Workbooks

Once you have established the print settings for the worksheets in a workbook and have added headers and footers, you are ready to print your worksheets. The following steps explain how to print the worksheets in the **Merchandise City, USA Sales** workbook:

1. Click the File tab on the Ribbon.

2. Click the Print option on the left side of the Backstage view (see **Figure 1.50**). On the right side of the Backstage view, you will be able to see a preview of your printed worksheet.

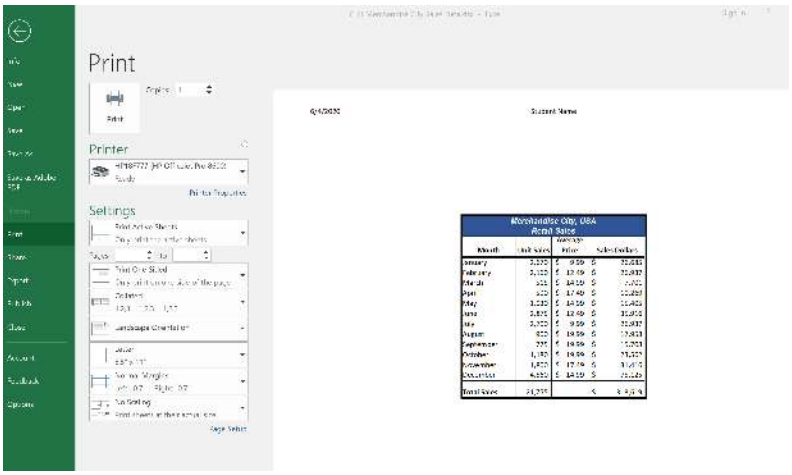


Figure 1.50 Backstage View Print option

3. Click the Print Active Sheets button in the Print section of the Backstage view (see **Figure 1.50**).
4. If your instructor has asked you to print your work, click the Print button.
5. Click the Home tab of the Ribbon.
6. Save and close the workbook.

Key Takeaways

- The commands in the Page Layout tab of the Ribbon are used to prepare a worksheet for printing.
- You can add headers and footers to a worksheet to show key information such as page numbers, the date, the file name, your name, and so on.
- The Print commands are in the File tab of the Ribbon.

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5.7: Preparing to Print

This page is a draft and is under active development.

Learning Objectives

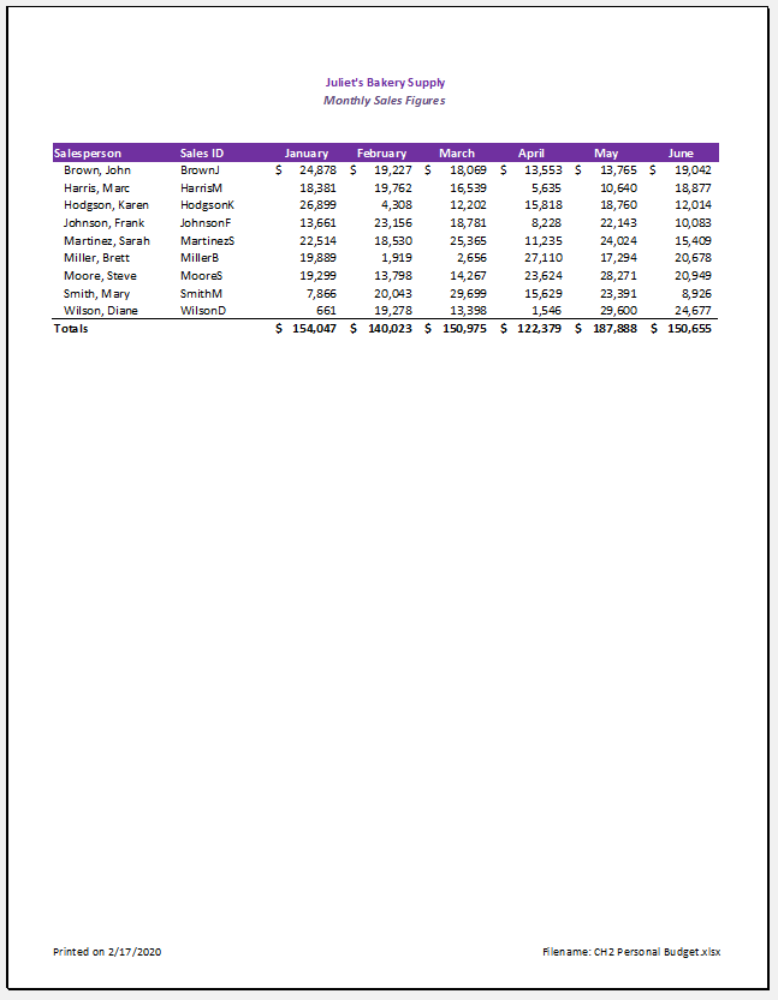
- Review and learn new cell formatting techniques.
- Understand how to modify page scaling and margins.
- Create custom headers and footers to automatically update information.

In this section, we will review some of the formatting techniques covered in Chapter 1, as well as learn some new techniques. We will also preview a two-page worksheet and set page setup options to present the data in a professional manner. A new data file will be used in this section.

Formatting Worksheet Data

Data File: Continue working with CH2 Personal Budget

You have been given sales data that needs to be formatted in a professional manner. This worksheet will be printed and presented to investors, so it needs to be prepared for printing as well. **Figure 2.42** shows how the finished worksheet will appear in Print Preview.



Juliet's Bakery Supply
Monthly Sales Figures

Salesperson	Sales ID	January	February	March	April	May	June
Brown, John	BrownJ	$ 24,878	$ 19,227	$ 18,069	$ 13,553	$ 13,765	$ 19,042
Harris, Marc	HarrisM	18,381	19,762	16,539	5,635	10,640	18,877
Hodgson, Karen	HodgsonK	26,899	4,308	12,202	15,818	18,760	12,014
Johnson, Frank	JohnsonF	13,661	23,156	18,781	8,228	22,143	10,083
Martinez, Sarah	MartinezS	22,514	18,530	25,365	11,235	24,024	15,409
Miller, Brett	MillerB	19,889	1,919	2,656	27,110	17,294	20,678
Moore, Steve	MooreS	19,299	13,798	14,267	23,624	28,271	20,949
Smith, Mary	SmithM	7,866	20,043	29,699	15,629	23,391	8,926
Wilson, Diane	WilsonD	661	19,278	13,398	1,546	29,600	24,677
Totals		**$ 154,047**	**$ 140,023**	**$ 150,975**	**$ 122,379**	**$ 187,888**	**$ 150,655**

Printed on 2/17/2020

Filename: CH2 Personal Budget.xlsx

Figure 2.42 Completed Prepare to Print worksheet

1. Switch to the Prepare to Print worksheet.

2. To change the font of the entire worksheet, click the Select All button in the top left corner of the worksheet grid (see **Figure 2.43**).

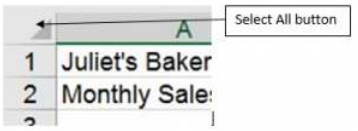


Figure 2.43 Select All button

3. Change the font to Calibri, Size 12.
4. Using the skills learned in Chapter 1, make the following formatting changes:
   i. A1:H1 – Merge and Center; format text as bold and apply a font color and size of your choice
   ii. A2:H2 – Merge and Center; format text as bold and italic, apply a font color of your choice
   iii. A5:H5 – Apply a dark fill color; format text as white and bold
   iv. C5:H5 – Center align
   v. A15:H15 – Apply Top Border to the cells; format text as bold
   vi. C6:H6 and C15:H15 – Apply Accounting Number format with 0 decimal places
   vii. C7:H14 – Apply Comma style with 0 decimal places
   viii. Highlight A6:A14 (salespeople's names) and click the Increase Indent button in the Alignment group on the Home ribbon (see **Figure 2.44**). This will indent the text from the cell border.



Figure 2.44 Increase Indent button

Using Page Setup Options

Once the worksheet is professionally formatted, you need to look in Print Preview to see how the pages will print.

1. Go to Backstage View by clicking the File tab on the ribbon. Select Print from the menu. Notice that the worksheet is currently printing on two pages, with the page breaking between the April and May columns. To fix this problem, you will first change the left and right margins while still in Print Preview
   Mac Users should click the **File menu option** and select **Print** from the menu
2. Click the Margins drop-down arrow in the Settings section (see **Figure 2.45**)
3. Select Custom Margins… at the bottom of the list.
   Mac Users should select **"Manage Custom Margins"**
4. Type in **0.5** for the Left Margin and **0.5** for the Right Margin.
5. Click OK. Changing the margins brought the May column onto the same page, but the June column is still on a separate page. Next you will use Page Scaling to fix this while still in Print Preview.
6. Click the Scaling drop-down arrow in the Settings section (**Figure 2.46**).
   Mac Users: there is no "Scaling drop-down arrow". Just click the checkbox for **"Scale to fit"**
7. Select Fit All Columns on One Page.
8. Exit Backstage View.

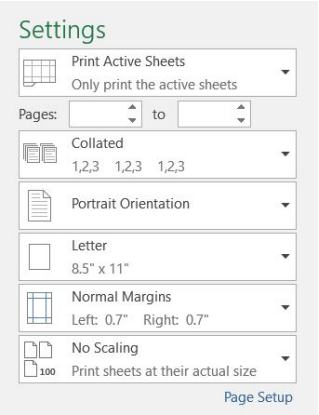


Figure 2.46 Settings section of Print Preview

Creating a Footer using Page Setup

Now that the entire worksheet is printing on one page, you need to add a footer with information about the date the file was printed along with the filename. In Chapter 1 you learned how to create headers and footers using the Insert ribbon. You can also create headers and footers using the Custom Header/Footer dialog box.

1. Click the **Page Layout** tab on the ribbon.
2. Click the dialog box launcher in the Page Setup group. A window similar to **Figure 2.47** should appear.

Mac Users: there is no "dialog box launcher". Just click the **Page Setup button** 

and continue with Step 3 below.

Cost of Goods Sold	500	
Work in Process Inventory		500
(When transferred)		

Figure 2.47 Page Setup Dialog Box

3. Click the Header/Footer tab in the Page Setup dialog box.
4. Click the Custom Footer button. The Footer dialog box should appear (see **Figure 2.48**).

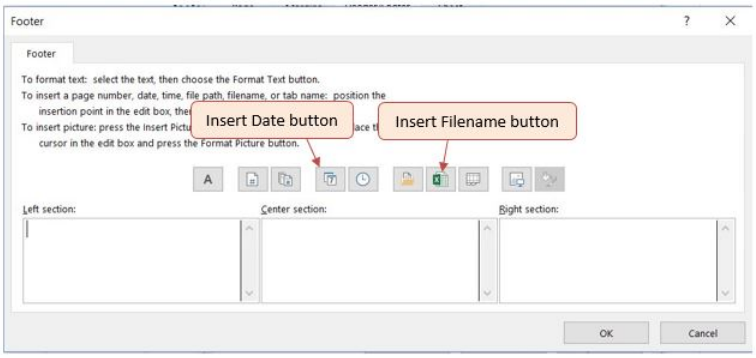


Figure 2.48 Footer Dialog Box

5. Click in the Left section: box and type **Printed on.**
6. Making sure to leave a space after the word on, click the Insert Date button.
7. Click in the Right section: box and type **Filename:.**
8. Making sure to leave a space after the colon, click the Insert File Name button.
9. The Footer dialog box should look like **Figure 2.49**.
10. Click the OK button. Click OK again to close the Page Setup dialog box.
11. Go to Print Preview to see that the current date and file name are displayed in the footer.
12. Exit Backstage View. Check the spelling on all of the worksheets and make any necessary changes.
13. Save the **CH2 Personal Budget** file.
14. Compare your work with the completed worksheet shown in **Figure 2.42** and then submit the **CH2 Personal Budget**workbook as directed by your instructor.



Figure 2.49 Completed Custom Footer Dialog Box

Key Takeaways

- It is important to always check your workbooks in Print Preview to ensure that the data is printed in a professional and easy to read manner.
- Adjust margins and page scaling as needed to keep columns of data together on one page if possible.
- Use headers and footers to display information in the top and bottom margins of the printed worksheet. Use the Insert buttons to insert changing information, such as dates and file names, instead of typing them in directly.

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5.8: Chapter Practice

This page is a draft and is under active development.

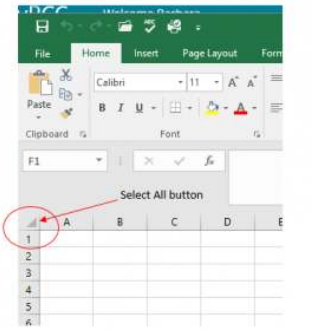
To assess your understanding of the material covered in the chapter, complete the following assignment.

Basic Monthly Budget for Medical Office

Download Data File: PR1 Data

Creating and maintaining budgets are common practices in many careers. Budgets play a critical role in helping a business or household control expenditures. In this exercise you will create a budget for a hypothetical medical office while reviewing the skills covered in this chapter.

1. Open the file name **PR1 Data**, then Save As **PR1 Medical Office Budget**.
2. Activate all the cell locations in the Sheet1 worksheet by clicking the Select All button in the upper left corner of the worksheet.



3. In the Home tab of the Ribbon, set the font style to Arial and the font size to 12 points. Then click any cell to Deselect.
4. Increase the width of Column A so all the entries in the range A3:A8 are visible. Place the mouse pointer between the letter A and letter B of Column A and Column B. When the mouse pointer changes to a double arrow, left click and drag it to the right until the character width is approximately 18.00.
5. Enter **Quarter 1** in cell B2.
6. Use AutoFill to complete the headings in the range C2:E2. Activate cell B2 and place the mouse pointer over the Fill Handle.
7. Select the range B2:E2 and click the Format button in the Home tab of the Ribbon. Click the Column Width option, type 11.57 in the Column Width dialog box, and then click the OK button in the Column Width dialog box.
8. Enter the words **Medical Office Budget** in cell A1.
9. Insert a blank column between Columns A and B by clicking on any cell in Column B. Then, click the drop-down arrow of the Insert button in the Home tab of the Ribbon. Click the Insert Sheet Columns option.
10. Enter the words **Budget Cost** in cell B2.
11. Adjust the width of Column B to approximately 12.0 characters.
12. Select the range A1:F1 and click the Merge & Center button in the Home tab of the Ribbon to merge the cells in that range.
13. Make the following format adjustments to the range A1:F1: bold; italics; change the font size to 14 points; change the cell fill color to Aqua, Accent 5, Darker 50%; and change the font color to white.
14. Increase the height of Row 1 to approximately 24.75 points.
15. Make the following format adjustment to the range A2:F2: bold; and fill color to Tan, Background 2, Darker 10%. Center the column titles so that they are horizontally centered in each cell.
16. Select B2 and choose the Wrap Text button in the Home tab of the Ribbon. Increase the height of Row 2 to approximately 30 points.
17. Copy cell C3 and paste the contents into the range D3:F3.
18. Copy the contents in the range C6:C8 by highlighting the range and clicking the Copy button in the Home tab of the Ribbon. Then, highlight the range D6:F8 and click the Paste button in the Home tab of the Ribbon.

19. Calculate the total budget for all four quarters for the salaries. Click cell B3 and click the down arrow on the AutoSum button in the Formulas tab of the Ribbon. Click the Sum option from the drop-down list. Then, highlight the range C3:F3 and press the ENTER key on your keyboard.
20. Copy the formula in cell B3 and paste them into the range B4:B8.
21. Format the range B3:F8 with Accounting format and zero decimal places.
    If any of the cells display pound symbols (######), simply widen the column to display the values again.
22. Select the range A1:F8 and click the down arrow next to the Borders button in the Home tab of the Ribbon. Select the All Borders option from the drop-down list.
23. Double click the Sheet1 worksheet tab to change the name of Sheet1 to the word **Budget**, and press the ENTER key. Delete any unnecessary worksheets.
24. Change the orientation of the Budget worksheet so it prints landscape instead of portrait.
25. Use Fit to 1 page so the Budget worksheet prints on one piece of paper, if it does not already.
26. Add a header to the Budget worksheet that shows the date in the upper left corner and your name in the center.
27. Add a footer to the Budget worksheet that shows the page number in the lower right corner.
28. Check the spelling on the worksheet and make any necessary changes. Save **PR1 Medical Office Budget** workbook.
29. Compare your work to the screenshot below and then submit the **PR1 Medical Office Budget** workbook as directed by your instructor.

3/19/2020 Student Name

Medical Office Budget					
Item	Budget Cost	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Salaries	$ 120,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000
Medical Supplies	$ 60,000	$ 18,000	$ 13,800	$ 9,000	$ 19,200
Medications	$ 90,000	$ 27,000	$ 20,700	$ 13,500	$ 28,800
Rent	$ 30,000	$ 7,500	$ 7,500	$ 7,500	$ 7,500
Office Supplies	$ 12,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Phone & Utilities	$ 8,400	$ 2,100	$ 2,100	$ 2,100	$ 2,100

1

PR 1 Medical Office Budget Solution Screenshot

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CHAPTER OVERVIEW

6: Excel Tables and Data Analysis

> This page is a draft and is under active development.

Excel is the leading application for storing, managing and analyzing data. In Chapter 5, you will explore how to import, organize, and analyze data effectively. To manage and analyze a group of related data, users can turn a range of cells into an Excel table.

A table, also called a database, is an organized structure of rows and columns of related data in a worksheet; for example, a list of employee information. In a table of employees, each employee would have a separate record; as shown below, each record might include several fields, such as the Employee ID Number, their Last Name, and First Name, etc. Each row of a table stores records, and each column stores one field for the record. A record also can include fields that contain references, formulas, and functions. Additionally, a row of column headings at the top of the table stores field names that identify the data being collected and stored.

Excel has a vast collection of database and tabling tools that allow users to import, clean, sort, filter, total, subtotal, analyze, visualize, and report. This chapter explores how to import, insert, edit, and examine data with Excel table and PivotTable tools. Demonstrate skills by studying the provided 2017-2018 employee database. Examine employee relations, payroll, benefits, and training options.

6.1: Understanding Data, Data Validation, and Data Tables
6.2: Table Basics
6.3: Intermediate Table Skills
6.4: Advanced Formatting Techniques
6.5: Preparing to Print
6.6: Chapter Practice

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6.1: Understanding Data, Data Validation, and Data Tables

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Describe the different types of data
- Define data validation and describe the different techniques for validating data
- Construct a Data Table for a dataset

Data can come in a variety of forms. It can fit into specific categories, or it can be more general in nature. We can collect data in different ways, such as through instruments like a thermometer or through an open-ended survey. Regardless of the type of data and how it is collected, the information is useless without analysis. Data analysis is a powerful tool that can guide key strategic decisions. Businesses rarely make important decisions without some data analysis to support them. A key step in the analysis process is ensuring the reliability and validity of data. A business can then use various techniques to understand the information better. Microsoft Excel provides several tools to make that process a bit easier for the business decision maker.

Business analytics is one career field that uses extensive Excel skills. This field focuses on careful analysis of data to provide insights and recommendations to the management team on ways to monitor and improve performance. The soft skills needed in this field include critical thinking, analytical thinking, problem solving, attention to detail, and communication. The business analyst must dig deeper into data by asking the "why" questions and then be able to clearly communicate their findings to colleagues who may not know the terminology and techniques. The vast amount of data in today's business world creates a high demand for these positions. Over the next decade, the number of jobs in the field is expected to grow over 10 percent with the positions commanding salaries over $80,000 per year.[1] Even if you choose to take a different path in your career, learning these skills can greatly increase your value to an organization.

What Is Data?

To analyze data, let's examine the various forms that data can take and how to collect and organize it. In essence, data consists of facts or information that can be used for reference, performance monitoring, and/or analysis. For example, data can be collected about online purchasing habits to monitor the market share performance of select brands. A business can then analyze the data to reveal trends such as the purchasing habits of certain demographic groups.

Businesses use many methods to collect data. One common approach is using surveys, which can collect a wide variety of information. Also, with today's technology, surveys can often reach a large audience by using email or social media distribution. Businesses also often have a lot of data stored in both internal and external databases. Internal databases consist of information a company has collected itself, such as customer demographic information, past purchases, or frequency of purchases. WorldCorp's internal database includes key contact information for each of their customers, order sizes and frequency of orders, and payment history. External databases are collected by data providers. Often, a business can purchase this data from a provider to obtain information on market demographics, competitor products, and industry statistics. Many sources of compiled data can be accessed for free. U.S. Census data, available at the United States Census Bureau website, is one example. This site provides a lot of varied information on U.S. residents, such as education levels and median incomes. The data can be filtered based on specific criteria, such as location. WorldCorp can use this census data to identify and evaluate new locations for warehouses. They can use the data to determine if a particular city has the employee base needed to open the new warehouse and what the salary ranges in the region are (Figure 11.2).

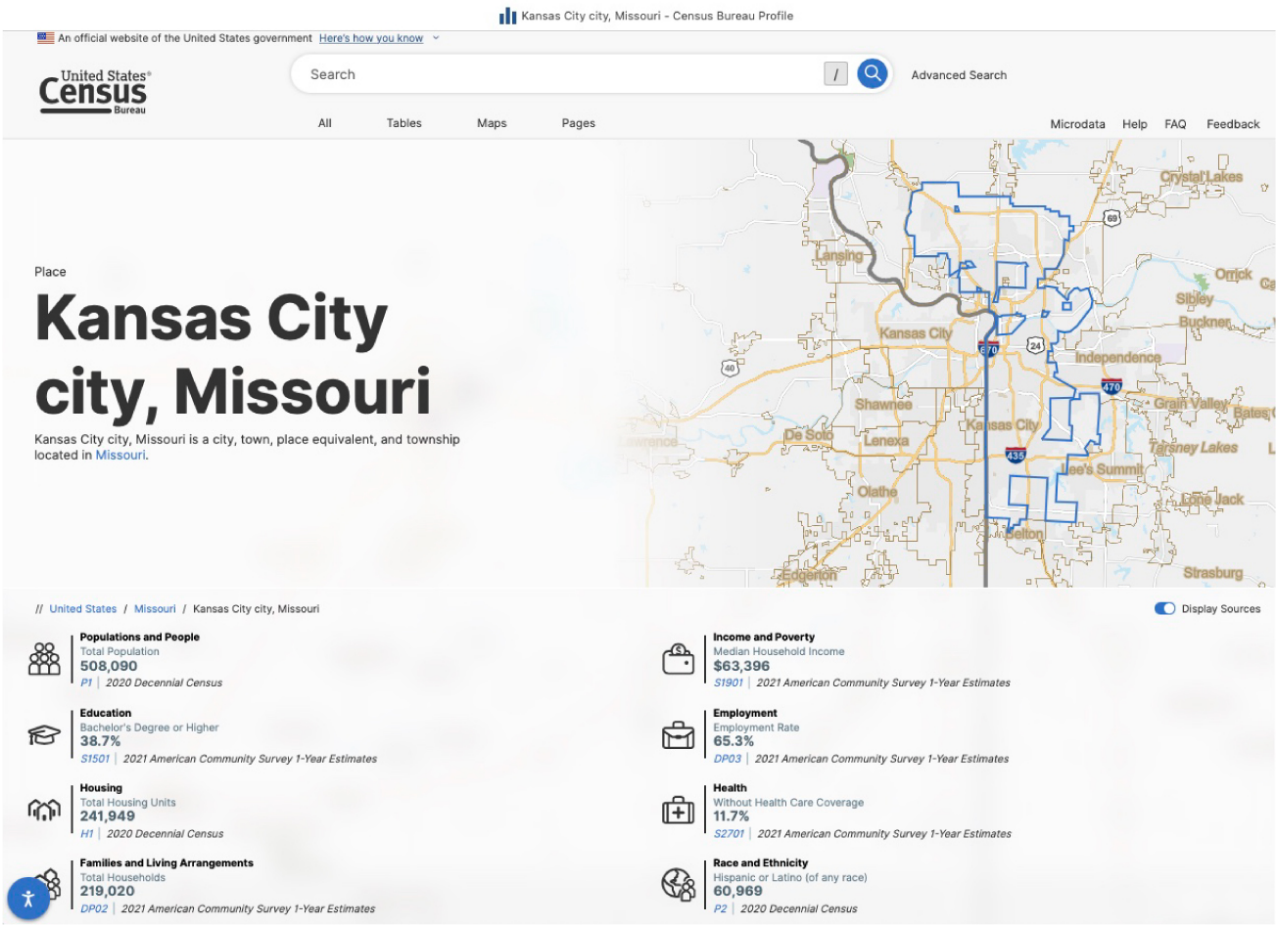


Figure 11.2: Using census data can help you gather a good deal of detailed information about a geographic location.

Interviews and focus groups are also methods for collecting data such as customer preferences for a product or for understanding the impact of price changes, but they do not provide as much data for deep analysis. Excel is better suited for numerical information. However, some information from interviews and focus groups can be transformed into quantitative data. For example, if you ask potential customers if they would still purchase a product if the price increased by 5 percent or a certain dollar amount, you could record the number (or percentage of respondents) who replied yes and no to that question. Both methods can be time intensive and generally provide information that is more exploratory in nature.

The information gathered from interviews or focus groups can often help data analysts determine the appropriate data they might need for a more in-depth analysis. The information about a price change could then be further explored with more research to determine at what point a price increase becomes too much and the customer will no longer purchase the product.

Spotlight on Ethics - Is Your Information Safe Online?

Database marketing is a business strategy that uses information collected on consumers to better market their products or services to them. This could include collecting information from people's online activities or buying information collected by marketing research firms on their purchasing habits. User data and information about online activities is collected at an astonishing rate.[2] All of this available data brings up valid concerns related to privacy and protecting your information from unlawful activities. What's more, many people often provide sensitive information freely, such as when completing online surveys or taking social media quizzes that often are designed to determine usernames and passwords. In 2019, nearly fifteen million people were the victims of identity fraud. Some strategies to protect yourself include using strong passwords and changing them often, only visiting trusted sites, using prepaid cards for online transactions, and hiding personal information when you can. You will also want to avoid providing personal information unless absolutely necessary and be mindful of how you use the sites you visit.

Once data is collected, it can be grouped into two broad categories: qualitative and quantitative. The first category, qualitative data, is categorical information that does not include numbers, or if it does include numbers, those numbers do not have a true mathematical meaning. For example, a question on a class evaluation survey could ask the mode of delivery for the course and could be as follows: 1 – in person, 2 – online, or 3 – hybrid. The numbers in this case do not have a meaning; instead, they are placeholders to indicate the category you select. However, because Excel cannot analyze text information, converting the categories to numbers allows for some analysis of this qualitative data. Other qualitative data can be in the form of text that includes statements of opinion. For example, a customer review that reads "This product is wonderful!" is a qualitative assessment of the product.

The second category, quantitative data, involves numerical evaluations. It could include numerical expressions of opinions but also could be facts such as the cost of a specific product. Along with a glowing qualitative review of a product, a customer could also provide a rating of five on a scale of one to five. In this example, the same assessment, the customer's opinion of the product, can be expressed in both qualitative and quantitative terms. This is similar in concept to what you might see for a product rating on an e-commerce site. A buyer can give a product five stars and add some textual comments about their experience with the product.

Quantitative data can be further classified as discrete or continuous. Information that can only take on a specific set of values is called discrete data. For example, the number of customers in a store is discrete information. You cannot have a portion of a customer. So, the number of customers in the store is restricted to certain values, in this case, whole numbers. Discrete data is counted. In contrast, continuous data is information that is measured and can take on an infinite set of values. For example, you could weigh yourself at home on a digital scale that only measures to one-tenth of a pound (i.e., 132.7 lbs.). Your doctor might have a more precise scale that will display your weight in hundredths of a pound (i.e., 132.65 lbs.). There is an infinite range to which the data can be reported, and it is constrained by the measurement device.

Data is grouped by the level of measurement represented by the information. There are four categories of measurement into which all data can be placed: nominal, ordinal, interval, and ratio. The nominal level of measurement is the lowest level of analysis. With nominal data, the information can only be placed in categories. No category is more important than another, and the categories cannot be placed in any logical order. One example of nominal data is marital status. With four possible answers (single, married, divorced, or widowed), every response can be placed into one of the four categories.

The next level of measurement is ordinal. At this level, data is placed into categories, but then those categories can be put in order. Ordinal data gives the company more information than nominal data does, but there is still not enough information for an in-depth analysis. The distance between the levels of the categories is not defined, but one category is of a higher order than another. A typical example is an opinion scale, often referred to as a Likert scale (Figure 11.3). As a company, you know that you want customers to be Very Satisfied as opposed to Unsatisfied. WorldCorp often uses this scale to get feedback on the customers' interactions with sales agents. They can then rank the responses to determine which sales agents are ranked higher than others. But what you do not know is the degree of difference between Very Satisfied and Unsatisfied.


How satisfied are you with...

	Very satisfied	Satisfied	Neutral	Unsatisfied	Very unsatisfied
The responsiveness of the sales agent	○	○	○	○	○
The service you received	○	○	○	○	○
Our company overall	○	○	○	○	○

Figure 11.3: A Likert scale is used to gather ordinal data that can be analyzed.

Link to Learning

Organizations often use surveys to gather data to inform their organizational and business practices. For instance, a business might send out a satisfaction survey to their clients. Or they might survey employees regarding their work preferences.

> Regardless of the purpose, you will need to write questions and provide options for responses that will capture exactly the information you need to answer the questions you are asking. Read this article from Survey Monkey regarding how to craft effective survey questions to learn more.

The last two levels are interval and ratio. Both allow data to be put into categories (nominal) and establish an order of the categories (ordinal), but now quantitative data is added so that the difference between each category is defined. The key difference between interval and ratio is how they treat a value of zero. With the interval level, zero acts as a placeholder rather than representing the value of zero, or the absence of something. One example is a survey question in which zero represents a neutral response. In this case, the respondent has no strong feelings either way on the question being asked. In contrast, with the ratio level of measurement, zero takes on the value of zero. If your product sold zero units this week, there was an absence of sales for the product. Understanding the differences between these levels of measurement can help you determine the best strategy to analyze the data you have collected. Figure 11.4 summarizes the levels of measurement.

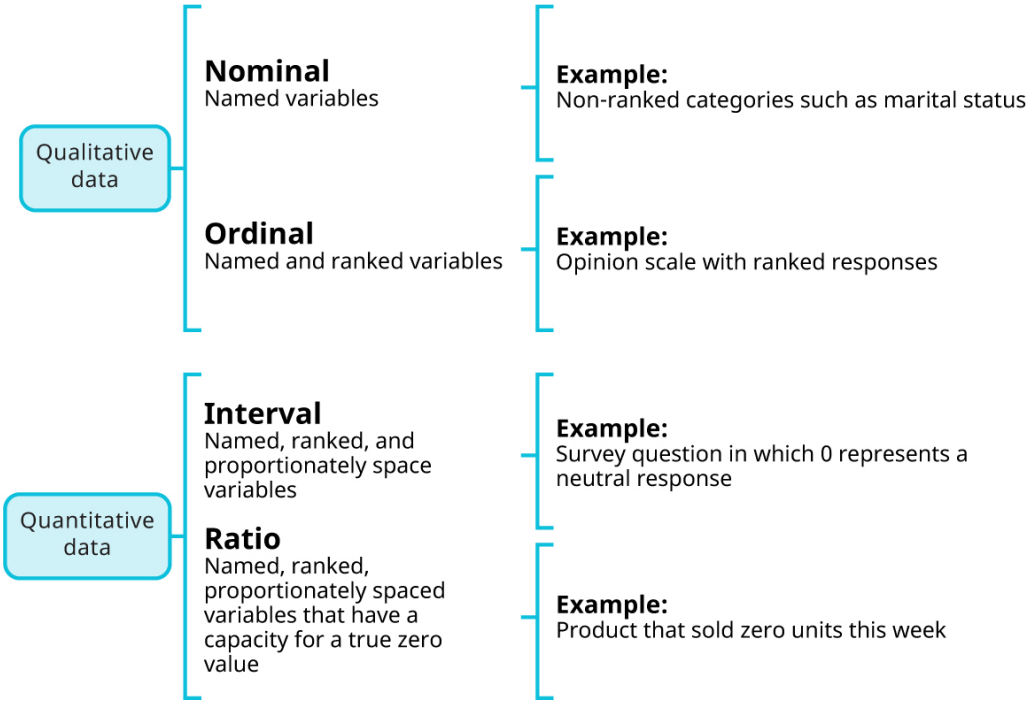


Figure 11.4: The levels of measurement differentiate data based on the depth of analysis possible.

Categorical Data

Nominal and ordinal data make up categorical data, which is grouped into categories based on attributes or characteristics. Categorical data is considered qualitative data. The data can be represented with numbers; however, those numbers do not have a mathematical meaning. Some examples would be gender, marital status, or employment status (see Figure 11.4). Numbers can be assigned to these categories to make analysis possible with Excel, but those assignments are arbitrary. For example, you could represent full-time employment with the number 1 and unemployment with a 0. The same analysis could happen if the numbers were 2 and 4. There is no mathematical meaning behind the assigned numbers.

An advantage of using categorical data is that you can capture assessments of behaviors, opinions, and emotions. These concepts are not quantifiable, but using categorical data, you can assess and analyze these concepts to better understand the situation at hand. A disadvantage of categorical data is that deeper analysis using statistical methods may not be possible. Categorical data is often represented in a table format and graphically displayed with pie charts or bar charts. The data is most often analyzed through percentages in each of the categories of interest.

Numerical Data

The interval and ratio levels of measurement are numerical data. Numerical data is quantitative data and represents measures of variables, and it can either be discrete or continuous. The key feature is that the numbers have mathematical meaning with respect

to the attribute or variable being evaluated. For example, a manager could determine the distance between two office locations in miles to determine the mileage reimbursement for employees traveling between the two sites. Other examples include the length of time waiting for a table at a restaurant, the amount of money spent by a customer at a particular shop, or the fuel efficiency of a vehicle (Figure 11.5). The advantage of using numerical data is that you can do in-depth analysis with statistics and use the data to develop predictions for future performance. This could be helpful for a business to forecast sales in the next quarter or predict expenses for the next year. Numerical data can be graphed using scatter plots and histograms. The data can be analyzed using various statistical methods. These could include mean, mode, median, standard deviation, and regression modeling.

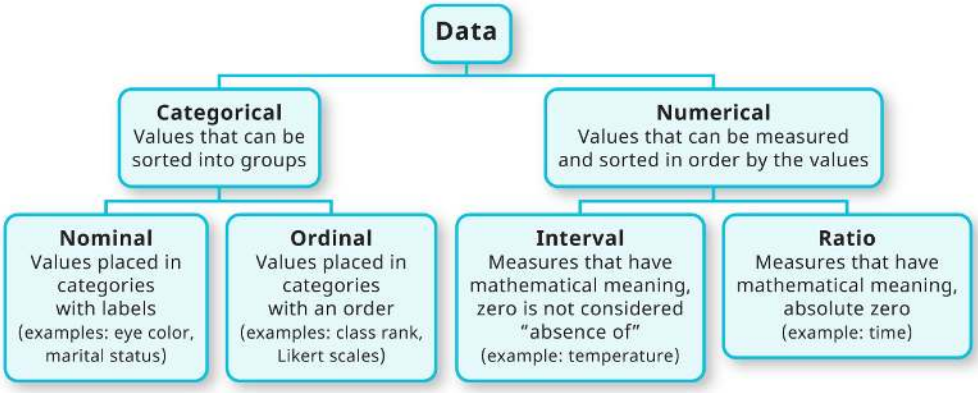


Figure 11.5: Categorical data can be used for behaviors and emotions. Numerical data is used for more objective information such as distances or sales figures.

What Is Data Validation?

Data validation is another technique that can be used to verify data. In essence, data validation is the process of ensuring that the data values fall within a predetermined range. For example, if you know that there are only fifteen sales agents at WorldCorp, you can use data validation to make sure that the values assigned to various sales transactions in the monthly sales data spreadsheet are only whole numbers from 1 through 15. Data validation can also be used to ensure that product codes for the HDTVs sold by WorldCorp are accurately entered into the spreadsheet.

Two components are often used to ensure you are working with quality data: data verification and benchmarking. The process that ensures your data is accurate and reliable is called data verification. It is important to check the accuracy because if the data is not valid, then any analysis using that data will also be invalid, which could lead to critical mistakes if key strategic business decisions are based on the inaccurate data. WorldCorp could use data verification to ensure that product codes or prices are entered correctly into the spreadsheet used by the accounting department. You can imagine the issues that could arise if the price entered is incorrect. WorldCorp could be charging customers incorrectly for the product, which could lead to issues with both internal recordkeeping and external customer relations.

There are several approaches to checking the validity of your data. One way is to check the data that has been inputted in the spreadsheet against the original paper copy of the data. You could also use benchmarking, a tool that checks the validity of your data with similar datasets or a set standard. Benchmarking involves checking specific values such as price points or sales projections against known standards. These known standards could be from competitors or from established company goals. Sometimes, standards are set by government organizations as well. WorldCorp could use benchmarking to evaluate their product shipping speeds and costs versus that of their closest competitor. If their competitor ships products faster and at a cheaper price, WorldCorp might decide to investigate the impact of lowering their prices. Benchmarking can also be used to measure how your company's sales are growing versus that of your competitors. Benchmarking against industry-wide data is also commonly used when assessing the performance. The benchmarking process can help a company determine where there might be gaps in performance compared with the competition or ways to enhance their position in the marketplace.

The Process and Techniques of Data Validation

Data validation techniques can be used to ensure that quality information is being used in decision making. Errors can occur when inputting data into the spreadsheet. Data can be entered in the cell incorrectly, data can be accidently duplicated, or numbers can be transposed. Through data validation, many of these common errors can be identified and then the user can correct those errors as

appropriate. Data validation can also be used as a part of ongoing process improvement efforts in conjunction with benchmarks from key competitors or industry values. The tools available in Excel for data validation help ensure that your data has as few errors as possible and check business performance against internal standards or competitors.

Spotlight on Ethics - Keeping Accurate Data

Professional ethics dictates that businesses keep accurate and up-to-date information and data; this includes information they may collect with consent from clients and internal business information, as well as information they may create and consume in their interactions with external stakeholders across all platforms, including in spreadsheets where much of their financial information will likely be found. As such, quality data is accurate data and businesses can incorporate a number of ways to ensure data is recorded accurately, such as using Excel's data validation capabilities. Data validation simply means we have a process in place to ensure the information is entered correctly and that it is appropriately checked to ensure it is both accurate and useful. For instance, businesses can ensure employees use effective and accurate data entry practices, such as shortcuts, AutoFill, and drop-down menus.

In addition, Excel can also restrict what content is input in certain cells to ensure it is correct—for instance, you can use data validation to have Excel reject an entry of 000-000-0000 as a valid phone number. In Excel, you would enter this validation criteria in data validation settings (Data tab, Data Validation, then select Settings). You can also prompt the person entering the data with an input message, giving them instructions to enter specific information in a cell.

Data Validation

The process of validating data is made easier with Excel. There are several ways to customize the validation processes to meet specific needs. One simple validation approach is removing duplicates. You access this tool through the Data tab. This function is helpful if you are unsure whether there are duplicate entries in your data.

Consider an example in which there are twenty employees at WorldCorp's warehouse location in Portland and each of those employees has a unique company identification number. In a spreadsheet keeping track of the number of days of vacation remaining for the year for each employee, you would not expect to have more than one line per employee. For a dataset of only twenty employees, it would be easy to identify a duplicate entry. But what if your company had two thousand employees? This could take a good bit of time to manually identify duplicates.

To remove duplicates from your data, first open the spreadsheet that you want to examine. Click on the Data tab and then on the Remove Duplicates tool (Figure 11.6).

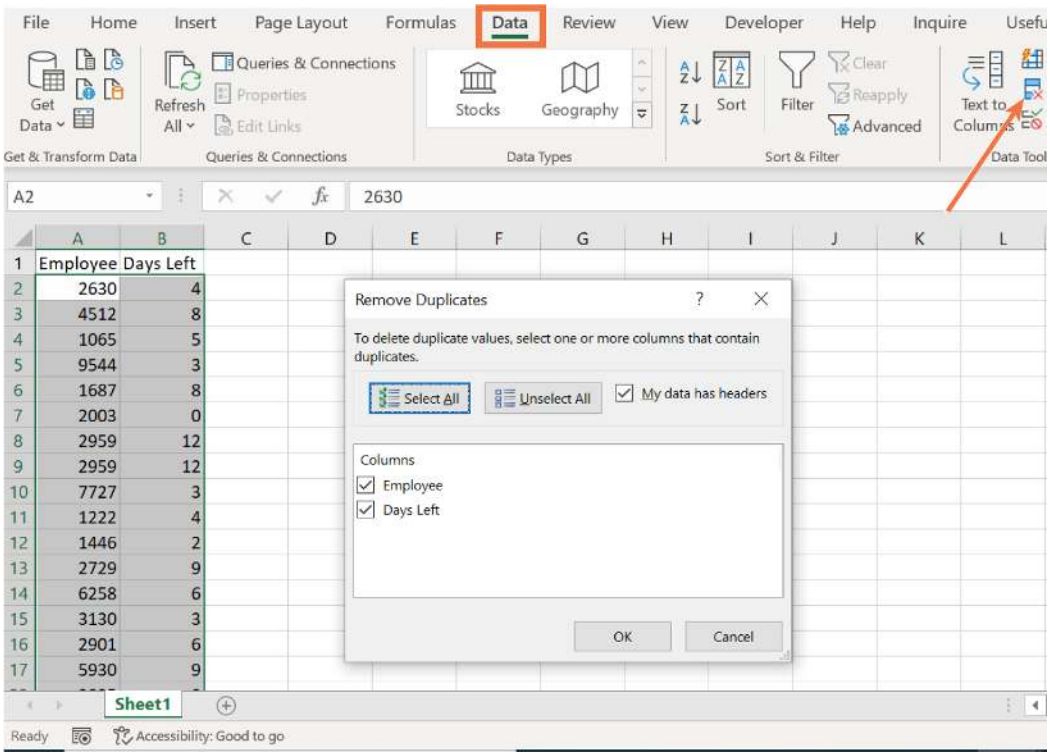


Figure 11.6: The Remove Duplicates dialog box allows you to choose the data from which you need to remove the duplicates. (Used with permission from Microsoft)

The dialog box that opens has several options. First, ensure that the box next to “My data has headers” is checked if your data has a header row, as shown in Figure 11.6. Then, choose which columns you want to check for duplicates. In this case, you will check both columns for rows that have duplicate data in both. The removal of the duplicate information in this example requires checking both columns and only occurs if both columns have duplicate information. You can check only one column if desired as well. In this example, though, you choose both columns because the information is grouped by rows. Thus, the Employee number is matched up with their days of vacation left.

After you’ve chosen the data to check, click OK. Notice that employee number 2959 (rows 8 and 9) appears twice, with the same number of days left. Excel will remove one of these entries. If you had only selected the first column, Excel would delete any rows that had duplicate information in Column A, regardless of the content of Column B. For this reason, you need to be careful to ensure that your criteria will not unintentionally delete too much data. Once the tool has finished removing duplicates in the selected data, Excel will notify you of the number of duplicates that were removed from the selection and indicate how many unique values remain (Figure 11.7).

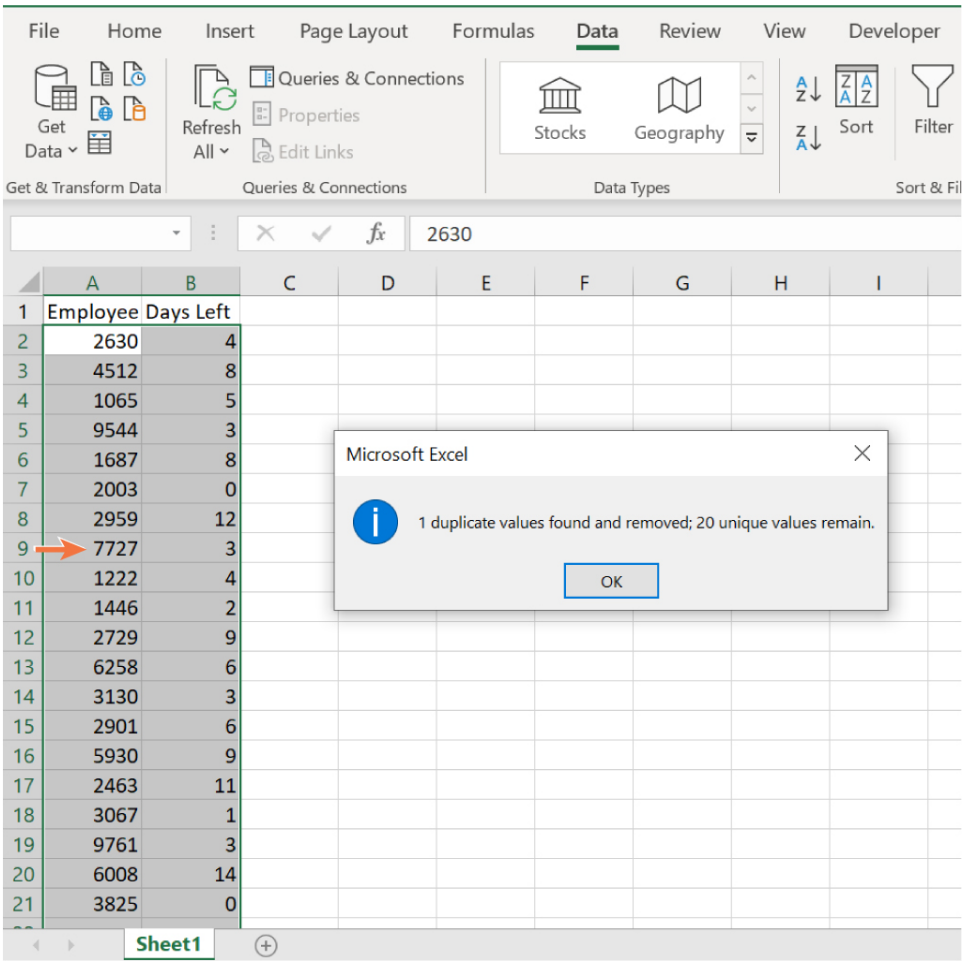


Figure 11.7: The Remove Duplicates tool removed Employee 2959, who appeared twice in the data, from row 9. (Used with permission from Microsoft)

Further validation of data can be accomplished using Excel's Data Validation tool accessed through the Data tab in the Data Tools command group. This tool checks a selection of data to determine if it falls within a specific range of numbers.

There are several options available with the Data Validation tool. You can set the tool to check the data within a certain date range, to verify if all numbers are whole numbers, or to check for all positive numbers. You can also create a drop-down list of options from which the user can choose. Additionally, you can set the tool to display an error message when a data point does not meet the criteria you have established.

How to Add Data Validation

Adding data validation means that you are requiring that a dataset meet certain specifications to be deemed valid. If these specifications are not met, the formula will not work. To demonstrate how to add data validation, you'll go back to the example of employee vacation days.

In the spreadsheet, first select the data (B2:B21) you want to examine. Do not select the column headers when selecting the data. Only select/highlight the numerical information. Next, click on the Data tab and choose the Data Validation tool (Figure 11.8). The Data Validation window will open. Once open, there are three tabs available.

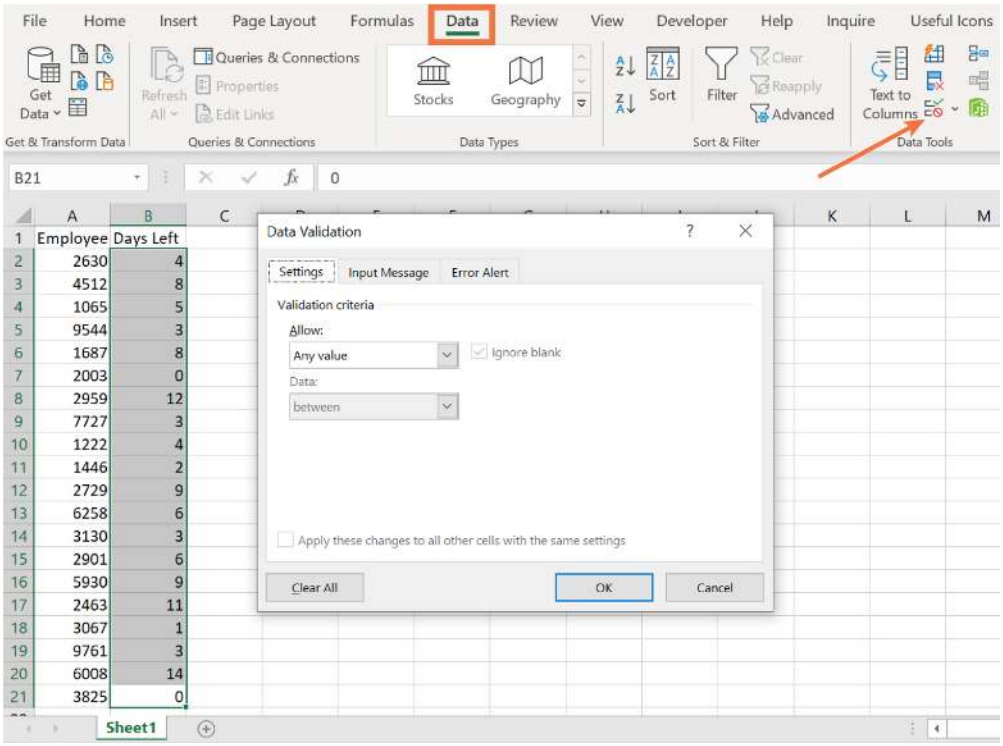


Figure 11.8: When using the Data Validation tool, first select the data and then choose the tool from the Data Tools command group. (Used with permission from Microsoft)

The Settings tab allows you to set parameters/ranges for the data validation. Assume that each employee is allocated two weeks (or 14 days) of paid vacation per year. This simple spreadsheet shows the number of vacation days remaining for each of the employees. Make sure that all entries are from 0 through 14. Using the Settings tab, change the value box under Allow to indicate a whole number (Figure 11.9). Then, under Data, choose “less than or equal to” and enter 14 in the Maximum box. Examine the other options available under Data. You could choose to have the number fall between two values. You could select greater than, greater than or equal to, and not between two values. The many choices will accommodate most data validation needs.

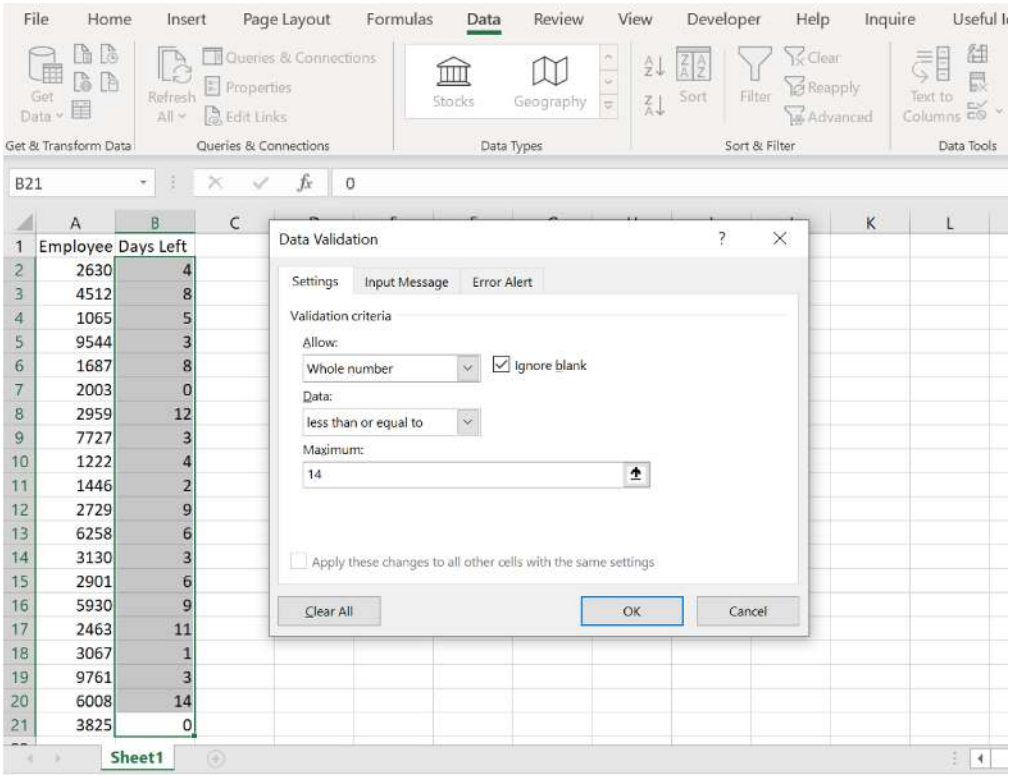


Figure 11.9: Use the Allow and Data fields to change the parameters of the data validation. (Used with permission from Microsoft)

Next, go to the Input Message tab. This is used to show a message to a user of a spreadsheet when they click in a cell to add data. For example, this message could indicate that the number must fall within a certain range. This is particularly useful if you have multiple users for an Excel spreadsheet.

Finally, the Error Alert tab will display a message to the user when they have entered an invalid entry. There are three different types of errors available. The Stop error gives you the option only to retype an entry or cancel. The Warning error allows the user to add an entry that is not in the predetermined list. Finally, the Information error simply states to the user that the entry does not match the validation rules, but the entry is still allowed. When an entry triggers an error, a small green triangle will appear in the upper-left corner of the cell. Clicking on the triangle will show what caused the error. Finally, you have the option to not display an error alert at all. By selecting this checkbox, all entries are permitted.

Once the parameters and messages are established in the previous steps, click OK. Now, using those settings, Excel can check the data. Under the Data Validation tool, click on the small down arrow to the right of the button to open the additional options. Select Circle Invalid Data. You then will see all data that does not meet the established criteria circled in orange (Figure 11.10).

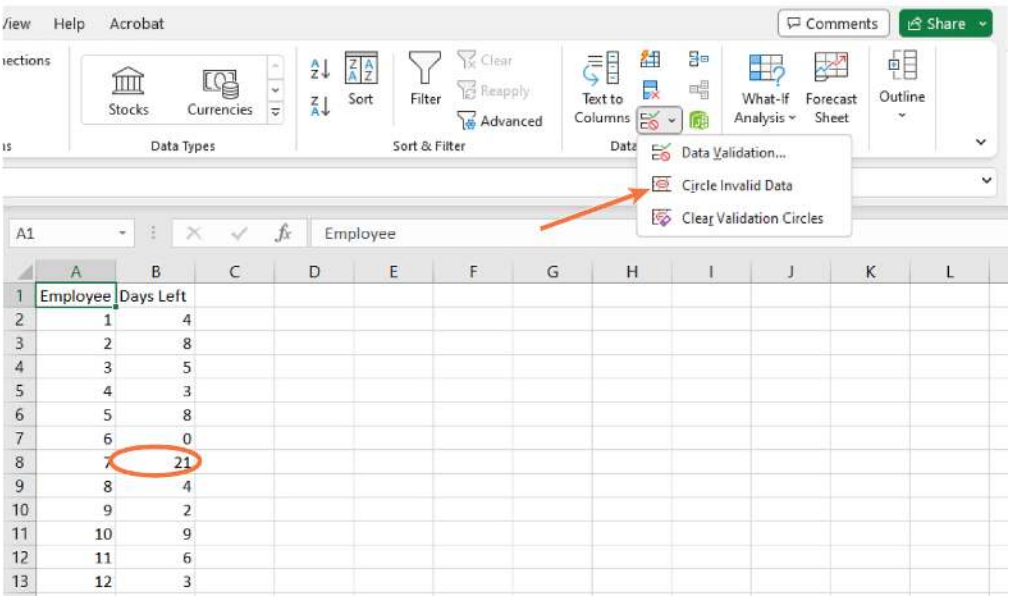


Figure 11.10: You input the settings for validating data with data validation. Then, to do the validation, choose “Circle Invalid Data.” The circle is placed around data that does not meet the parameter of the data validation. (Used with permission from Microsoft)

You can clear the circles by clicking on Clear Validation Circles. To remove data validation entirely, select the Data Validation tool, and in the lower left, choose Clear All. This will clear the validation rules from the cells. Here are the general steps for using the Data Validation tool to find invalid data:

1. Highlight the desired data (include only numbers, not text).
2. Click on the Data tab and select the Data Validation tool.
3. Set the parameters for the validation under the Settings tab.
4. Set an input message if desired.
5. Set an error alert message if desired.
6. Click OK.
7. Choose Circle Invalid Data under the Data Validation tool to identify data that does not meet the parameters established in Step 3.

Data Validation List

Creating a data validation list is a convenient way to ensure that only specific values are entered into a spreadsheet. The user chooses the appropriate response from a predetermined set of values, which can be numbers or text. This assures that only acceptable values will be entered into the spreadsheet. For example, let’s add a column to the employee spreadsheet that indicates the employee’s location. Suppose the company has three different locations: North, East, and South. The management team may want to review staffing at the various locations when vacation time is used, so this column might provide helpful information for scheduling purposes.

To create a data validation list, first click in an empty cell on the spreadsheet. Then, access the Data Validation tool. On the Settings tab under Allow, choose List. In the Source, you have two options. You can input text or values into the box separated by commas (Figure 11.11a), or if you have the list already in the named range, you can reference the named range in the Source box (Figure 11.11b). By using the cell range reference, the drop-down list is dynamic and will update if you change the source list. This is often the preferred method unless it is certain that the options will remain the same.

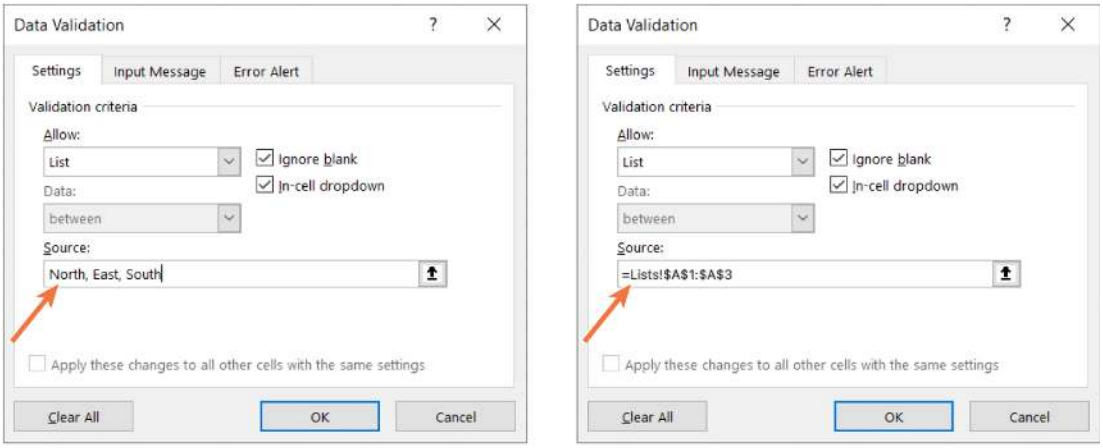


Figure 11.11: When establishing a data validation list, you can (a) directly enter the text or values, but it is preferred to use (b) cell references so that the drop-down list is dynamic. (Used with permission from Microsoft)

Either method will give the user a drop-down list to choose from when inputting information into the spreadsheet (Figure 11.12). If the list needs to be copied to other cells, it can be copied using the Paste Special technique (see Essentials of Software Application for Business).

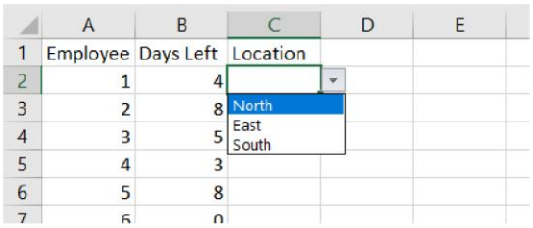


Figure 11.12: The drop-down list will show the text from the data validation list so the user can choose from the permitted values. (Used with permission from Microsoft)

Custom Data Validation Rules

If there are specific validation needs that are not covered by the existing built-in choices in data validation, you can create a custom data validation rule. This allows you to set your own parameters for the cells. Open the Data Validation tool and in the Allow drop-down menu, choose Custom. This offers a great deal of flexibility to use formulas and functions in data validation. You can use any of the available functions for data validation, even those that look at text or characters. Using data validation to look at text or characters could help you identify product codes or city names that were spelled incorrectly.

Using the employee vacation list, let's add the employee names to the data. Create a column called Name. To ensure that only textual information is entered into the cell, you will use the custom data validation option. Open the Data Validation tool. Select Custom. In the Formula Bar of the window, use the ISTEXT function to restrict the entries to text data only (Figure 11.13). You can also add an input message and error alert if desired. Click OK.

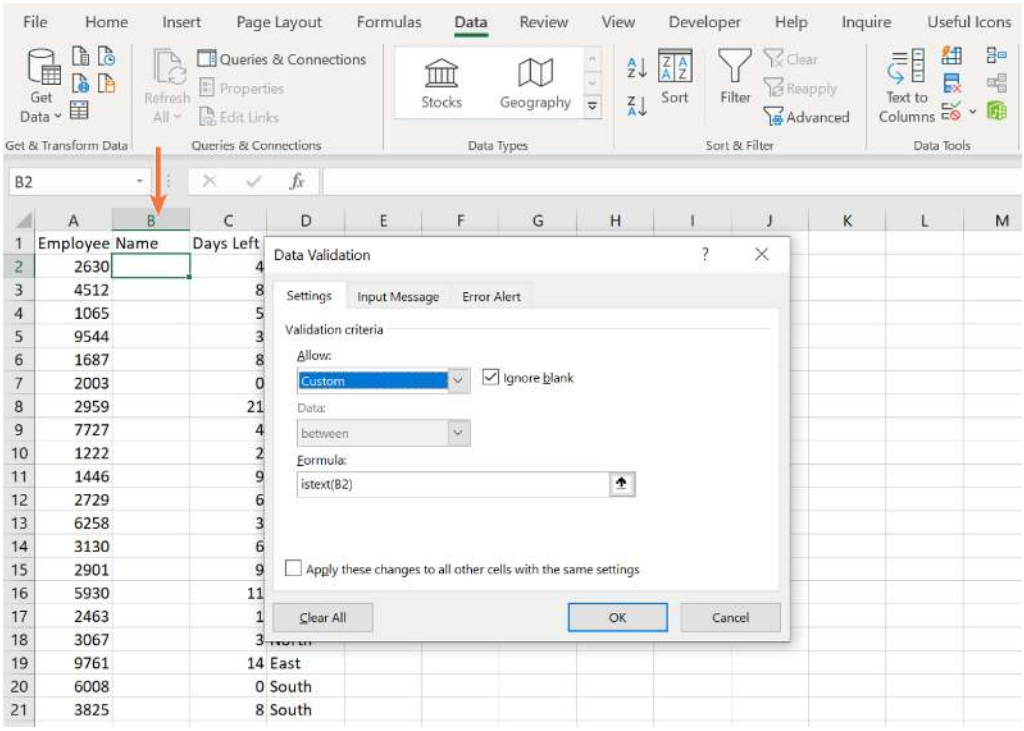


Figure 11.13: Data validation can be set to ensure that only text is input into a cell or group of cells. (Used with permission from Microsoft)

If the user tries to enter a number in the cell and you have enabled error alerts, an alert message will appear. Other custom data validation rules include not allowing any punctuation, restricting entries to not exceed a certain total, or entering data within a specified range.

The custom data validation rule option helps to ensure the accuracy of data entered based on scenarios that are appropriate to your specific application. These options are useful when creating spreadsheets that have multiple users. Data quality issues can be mitigated by setting up validation rules or adding drop-down lists. Data validation along with other skills, such as protecting sheets or cells, can be critical to maintaining the integrity of the spreadsheet and the data analysis built from the information in the spreadsheet.

Editing Validation Rules

To edit existing validation rules, first identify the cells where data validation rules are located. To do this, on the Home tab, go to Find & Select on the far right side of the tab, and choose the down arrow. When the menu appears, choose Data Validation. This will highlight all cells that have data validation rules. To view the parameters of that rule, simply click in one of the highlighted cells. Then, go to the Data Validation tool. The tool window will appear and list the restrictions of the data validation rule. If you want to make any changes, you can make them here. However, before closing the window, ensure that you check the box next to the instruction “Apply these changes to all other cells with the same settings” (Figure 11.14). This will then apply the changes to the other cells with the same data validation rule.

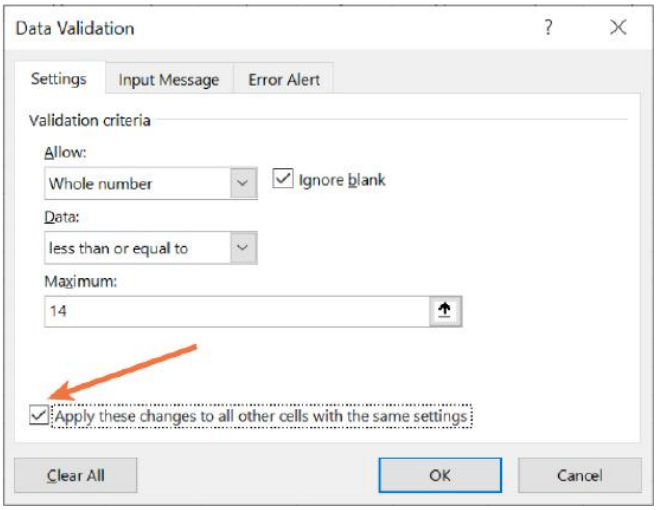


Figure 11.14: Be sure to select this checkbox to apply changes to all cells using the same data validation rule. (Used with permission from Microsoft)

Organizing and Presenting Data

A benefit of using Excel to organize data is the wide variety of formatting choices available for presenting the information in a professional manner. Remember the basic formatting concepts you learned in Working with Spreadsheets. Organizing the data in a table format with headers, colors, and other formatting options makes the information visually appealing and often makes it easier to understand. This is especially important when dealing with a large spreadsheet of information. When formatting data in your spreadsheet, there are a few settings that will allow you to present the data in a more professional way:

- Adjust the alignment so that numbers are aligned to the right and text is aligned to the left. This allows users to easily distinguish between text and numerical information.
- Add formatting to column and row headings, such as bold fonts or a larger text size. You might consider adding a border to the header row but avoid using all capital letters in the header row because it makes text difficult to read.
- Filler colors can highlight your header row or make it easier to distinguish between rows of data. Too many colors, however, can distract from the professional look of the spreadsheet. One clean and simple way to distinguish rows is to use a light gray filler for every other row or column, as illustrated with the WorldCorp dataset from the previous chapter, shown here in Figure 11.15.
- When choosing fonts for your data, use only one font, and use fonts that are easy to read, such as Times New Roman or Calibri. Avoid script fonts and fonts that look artistic.
- Adjust column widths and row heights to make the spreadsheet more readable.
- In large datasets, consider freezing the header row so that when the user scrolls, the column headings remain visible. To do this, go to the View tab, select Freeze Panes, and then Freeze Top Row. This keeps the top header row visible while scrolling.

There are many built-in settings that might be useful when formatting your data for a professional look. You can access them through the Cell Styles menu on the Home tab (see Working with Spreadsheets).

	A	B	C	D	E	F	G
1	Date	Port	Item Description	Quantity	Unique Quantity Code	FOB s	
2	3/22/2021	Portland, ME	Headphones	542	PCS	$ 26,016.00	
3	3/27/2021	Portland, ME	Computer Servers Accessories	2500	PCS	$ 21,350.00	
4	3/29/2021	Portland, ME	Tablets 7in	143	PCS	$ 10,582.00	
5	3/21/2021	Portland, ME	LED TVs, 55in and 65in	53	PCS	$ 14,575.00	
6	3/17/2021	Portland, ME	LCD TVs 32in and 45in	97	PCS	$ 64,505.00	
7	3/15/2021	Portland, ME	Cellular Phone Accessories	3000	PCS	$ 22,920.00	
8	3/10/2021	Portland, ME	Home Stereo Systems	74	PCS	$ 7,252.00	
9	3/7/2021	Portland, ME	Blu-Ray Players	127	PCS	$ 10,922.00	
10	3/5/2021	Portland, ME	HDTV Antennas	768	PCS	$ 21,504.00	
11					Total	$ 199,626.00	
12							
13							

Figure 11.15: Built-in Cell Styles make datasets with many rows more visually appealing. (Used with permission from Microsoft)

Another way to present data in a spreadsheet is to display it in a graphic format. The type of chart or graph you should choose depends on the type of data. For example, a bar chart is appropriate for categorical data, while a line graph is appropriate for numerical data. When the data includes categories that equal 100 percent, a pie chart (Figure 11.16) is an effective option, such as with the data presented in Figure 11.15. Using a pie chart with the data, you can see the proportion of each product compared with each other. Charts will be covered in more depth later in Data Analysis Charts.

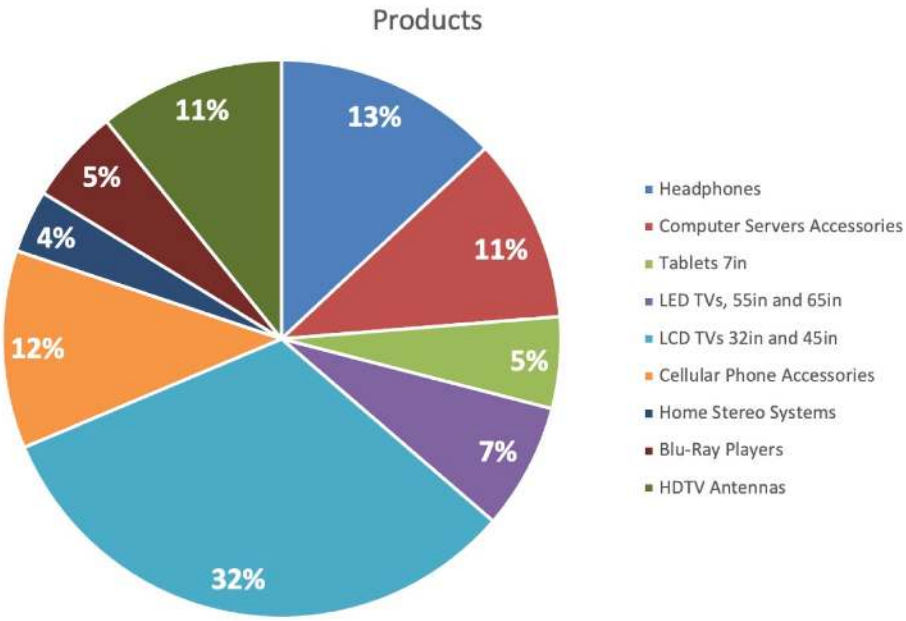


Figure 11.16: Pie charts are an effective way to visually represent data when categories equal 100 percent.

Constructing a Data Table

To add even more functionality, you can format data to be an Excel Data Table, rather than simply a table of numbers. Using the Data Table formatting sets the data as a separate object in the spreadsheet. It is more than simply adding column or row headings. This feature allows you to easily add rows or columns, is automatically formatted to look professional, and allows you to quickly sort and filter information with a filter button at the top of the column. The table will automatically expand with the insertion of new rows or columns, and the preset formatting will carry over to these additions. Column headings are always visible without manually freezing the row, and formulas entered into cells are automatically applied to all cells in that column. Although these functions are available without formatting a set of data as a Data Table, working with the data is much easier if it is set this way.

You can create a Data Table from scratch and then add the data at another time. However, it is often easier to work from an existing spreadsheet of data to create the Data Table. To do so, open the "pivot_table_data" tab in the downloadable Chapter 11 data file workbook. There are two ways to format the data as a Data Table. For both, first highlight the data you want to convert to a Data Table. Then, press Ctrl+T, which opens a small window showing the selected range and a checkbox if the data contains a header row (Figure 11.17). Click OK. The other method is to click on the Home tab and choose Format as a Table in the Styles command group.

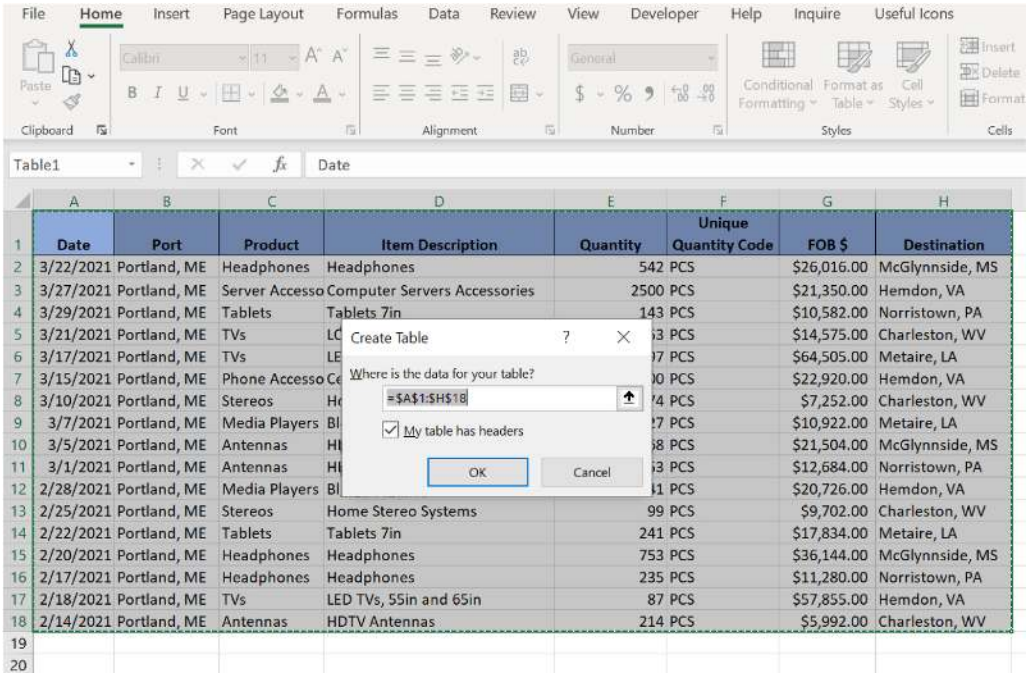


Figure 11.17: To create a Data Table, first select the columns and rows to be included in the table. (Used with permission from Microsoft)

Once you click OK, you will notice that your data looks different. There are drop-down arrows associated with each column, and there is a new tab in the ribbon: the Table Design tab (Figure 11.18).

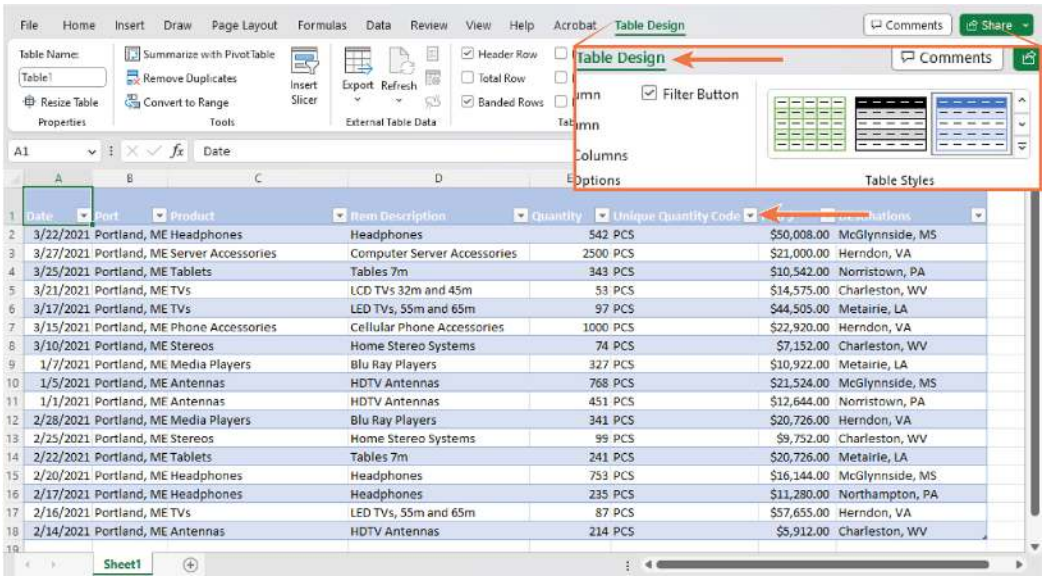
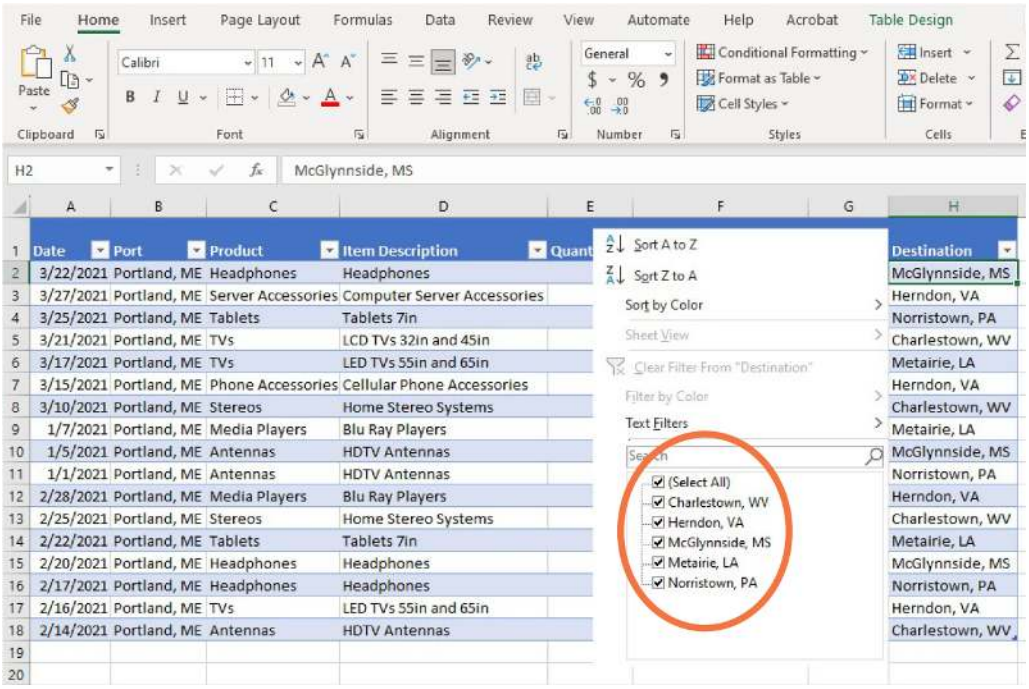


Figure 11.18: When data are in a Data Table, you will see a Table Design tab for formatting options. (Used with permission from Microsoft)

The Table Design tab appears when you click inside the Data Table and allows you to customize the table. You can change the color scheme, name the table, summarize the data, and refresh the information.

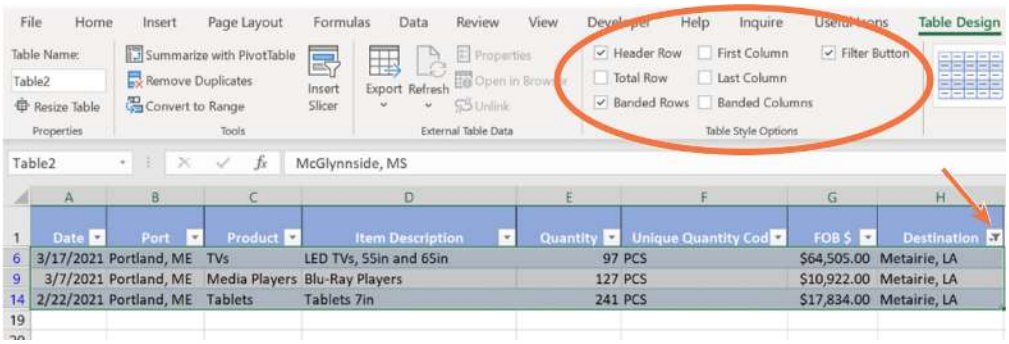
The drop-down arrows on each column header allow you to filter and sort the data. You can sort the data in many ways, and you can filter the data to only show selected information. You could sort this example to show certain destinations, such as Metairie, LA (Figure 11.19).



	Date	Port	Product	Item Description	Quant	Destination
2	3/22/2021	Portland, ME	Headphones	Headphones		McGlynnside, MS
3	3/27/2021	Portland, ME	Server Accessories	Computer Server Accessories		Herndon, VA
4	3/25/2021	Portland, ME	Tablets	Tablets 7in		Norristown, PA
5	3/21/2021	Portland, ME	TVs	LCD TVs 32in and 45in		Charlestown, WV
6	3/17/2021	Portland, ME	TVs	LED TVs 55in and 65in		Metairie, LA
7	3/15/2021	Portland, ME	Phone Accessories	Cellular Phone Accessories		Herndon, VA
8	3/10/2021	Portland, ME	Stereos	Home Stereo Systems		Charlestown, WV
9	1/7/2021	Portland, ME	Media Players	Blu Ray Players		Metairie, LA
10	1/5/2021	Portland, ME	Antennas	HDTV Antennas		McGlynnside, MS
11	1/1/2021	Portland, ME	Antennas	HDTV Antennas		Norristown, PA
12	2/28/2021	Portland, ME	Media Players	Blu Ray Players		Herndon, VA
13	2/25/2021	Portland, ME	Stereos	Home Stereo Systems		Charlestown, WV
14	2/22/2021	Portland, ME	Tablets	Tablets 7in		Metairie, LA
15	2/20/2021	Portland, ME	Headphones	Headphones		McGlynnside, MS
16	2/17/2021	Portland, ME	Headphones	Headphones		Norristown, PA
17	2/16/2021	Portland, ME	TVs	LED TVs 55in and 65in		Herndon, VA
18	2/14/2021	Portland, ME	Antennas	HDTV Antennas		Charlestown, WV

Figure 11.19: The drop-down menu with each column in a Data Table is a convenient way to filter information. (Used with permission from Microsoft)

To accomplish this, select the down arrow in the Destination column. Then, deselect all the destinations *except* Metairie. This will filter the entire table to only display those products for Metairie (Figure 11.20). You can tell that the data is filtered because the row number starts at a number other than 2 (row 1 is the header row). In this case, it starts at row 6. The other data is still contained in the table, but it does not display when this filter is applied. Also notice that the drop-down arrow changes to a funnel icon to indicate that the table has been filtered based on the information in this column. To remove the filter, click on the funnel icon and choose Clear Filter. This will remove the filtering from the table, and it will return to its original form. The funnel icon will change back to a drop-down arrow. If you do not want to filter your data, you can choose to not have the filter buttons displayed in your table using the Table Design tab in the Table Style Options command group. You can also use the Table Styles Options command group to add a total row to your Data Table.



	Date	Port	Product	Item Description	Quantity	Unique Quantity Cod	FOB $	Destination
6	3/17/2021	Portland, ME	TVs	LED TVs, 55in and 65in	97	PCS	$64,505.00	Metairie, LA
9	3/7/2021	Portland, ME	Media Players	Blu-Ray Players	127	PCS	$10,922.00	Metairie, LA
14	2/22/2021	Portland, ME	Tablets	Tablets 7in	241	PCS	$17,834.00	Metairie, LA

Figure 11.20: Customize the Data Table using the options in the Table Style Options command group. (Used with permission from Microsoft)

To customize the color scheme of the Data Table, choose the Table Style Options command group in the Table Design tab. There are many color choices and designs to choose from. You can also create a custom style, perhaps with your company colors, by choosing New Table Style. A window appears that allows you to format each section of the table with various fonts or colors.

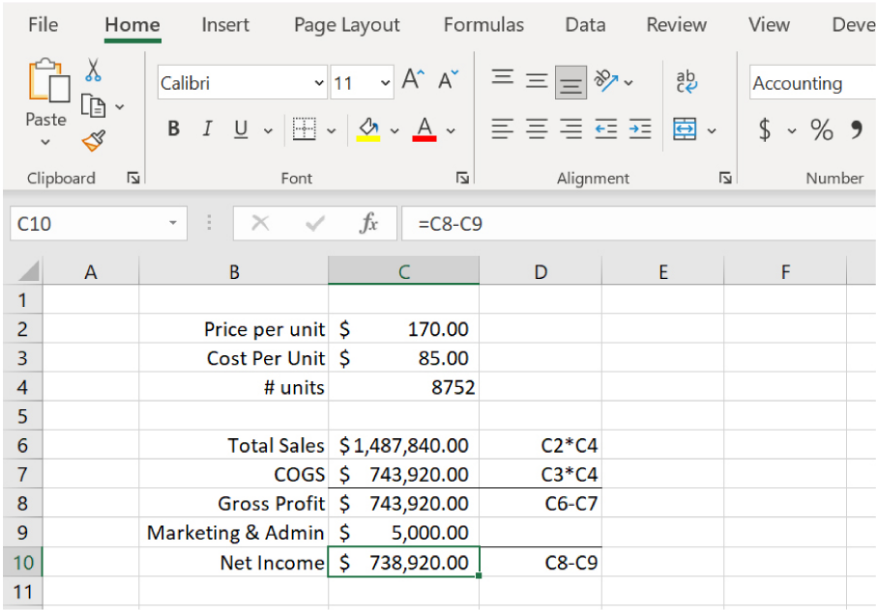
Another benefit of using Data Tables is that you can easily summarize the data using PivotTables. This feature allows you to display the data in various ways to better analyze the information. You can create subtotals and summations of various factors within the table. To use this feature, choose Summarize with PivotTable from the Tools command group on the Table Design tab. We will discuss PivotTables in PivotTables/Charts.

If you no longer want to use a Data Table object for your data, you can revert it to a regular data range. Choose Convert to Range in the Tools command group on the Table Design tab. This will keep all the formatting but will leave the data as a range rather than a Data Table object in the spreadsheet. This makes it easier to copy and paste the information into a document or a presentation when communicating the analysis to others.

One-Variable Data Tables

Data Tables allow you to change cell values and see the result those changes have on other cells containing formulas. The tables can be used to evaluate possible scenarios to help make decisions within a business. Often, Data Tables are used to understand the financial implications of decisions.

Data Tables can use one variable or two variables. The Data Table tool is part of the What-If Analysis options on the Data tab. A one-variable Data Table investigates the impact of manipulating a single cell on another cell. Imagine you are interested in looking at the impact to your company's overall profit if the price of one product is changed. Begin by setting up a model of the current data. For this example, let's look at WorldCorp's 32" LCD TV that sells for $170 and costs WorldCorp $85 to make. Let's assume that marketing and administrative costs are $5,000 annually. You can set up an initial spreadsheet that reflects the current model and an abbreviated income statement to show the company profit (Figure 11.21). The formulas are shown in column D so that you can see how the cells were calculated.

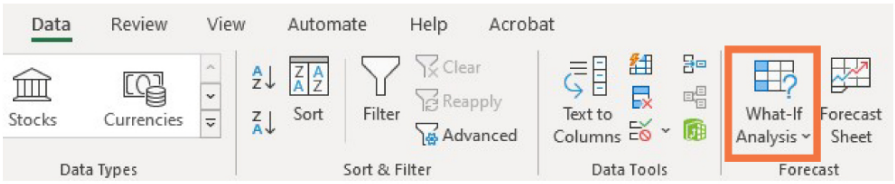


	A	B	C	D	E	F
1						
2		Price per unit	$ 170.00			
3		Cost Per Unit	$ 85.00			
4		# units	8752			
5						
6		Total Sales	$ 1,487,840.00	C2*C4		
7		COGS	$ 743,920.00	C3*C4		
8		Gross Profit	$ 743,920.00	C6-C7		
9		Marketing & Admin	$ 5,000.00			
10		Net Income	$ 738,920.00	C8-C9		
11						

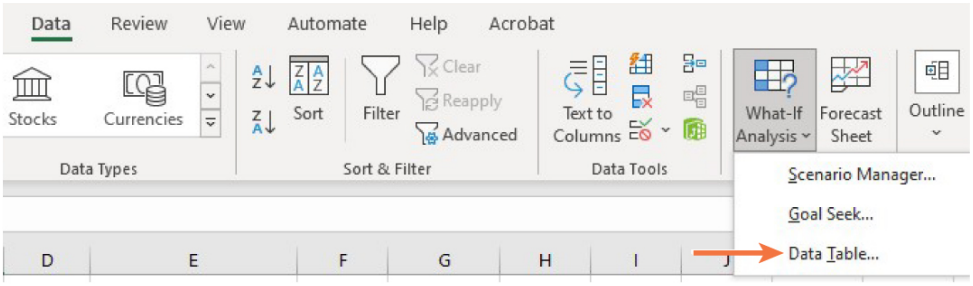
Figure 11.21: For a one-variable Data Table, you will model a single variable such as Net Income. (Used with permission from Microsoft)

You are interested in seeing the impact to profit, or cell C10, in this example. The value in this cell becomes the top row of the Data Table, so repeat it below the model. Next, identify the new prices to investigate. With a one-variable Data Table, those values are placed in the column to the left of the impacted cell. In this example, put the values in column B, starting in the row below the impacted cell. At this point, you can format the values using the Currency style to be more representative of what is being investigated. Then, select the cells to include in the Data Table, including all the price-level changes being evaluated.

Now, construct the Data Table. Go to the Data tab, click the arrow next to What-If Analysis, and select Data Table from the list (Figure 11.22). When the input window appears, choose the input value (price in this example) in the Column input cell box. You only use the Column input cell for a one-variable Data Table (Figure 11.23). Notice the dotted line around the input cell and the highlighted region for the Data Table. Click OK.



(a)



(b)

Figure 11.22: (a) For the new data table, first choose the What-If Analysis option from the Data tab. (b) Then select Data Table from the drop-down menu. (Used with permission from Microsoft)

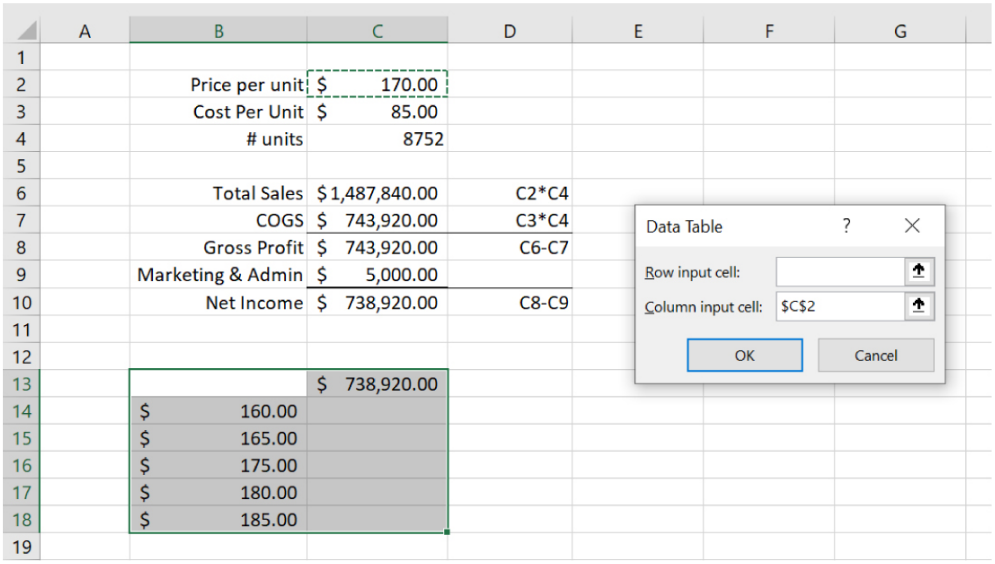


Figure 11.23: The impact of the Price per unit on overall Net Income is the desired output. (Used with permission from Microsoft)

When you click OK, Excel will use the information from the model to calculate the Net Income at each of the price points (Figure 11.24).

	A	B	C	D	E	F	G
1							
2		Price per unit	$ 170.00				
3		Cost Per Unit	$ 85.00				
4		# units	8752				
5							
6		Total Sales	$ 1,487,840.00	C2*C4			
7		COGS	$ 743,920.00	C3*C4			
8		Gross Profit	$ 743,920.00	C6-C7			
9		Marketing & Admin	$ 5,000.00				
10		Net Income	$ 738,920.00	C8-C9			
11							
12							
13			$ 738,920.00				
14		$ 160.00	651400				
15		$ 165.00	695160				
16		$ 175.00	782680				
17		$ 180.00	826440				
18		$ 185.00	870200				
19							

Figure 11.24: The change in net income due to the change in the price per unit is automatically generated. (Used with permission from Microsoft)

Excel shows that if the price point per unit is adjusted to $165.00, the Net Income will be $695,160, as shown in cell C15. When Excel creates the Data Table, the results are not automatically formatted. You can format the information after the Data Table is created, or you can set the number style to accounting or currency for the cells C14:C18 prior to creating the table. This simple example demonstrates the value of creating a Data Table. Excel quickly calculates the impacted cell values based on the predetermined formulas. This allows the decision maker to see all options in a single table.

Two-Variable Data Tables

Often in data analysis, there is more than one variable. You may need to investigate the interaction between two variables to get more information. For example, a two-variable Data Table could analyze the performance of various locations during each quarter of the year or could examine different production levels at various price points to investigate the impact on profit.

Let's continue with the example of product price and impact on profit, and add various quantities sold into the analysis. Again, the target impacted cell is C10, Net Income. Put the quantity values across the top of the table and the prices down the side, as with the one-variable Data Table. Format the output cells (D14:H17) as currency. Next, highlight the table area and go to the Data Table tool in What-If Analysis. For the Row input cell, choose the # units, C4, and for the Column input cell, use the unit price, C2. Click OK (Figure 11.25). Notice the output cells are formatted to the Currency style. As a manager, you can see the impact on your profit outlook when you change the two variables (Figure 11.26). For example, if the price is lowered to $165 and you sell 9,500 units, your profit would be 755,000 (cell G15).

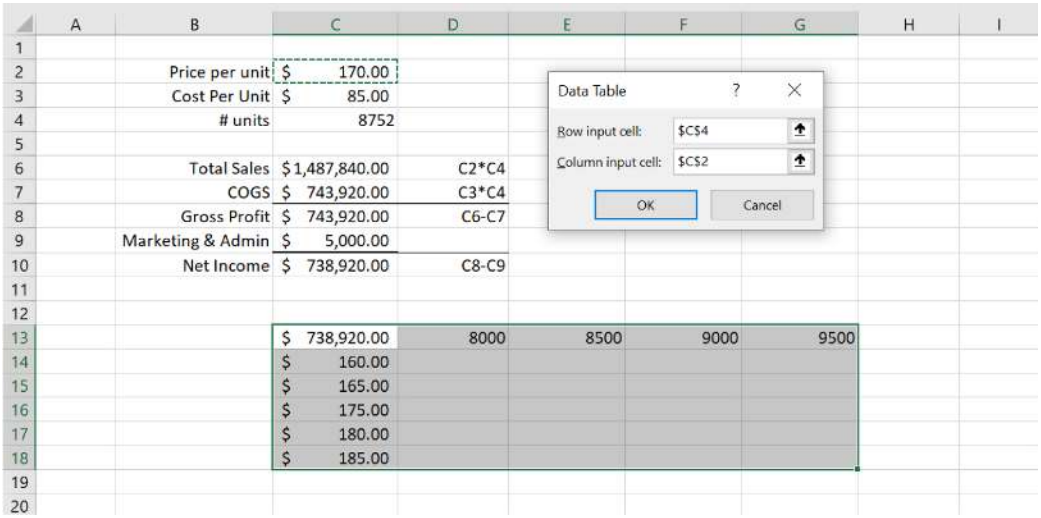


Figure 11.25: Two-variable Data Tables can manipulate two cells. Use the Data Table tool to enter your input cells. (Used with permission from Microsoft)

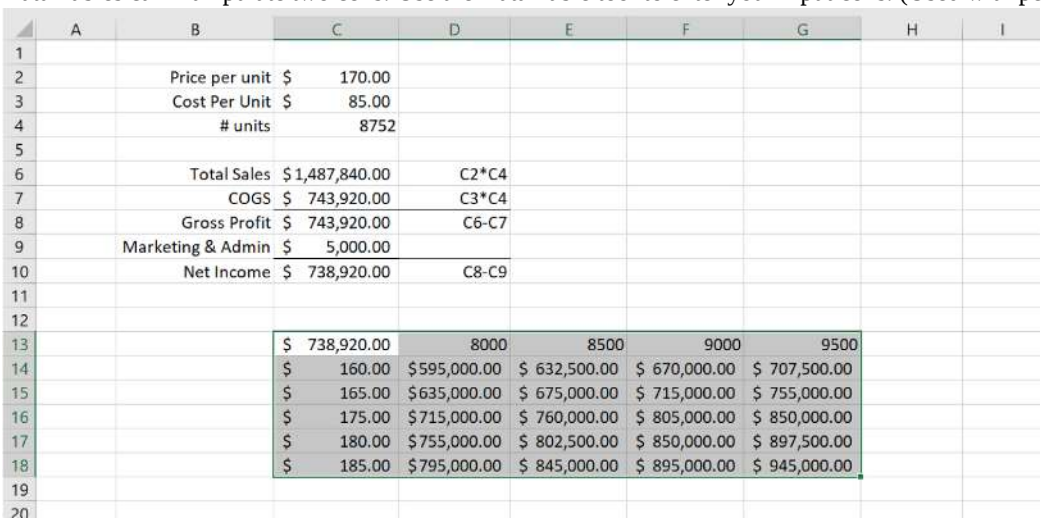
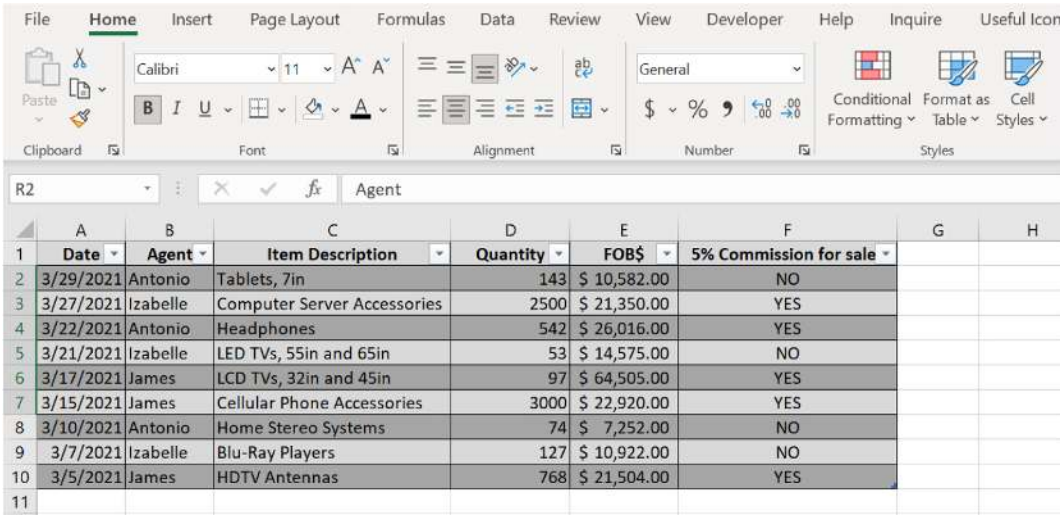


Figure 11.26: The final Data Table shows the impact of changing one or both variables. (Used with permission from Microsoft)

Visualizing Mixed Variables

Data collected by businesses comes in a wide variety of forms. It may not always be numerical. It might include income or age data reported as ranges of numbers rather than an exact number. Sales data may report a purchase was made but not include the sales price. The Data Table in Figure 11.27 includes both numerical data (the number of units sold) and categorical data (the sales agent). Summarizing both categorical and numerical data in the same table is appropriate and useful in many cases. The data can also be visually presented with a combination of charts and graphs. However, for any in-depth analysis, you will need to adjust the categorical data.



	A	B	C	D	E	F	G	H
1	Date	Agent	Item Description	Quantity	FOB$	5% Commission for sale		
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00	NO		
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$ 21,350.00	YES		
4	3/22/2021	Antonio	Headphones	542	$ 26,016.00	YES		
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$ 14,575.00	NO		
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$ 64,505.00	YES		
7	3/15/2021	James	Cellular Phone Accessories	3000	$ 22,920.00	YES		
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	NO		
9	3/7/2021	Izabelle	Blu-Ray Players	127	$ 10,922.00	NO		
10	3/5/2021	James	HDTV Antennas	768	$ 21,504.00	YES		
11								

Figure 11.27: Information in a Data Table can be numerical or categorial. (Used with permission from Microsoft)

One strategy to adjust categorical data is to replace the text with a numerical value. Using the data in Figure 11.27, you could replace all instances of “Antonio” with the number 1, “Izabelle” with the number 2, and “James” with the number 3. When making a substitution like this, be sure the spreadsheet includes a legend that identifies each category and its corresponding number. This could be a simple chart on the same worksheet or on another worksheet that explains what each number represents. When there are only two categories, such as a Yes/No question, you can use the binary system with 0 for No and 1 for Yes. Using the Find and Replace tool makes the process of changing text to numbers easier. Categorical data combined with numerical data can also be analyzed using PivotTables.

Footnotes

- 1U.S. Bureau of Labor Statistics. Management Analysts: Summary. Occupational Outlook Handbook. www.bls.gov/ooh/business-and-financial/management-analysts.htm. Modified September 8, 2022.
- 2Nicole Marti. “How Much Data Is Collected Every Minute Of The Day.” *Forbes*. August 12, 2019. https://www.forbes.com/sites/nicolemartin1/2019/08/07/how-much-data-is-collected-every-minute-of-the-day/?sh=30871fd03d66

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6.2: Table Basics

This page is a draft and is under active development.

Learning Objectives

- Understand table properties and structure.
- Format data as a table.
- Use Freeze Panes.
- Work with the Table Tools Design tab.

Organizing, maintaining, analyzing, and reporting human resources data is essentials across industries. In this chapter, we will import data, and demonstrate tabling skills by examining employee relations, payroll, benefits, and training options.

WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary
1102	Vanesa	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$ 106,010
1106	Elizabeth	Allen	11/6/2015	2.15	11/23/1991	25	Seattle	FT	$ 42,182
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$ 92,254
1114	Katherine	Baker	3/24/2003	14.78	12/8/1964	52	Seattle	FT	$ 69,250
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$ 102,567
1122	Brandon	Barnes	8/12/2002	15.40	10/15/1968	48	San Francisco	FT	$ 94,517
1126	Paul	Benham	11/6/2015	2.15	3/20/1973	43	San Diego	FT	$ 51,791
1130	Santos	Bennett	6/10/2010	7.56	4/20/1966	50	San Diego	FT	$ 32,530
1134	James	Bennett	1/20/2016	1.95	3/21/1957	59	Seattle	FT	$ 94,502
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$ 45,671
1142	Gregory	Blackshear	7/16/2009	6.47	2/8/1986	30	Seattle	FT	$ 70,346
1146	Thomas	Bradley	4/12/2008	9.73	7/13/1986	30	San Diego	FT	$ 34,685
1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$ 96,944
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$ 92,091
1158	Charlotte	Burgess	7/17/2015	2.46	7/12/1959	57	San Diego	FT	$ 30,150
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$ 81,536
1166	Ramon	Cannon	10/4/2013	4.24	10/25/1959	57	San Francisco	FT	$ 96,021
1170	Antolin	Casas	9/7/2012	5.32	3/11/1961	55	San Diego	FT	$ 58,720

Figure 5.1 Table Example

Table properties & structure

Turning a range of cells into an Excel table makes related data easier to analyze, visualize, and report. Structuring and planning table layouts are vital for data integrity. Below are guidelines to consider when designing and building a table from scratch:

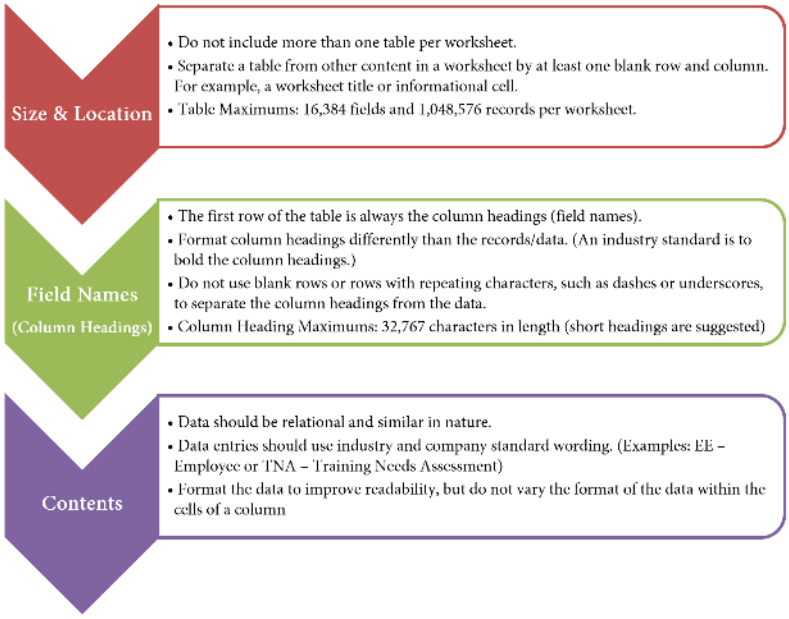


Figure 5.2 Table Layout Guidelines

Overview

Excel tables behave independently from the rest of the information on the worksheet. Excel treats the table area as a database locking the record entries together. There are several advantages of Excel treating the data independently. For example, using integrated filters and sort functions you can effortlessly drill down data based on questions and in return get results. Excel will also automatically expand the table to accommodate new data entries and allows for automatic formatting, such as recoloring of banded rows or columns.

You will also notice Excel treats formulas and calculations differently in a table, showing structured column names, along with automatically filling a calculated field to the entire table or offering quick and easy table totaling tools.

When graphing and charting table data you will also see Excel automatically adjusts of associated charts and ranges based on what the user is sorting or filtering at the time.

In industry, data is commonly stored in databases or multiple Excel files. Databases vary drastically, therefore in some cases, it is necessary to import data types into Excel. In our example, we will work with an Excel file that has imported data from a human resources database. The data downloaded from the database is stored in an Excel workbook, however, it's in a Comma Separated Values (CSV) format. We will import the Excel file into our CH 5 Data file, turn the data into a table for further analysis.

Import and format data as a table

Download Data file: CH5 Data

CH-5-HR_

Keeping the above table guidelines in mind, import human resource data into Excel, as a table. Demonstrate tabling skills by examining employee relations, payroll, and benefits. Note you will need to save the **CH 5 HR** file on your computer as you will import this file into the **CH 5 Data** file in the below steps.

1. Open data file **CH 5 Data** and save the file as **CH5 HR Report**.
2. In the **EmployeeData** sheet, click on cell **A5**.

Mac Users: Excel for Mac does <u>not</u> have the tool for "Getting Data" from an Excel Workbook. You will set up this data using alternate steps. **Please skip steps 3-11.** The alternate steps can be found below after Step 11.

3. From the Data tab, choose **Get Data**.
4. From the Get Data menu, choose **From File,** then **FromWorkbook**.

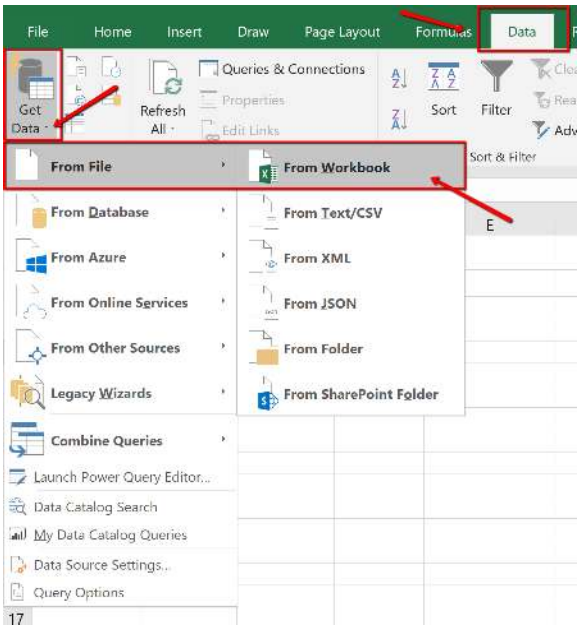


Figure 5.3 Get Data From File, From Workbook

5. Navigate to the course data files. Find, and select the **CH 5 HR** file.

6. Click **Import.**

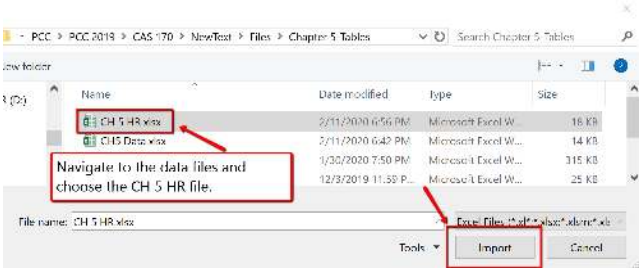


Figure 5.4 Import File Data CH 5 HR

7. The Navigator dialogue box will open. Select the **CH5 CSV File** listed in the Display Options pane.
8. At the bottom of the Navigator dialogue box, select **Load** to expand the menu and choose **Load To**…

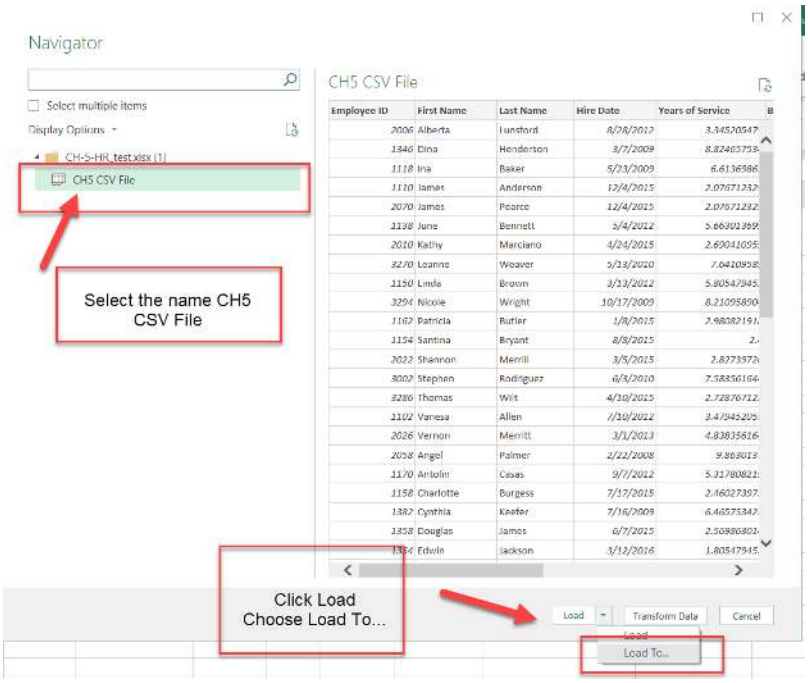


Figure 5.5 Navigator Window

9. The Import dialogue box will open. In the "**Where do you want to put the data?**" section choose **Existing worksheet:**
10. In the above steps A5 was already selected when we started the import, so Excel will indicate we want the information to import and display starting at cell =$A$5. If you did not click cell A5, then select the cell now. Click **OK.**

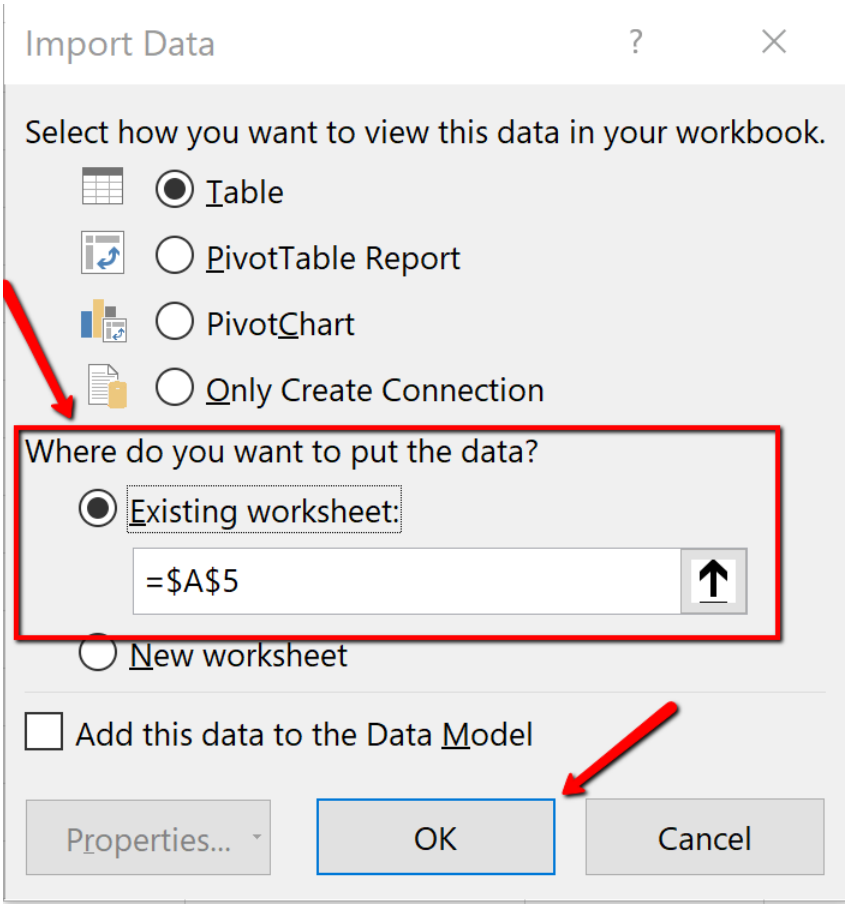


Figure 5.6 Import Data Dialogue Box

11. The data imports as a table. Close the Queries & Connections dialogue box.

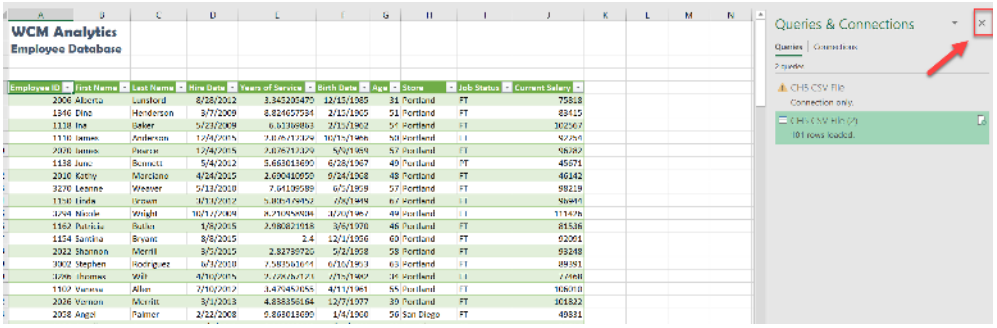


Figure 5.7 Close Queries & Connections

These are the alternate steps for Mac Users Only. If you are using Excel for Windows, please continue with the "Table Tools Design Tab" section below these alternate steps.

1. You should already have the **CH 5 HR Report** open and you should have clicked into cell A5 in the **EmploymentData sheet.** If you did not do this, please do it now.
2. Open the **CH 5 HR** workbook that you downloaded
3. Use the keyboard shortcut of **Ctrl key + letter A** to select all of the data in the worksheet. That should be cells A1:J102
4. Copy this data
5. Switch back to the **CH 5 Report** workbook and make sure cell A5 is the active cell
6. Paste the data into the **Employment Data sheet at cell A5**
7. Make sure Cell A5 is still the active cell and click the **Insert tab** from the Ribbon

8. Click the **Tables** button from the Ribbon and then click the **Tables** icon 
9. The **Create Table** dialog box should appear with the cell range of **A5:J106 as shown here in Figure 5.8.** Click **"OK"** to accept this range for your table**.**



Figure 5.8 Excel for Mac Create Table Dialog Box

10. **Congrats!** You just converted the data to an Excel table. Continue following the steps in the section below.

Table tools design tab

Excel tables require specific tools. The Table Tools Design tab houses these specific tools used for formatting and editing tables. The Table Tools tab is considered a contextual tab; meaning the tabs appear when you are clicked in a table area. When you click out of a table, the Table Tools disappear.

Explore the table tools now. Notice the specific checkboxes to turn on table options, for example, you can choose to display banded rows or banded columns, or a total row etc. We will explore table tools in the following steps.

When importing data as a table, Excel automatically applied table formatting. Follow the below steps to format and edit the table.

1. Click the **Table Tools/Design** tab on the ribbon.

Mac Users: you don't have a Table Tools/Design tab. Just make sure the Table tab is selected.

2. From the provided **Table Styles**, choose the **Blue, Table Style Medium 2** option.

Mac Users: the table you just created may already have the "Blue, Table Style Medium 2 option.

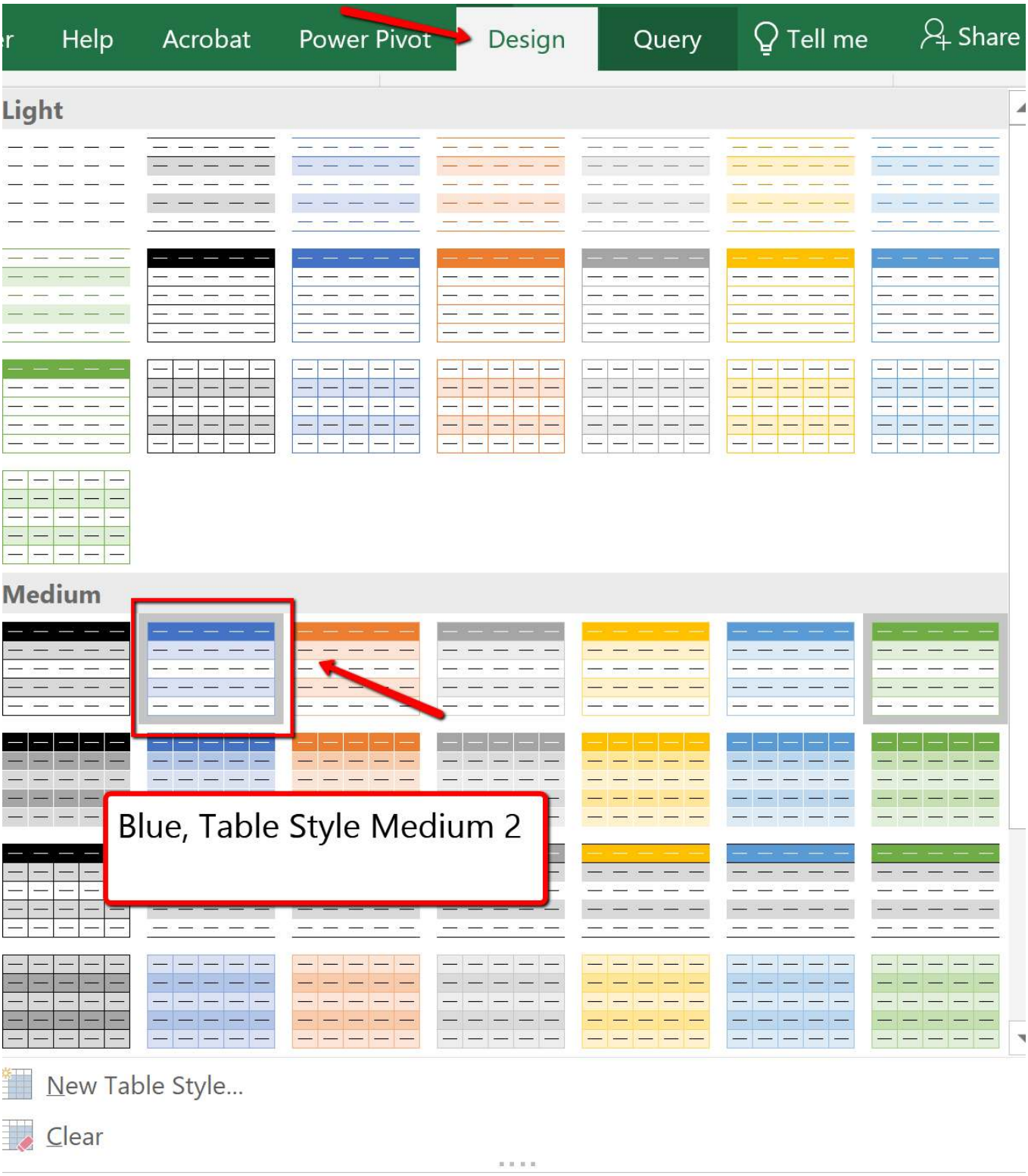


Figure 5.9 Blue Table Style Medium 2 Option

Another option for inserting a table is using the Insert button. The Insert Table button, located on the Insert tab will turn a range of information into an unformatted table. We will use the insert table option later on in the chapter.

Skill Refresher

Format Data as a Table

1. Click on the top-left cell in your data.
2. Click the Format As Table menu from the Home tab on the Ribbon. Choose a style.
3. Make sure “My table has headers” is checked. Click OK.
4. Click on the top-left cell again.
5. Adjust the widths of the columns so that you can see the complete headings with the filter arrows showing.

VIEWING table data

USING PANES

Data sets can bridge thousands of records with dozens of fields and extend beyond a workbook window. It can be difficult to compare fields and records in widely separated columns and rows. One way of dealing with this problem is by dividing the workbook window into viewing panes by using the **Split** view option. Excel can split the workbook window into four sections called panes with each pane offering a separate view into the worksheet. By scrolling through the contents of individual panes, you can compare cells from different sections of the worksheet side-by-side within the workbook window.

To split the workbook window into four panes, select any cell or range in the worksheet, and then on the View tab, in the Window group, click the Split button. Split bars divide the workbook window along the top and left border of the selected cell or range. To split the window into two vertical panes displayed side-by-side, select any cell in the first row of the worksheet and then click the Split button. To split the window into two stacked horizontal panes, select any cell in the first column and then click the Split button. To turn off the Spilt window option, simply click Split again on the View tab.

In our specific example the data set is manageable, however freezing the first column, and the top heading could be useful when scrolling through data.

FREEZE PANES

To keep an area of a worksheet visible while you scroll to another area of the worksheet use Freeze Panes. Follow the steps below to freeze, based on selection, the first column, and heading row.

1. If needed, adjust column widths so all heading names in row 5 are visible.
2. Click cell **B6** in the table. (By selecting this specific cell, when we apply the freeze pane option, Excel will freeze the table where the first column ends and the heading row is viewable.)
3. Click the View tab.
4. Select Freeze Panes, and for the listed options choose Freeze Panes (See **Figure 5.10 below)**. The column and rows will remain visible based on the cell that was selected above.

Mac Users should just click the **Freeze Panes** button 

under the View tab.

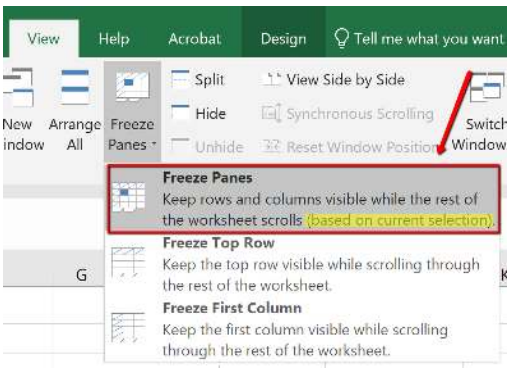


Figure 5.10 Freeze Panes

Formatting table Data

After reviewing the table, two columns have data that need to be formatted accordingly. In large data sets, it is useful to know data selection short cuts. In this example, we are going to use keyboard short cuts to select a column of information in the table and apply number formatting.

Format data by following the below steps:

1. In the EmployeeData sheet, click cell **E6**.
2. On the keyboard press and hold the **CTRL** and **SHIFT** and **DOWN** keys.
3. With the "Years of Service" data selected, click the Home tab. In the Numbers category, format the data as a Number. The number should automatically decrease the decimal to two decimal places.

   Mac Users: click the **"list arrow"** next to **"General,** 

and then choose **"Number"** from the list.

4. Click in cell J6. *(Be sure you have clicked J6 so that you are in the first cell in the Current Salary column)*. Using the same selection process, select the Current Salary column, and format the data as Currency, zero decimal place.
5. Using the non-adjacent selection method, select column headings E, G, and I, and center the data.

WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary
2006	Alberta	Lunsford	8/28/2012	3.35	12/15/1985	31	Portland	FT	$75,818
1346	Dina	Henderson	3/7/2009	8.82	2/15/1965	51	Portland	FT	$83,415
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671
2010	Kathy	Marciano	4/24/2015	2.69	9/24/1968	48	Portland	FT	$46,142
3270	Leanne	Weaver	5/13/2010	7.64	6/5/1959	57	Portland	FT	$98,219
1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$96,944
3294	Nicole	Wright	10/17/2009	8.21	3/20/1967	49	Portland	FT	$111,426
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091
2022	Shannon	Merrill	3/5/2015	2.83	5/2/1958	58	Portland	FT	$93,248
3002	Stephen	Rodriguez	6/3/2010	7.58	6/16/1953	63	Portland	FT	$89,391
3286	Thomas	Wilt	4/10/2015	2.73	7/15/1982	34	Portland	FT	$77,468
1102	Vanesa	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$106,010
2026	Vernon	Merritt	3/1/2013	4.84	12/7/1977	39	Portland	FT	$101,822

Figure 5.11 Number Formatting

Naming a table

Each time a table is created, Excel assigns a default name. The default naming convention is similar to the way new workbooks are named (Book1, Book2, etc.), however in this case Excel recognizes the area as a table and will assign the name table instead of book: Table1, Table2, Table3, and so on.

Why name a table range? Referring to the table by name rather than by range will make it easier to refer to a table in the future, for example, in a workbook that contains many tables. Seeing tables named Jan or Feb is more informational then seeing Table1 or Table 2. You can custom name each table and in the future connect named tables for reporting purposes.

There are two rules to consider when naming tables. One, Excel does not allow spaces in table names, and two, Excel also requires that table names begin with a letter or underscore.

Follow the next step to assign a custom name to the table.

1. Click anywhere in the table and then display the Table Tools Design tab.

Mac Users: there is no "Table Tools Design" tab in Excel for Mac. Simply click the **Table**tab and follow steps 2 and 3 below to give the table a new name.

2. Click the Table Name text box, in the Properties group.
3. Type **Employee_DB** and then press enter to name the table.



Figure 5.12 Name a Table Range

Entering & deleting records

Tables require constant updating and may need calculations. When your table needs updating you can add/delete data, by adding/deleting rows, or columns. Excel adjusts the table automatically to the new content. The format applied to the banded rows updates to accommodate the new data set size.

When calculations are needed you can create a calculated column or use the built-in Total Row tool. Excel tables are a fantastic tool for entering formulas efficiently in a calculated column. Excel allows you to enter a single formula in one cell, and then that formula will automatically expand to the rest of the column by itself. There's no need to use the Fill or Copy commands. This feature can be incredibly time-saving, especially if you have a lot of rows. And the same thing happens when you change a formula; the change will also expand to the rest of the calculated column. The Total Row tool, available on the Table Tools Design tab automatically adds a total row to the bottom of the table. To add a new row, uncheck the Total Row checkbox, add the row, and then recheck the Total Row checkbox. From the total row drop-down, you can select a function, like Average, Count, Count Numbers, Max, Min, Sum, StdDev, Var, and more.

Follow the steps below to update the employee table. You will insert new information just below the table. Data entered in rows or columns adjacent to the table becomes part of the table. Excel will format the new table data automatically.

1. Press and hold the **Ctrl** and **End** button to move to the last record in the table.

Mac Users: there is no "End" key on most Mac keyboards. Press and hold the **"Command" key a**nd tap the **right arrow key.** Then press and hold the **Command key,** again, and tap the **down arrow key.** That should move to the last record in the table.

2. Click tab to start a new record.
3. Type the new entries below. Click tab to move to the next column.

3297	Alfred	Yelnats	5/29/2015	2.59	2/19/1953	63	Seattle	FT	$95,552
3299	Jackson	Brown	7/15/2013	4	3/16/1953	63	Portland	FT	$98,655

As you enter the data, notice that Excel tries to complete your fields based on previous common entries.

Remove duplicates

Duplicate entries may appear in tables. Why? Duplicates sometimes happen when data is entered incorrectly, by more than one person, or from more than one source. The following steps remove duplicate records in the table. In this particular table, Robert Griffin was entered twice by mistake. Delete the duplicate record by following the below steps:

1. Click anywhere in the table.
2. From the Table Tools Design tab click the **Remove Duplicates** button.

Mac Users: Click the Table tab and click the Remove Duplicates button

3. The Remove Duplicates dialog box will open.
4. If necessary, click the Select All button to deselect all columns.
5. Click **OK**to remove duplicate records from the table.

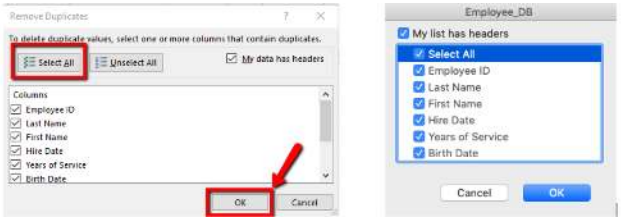


Figure 5.13 Excel for Windows and Excel for Mac Remove Duplicates Dialog Box

6. Excel notifies you that 1 duplicate record was removed.

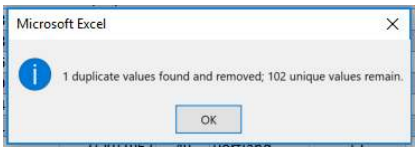


Figure 5.14 Results of Remove Duplicates

Create new columns

In this next exercise, we will explore how to add two new columns in the table. Take note, Excel automatically adds the column to the table's range and copies the format of the existing table heading to the new column heading. The first new column will use the VLOOKUP function to determine what cost of living adjustment (COLA) the employee qualifies for based on the region the employee lives in. The second column added will calculate the projected salary increase based on the COLA. When you use a formula in a table it is considered a calculated column.

A calculated column uses a single formula that adjusts for each row and automatically expands to include additional rows in that column. The formula is immediately extended to those rows. You only need to enter a formula to have it automatically filled down to create a calculated column—there's no need to use the Fill or Copy commands.

As mentioned in the previous section, Excel assigns a name to the table, and to each column header in the table. When you add formulas to an Excel table, those names can appear automatically as you enter the formula and select the cell references in the table instead of manually entering them.

As a visual reference compare the differences to a formula entered in a cell, compared to in a table:

Formula – Cell References	**Formula – Table: Excel shows field names**
=SUM(J6:K6)	=SUM([Current Salary]:[COLA])

Excel displaying table and or field names in a formula is called a structured reference. The names in structured references adjust whenever you add or remove data from the table headings. Structured references also appear when you create a formula outside of an Excel table that references table data. The references can make it easier to locate tables in a large workbook. To include structured references in your formula, use point mode method to click the cells you want to reference instead of typing their cell reference in the formula.

Complete the following steps to enter two new columns to determine each employee's COLA and their projected salaries.

1. Click cell K5, and type **COLA**. Autofit the column width.
2. Click cell L5, and type **Projected Salary Increase**. Autofit the column width.
3. Click cell K6. From the Formulas tab, choose the VLOOKUP function (it is located within the "Lookup and Reference" tool) to look up each employee's **Store** location. Matching their store location to the COLA table, located on the COLA sheet, bring over their percentage of increase listed in the second (2) column of the col_index. Note this is an EXACT match, so eliminate all **FALSE** possibilities in the Range_lookup area:

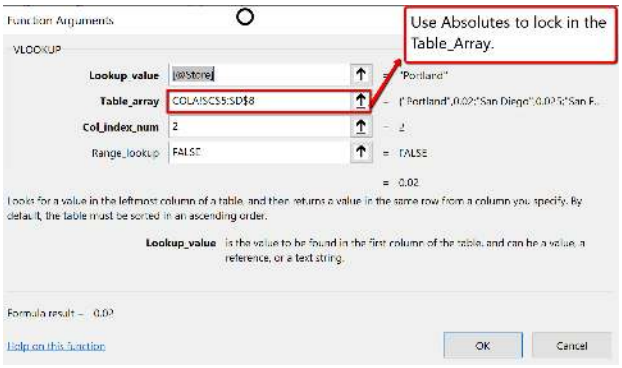


Figure 5.15 COLA VLOOKUP

Figure 5.15 COLA VLOOKUP

4. The Excel table will request you to overwrite all cells in the column with the formula. Click the icon, and choose the Overwrite command as shown below:

Mac Users: Excel for Mac will automatically fill in the rest of the cells in the column. You do not have to click the icon. Close the Formula Builder pane.

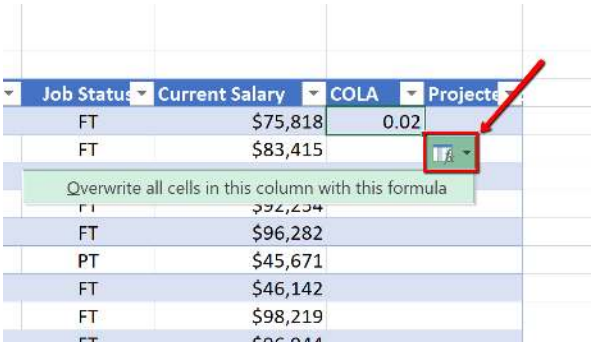


Figure 5.16 Table AutoCorrect Option

5. Using point mode method click the table cells to calculate the employees Projected Salary Increase by multiplying the Current Salary by the COLA increase:

=[@[Current Salary]]*[@COLA]

6. The Excel table will again request you to overwrite all cells in the column with the formula. Click the icon, and choose the Overwrite command.

Mac Users: You do not have to click the icon. Excel for Mac will auto-fill the rest of the cells in the column.

7. Format the COLA and Projected Salary Increase columns by selecting **K6:K107**, and applying the percentage number format, and increase the decimal to one place. Autofit the column widths. (*Suggestion*: Use the short cut selection method; click in K6, press and hold the **CTRL** and **SHIFT** and **DOWN** arrow keys to select the column data.)
8. Select **L6:L107**, and apply the Currency number format. (*Suggestion*: Use the short cut selection method; click in L6, press and hold the **CTRL** and **SHIFT** and **DOWN** arrow keys to select the column data.)
9. Select **L5.** Wrap, and right-align the text, then decrease the column width, and increase the row height to show the contents of the heading row wrapped on two lines.

WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
2006	Alberta	Lunsford	8/28/2012	3.35	12/15/1985	31	Portland	FT	$75,818	2.0%	$1,516.36
1346	Dina	Henderson	3/7/2009	8.82	2/15/1965	51	Portland	FT	$83,415	2.0%	$1,668.30
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567	2.0%	$2,051.34
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254	2.0%	$1,845.08
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
2010	Kathy	Marciano	4/24/2015	2.69	9/24/1968	48	Portland	FT	$46,142	2.0%	$922.84
3270	Leanne	Weaver	5/13/2010	7.64	6/5/1959	57	Portland	FT	$98,219	2.0%	$1,964.38
1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$96,944	2.0%	$1,938.88
3294	Nicole	Wright	10/17/2009	8.21	3/20/1967	49	Portland	FT	$111,426	2.0%	$2,228.52
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091	2.0%	$1,841.82
2022	Shannon	Merrill	3/5/2015	2.83	5/2/1958	58	Portland	FT	$93,248	2.0%	$1,864.96
3002	Stephen	Rodriguez	6/3/2010	7.58	6/16/1953	63	Portland	FT	$89,391	2.0%	$1,787.82
3286	Thomas	Wilt	4/10/2015	2.73	7/15/1982	34	Portland	FT	$77,468	2.0%	$1,549.36
1102	Vanesa	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$106,010	2.0%	$2,120.20
2026	Vernon	Merritt	3/1/2013	4.84	12/7/1977	39	Portland	FT	$101,822	2.0%	$2,036.44

EmployeeData | COLA | AdvancedFilter

Figure 5.17 Calculated Columns

Total row

A useful table tool for data analysis is the Total Row. You can quickly total data in an Excel table by enabling the **Total Row** option, and then use one of several built-in functions provided in a drop-down list, per column. The Total row, which is added to the end of the table after the last data record can calculate summary statistics, including the average, sum, minimum, and maximum of select fields within the table. The Total row is formatted with values displayed in bold, the double border line option is separating the data records from the Total row.

Apply a Total Row, and follow the below steps to sum three columns of data:

1. Click anywhere in the table and choose the Table Tools Design tab, and click on the Total Row option.

Mac Users: just click the Table tab and click on the Total Row option

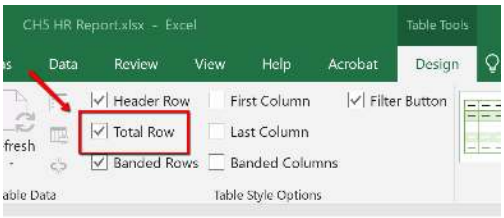


Figure 5.18 Total Row

2. Excel redirects you to the bottom of the table to view the total row, where a SUM defaulted in the Projected Salary Increase column. Click cell **J108**, select choose the Total Row menu arrow. Choose **SUM** to total the Current Salary column.

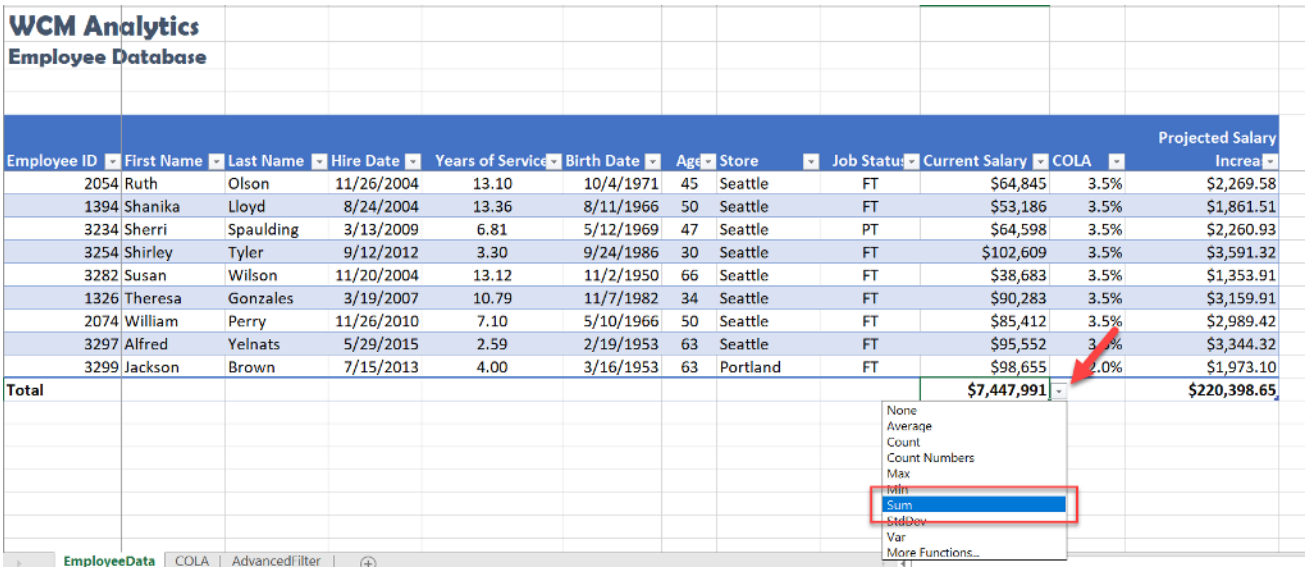


Figure 5.19 Total Row, Current Salary Column, Sum Function

3. Click cell **K108**, from the total row menu select Average. The average COLA increase will display.

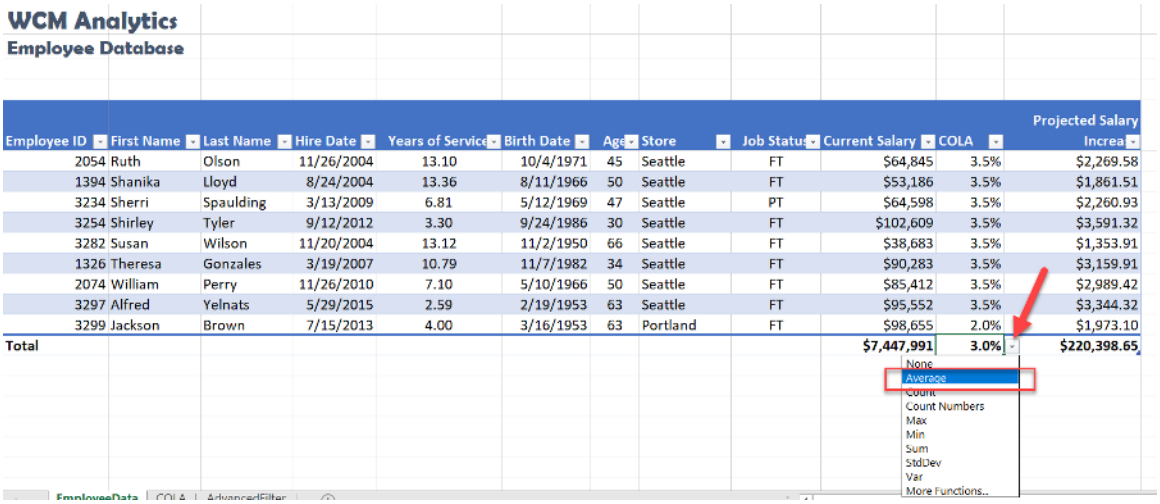


Figure 5.20 Total Row, COLA Column, Average Function

Center across selection

Follow the below steps to center the title in cell A1:L2 using the Center Across Selection tool located in the Format Cells dialog box. In prior chapters, we used the 'Merge & Center' button to center text across a range. The Merge & Center tool centers the title but removes access to individual cells. This restriction can present a problem when trying to autofit column widths in a table. The Center Across Selection format centers text across multiple cells but does not merge the selected cell range into one cell making it a better formatting choice when working with tables.

1. Select cell **A1:L2,** and right-click to access the short cut menu.

   Mac Users: hold down **CTRL key** and click the selected cells to access the short cut menu

2. Choose Format Cells.
3. In the Format Cells dialogue box, choose the Alignment tab.
4. From the Horizontal alignment menu, choose **Center Across Selection**. Click **OK** to return to the table.

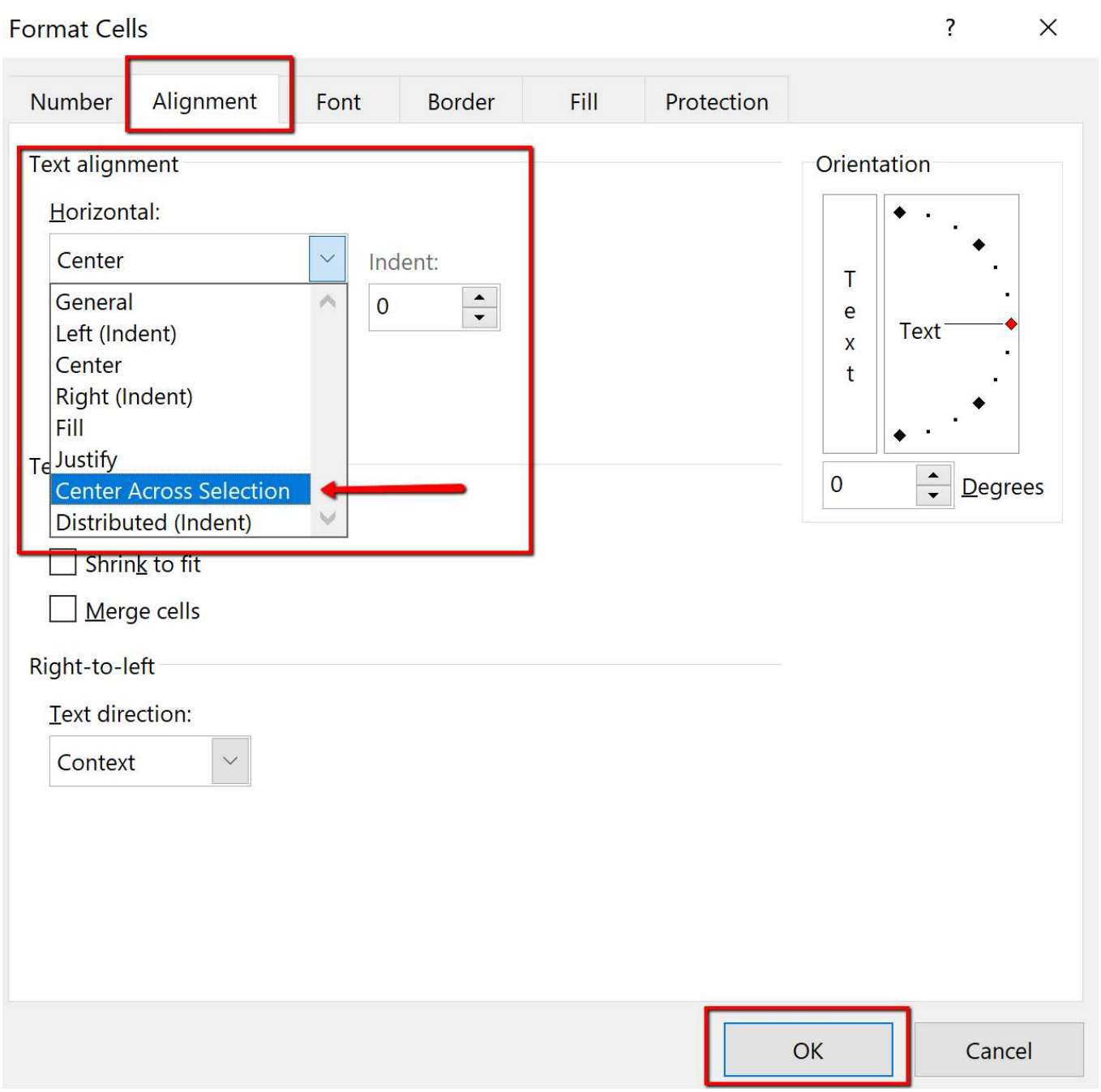


Figure 5.21 Format Cells Dialogue Box

	A	B	C	D	E	F	G	H	I	J	K	L
1					WCM Analytics							
2					Employee Database							
3												
4												
5	Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
6	2006	Alberta	Lunsford	8/28/2012	3.35	12/15/1985	31	Portland	FT	$75,818	2.0%	$1,516.36
7	1346	Dina	Henderson	3/7/2009	8.82	2/15/1965	51	Portland	FT	$83,415	2.0%	$1,668.30
8	1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567	2.0%	$2,051.34
9	1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254	2.0%	$1,845.08
10	2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64
11	1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
12	2010	Kathy	Marciano	4/24/2015	2.69	9/24/1968	48	Portland	FT	$46,142	2.0%	$922.84
13	3270	Leanne	Weaver	5/13/2010	7.64	6/5/1959	57	Portland	FT	$98,219	2.0%	$1,964.38
14	1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$96,944	2.0%	$1,938.88
15	3294	Nicole	Wright	10/17/2009	8.21	3/20/1967	49	Portland	FT	$111,426	2.0%	$2,228.52
16	1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72
17	1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091	2.0%	$1,841.82
18	2022	Shannon	Merrill	3/5/2015	2.83	5/2/1958	58	Portland	FT	$93,248	2.0%	$1,864.96
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20	3286	Thomas	Wilt	4/10/2015	2.73	7/15/1982	34	Portland	FT	$77,468	2.0%	$1,549.36
21	1102	Vanesa	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$106,010	2.0%	$2,120.20

Figure 5.22 Center Across Selection

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6.3: Intermediate Table Skills

This page is a draft and is under active development.

Learning Objectives

- Sort table data.
- Custom Sort table data.
- Apply Custom List sort options.
- Filter table data using criteria filters.
- Use the Advanced Filter option to filter table data.
- Analyze data with PivotTables & Subtotals.

INTERMEDIATE TABLE SKILLS

SORT, FILTER, AND ANALYZE DATA WITH PIVOT TABLES & SUBTOTALS

SORTING

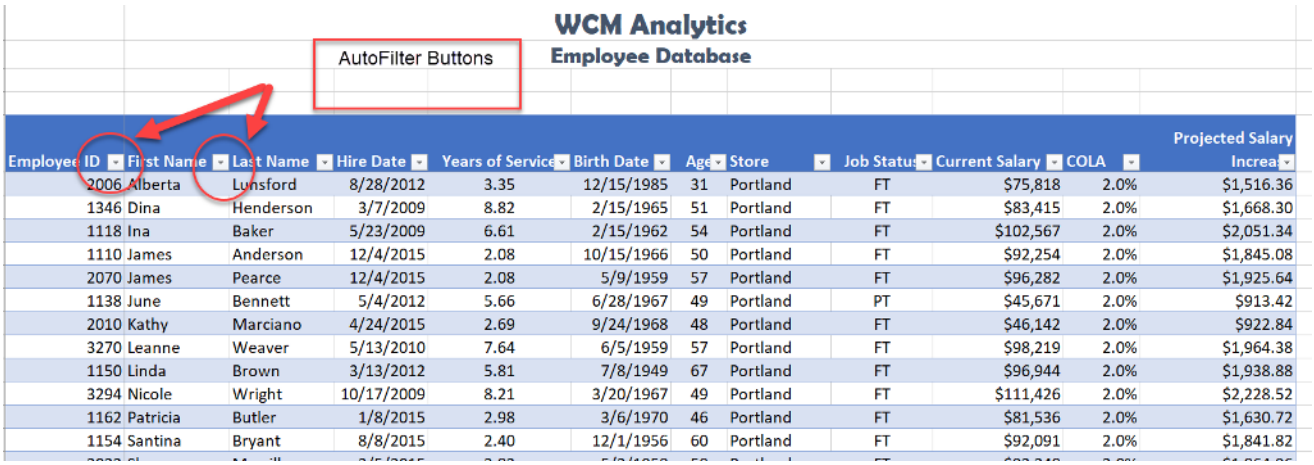
Sorting is one of the most common tools for data management. By arranging data sequentially the information becomes more meaningful. Arranging records in a specific sequence is called sorting. If you sort by one column this is considered a single sort. If you need to sort by more than one column, this is considered a custom sort.

The field or fields you select to sort are called sort keys. In Excel, you can sort your table by ascending or descending order. Data in ascending order appears lowest to highest, earliest to most recent, or alphabetically from A to Z. Data in descending order in arranged by highest to lowest, most recent to earliest, or alphabetically from Z to A.

Excel will sort a range of data that is not in a table. However, when working with large sets of information it is wise to make the data a table for integrity. Excel locks the row of information creating a record, thus when sorted, the record remains intact, just reorganized. For example, when you sort the table by last name, all of the records in each row move together. It is always a good idea to save a copy of your worksheet before applying sorts.

There are multiple places you can find and use sorting tools:

- When you first create a table, Excel automatically enables AutoFilter buttons; a tool used to sort, query, and filter the records in a table. The filter buttons appear to the right of the column headings. When you click the filter button sorting options appear on the menu options.



Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
2006	Alberta	Lunsford	8/28/2012	3.35	12/15/1985	31	Portland	FT	$75,818	2.0%	$1,516.36
1346	Dina	Henderson	3/7/2009	8.82	2/15/1965	51	Portland	FT	$83,415	2.0%	$1,668.30
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567	2.0%	$2,051.34
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254	2.0%	$1,845.08
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
2010	Kathy	Marciano	4/24/2015	2.69	9/24/1968	48	Portland	FT	$46,142	2.0%	$922.84
3270	Leanne	Weaver	5/13/2010	7.64	6/5/1959	57	Portland	FT	$98,219	2.0%	$1,964.38
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3294	Nicole	Wright	10/17/2009	8.21	3/20/1967	49	Portland	FT	$111,426	2.0%	$2,228.52
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091	2.0%	$1,841.82

Figure 5.23 AutoFilter Buttons

- From the Home tab, in the Editing group, click the 'Sort & Filter' button, and then click one of the sorting options on the Sort & Filter menu.

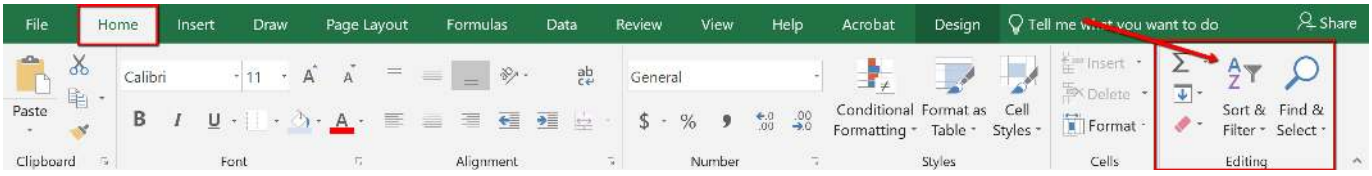


Figure 5.24 Sort and Filter Menu

- From the Data tab, use the 'Sort A to Z' or 'Sort Z to A' buttons or for multiple levels select the Sort button to open the Custom Sort dialogue.

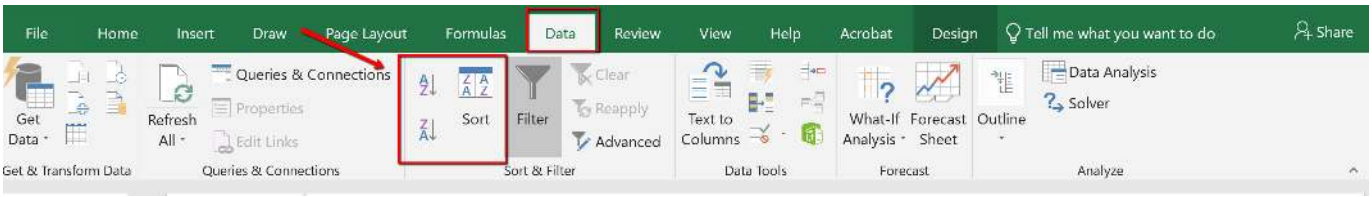


Figure 5.25 Data Tab Sort options

- Right-click anywhere in a table and then point to Sort on the shortcut menu to display the Sort sub-menu.

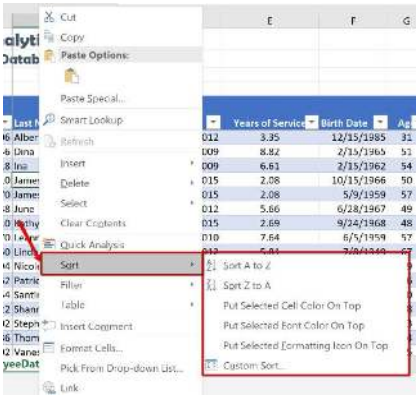


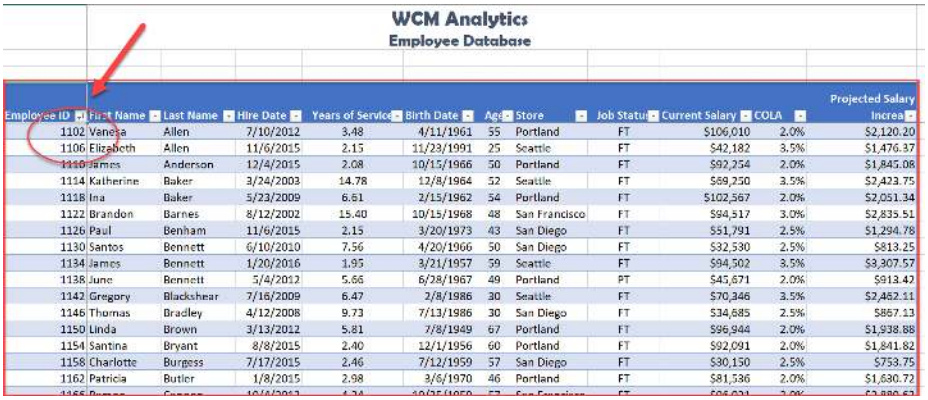
Figure 5.26 Right-Click Menu

Complete a single level sort by following the steps:

1. In the EmployeeID heading, click the filter button.
2. Choose to Sort Smallest to Largest.

Mac Users: Click the A-Z Ascending button 

Notice Excel arranges in chronological order all the employee data based on the EmployeeID number, however keeping each record together. You will also notice the filter button now displays an up arrow denoting an ascending sort.



WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
1102	Vaneta	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$106,010	2.0%	$2,120.20
1106	Elizabeth	Allen	11/6/2015	2.15	11/23/1991	25	Seattle	FT	$42,182	3.5%	$1,476.37
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254	2.0%	$1,845.08
1114	Katherine	Baker	3/24/2003	14.78	12/8/1964	52	Seattle	FT	$69,250	3.5%	$2,423.75
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567	2.0%	$2,051.34
1122	Brandon	Barnes	8/12/2002	15.40	10/15/1968	48	San Francisco	FT	$84,517	3.0%	$2,835.51
1126	Paul	Benham	11/6/2015	2.15	3/20/1973	43	San Diego	FT	$51,791	2.5%	$1,294.78
1130	Santos	Bennett	6/10/2010	7.56	4/20/1966	50	San Diego	FT	$32,530	2.5%	$813.25
1134	James	Bennett	1/20/2016	1.95	3/21/1957	59	Seattle	FT	$94,502	3.5%	$3,307.57
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
1142	Gregory	Blackshear	7/16/2009	6.47	2/8/1986	30	Seattle	FT	$70,346	3.5%	$2,462.11
1146	Thomas	Bradley	4/12/2008	9.73	7/13/1986	30	San Diego	FT	$34,685	2.5%	$867.13
1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$96,944	2.0%	$1,938.88
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091	2.0%	$1,841.82
1158	Charlotte	Burgess	7/17/2015	2.46	7/12/1959	57	San Diego	FT	$30,150	2.5%	$753.75
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72

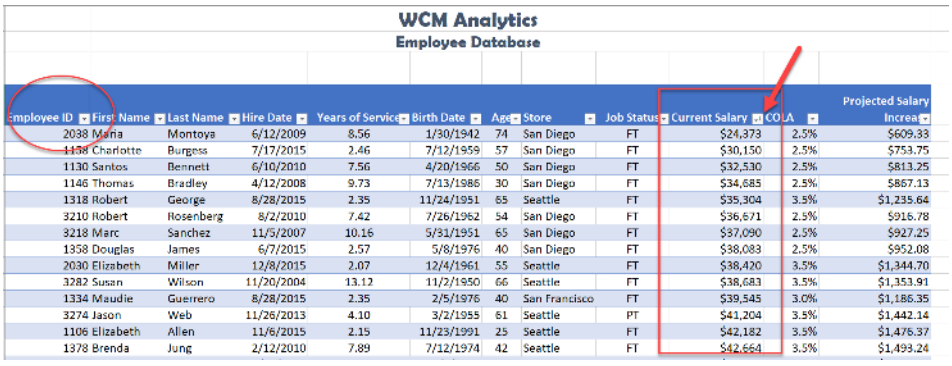
Figure 5.27 EmployeeID Sort

The following steps will sort the records in descending order by Current Salary using the 'Sort Largest to Smallest' option form the filter button.

1. Click the filter button located in the Current Salary heading.
2. Choose Sort Largest to Smallest option from the menu.

Mac Users: click the "**Descending**" button

Notice the original sort has been overridden, and the information is now organized based on the largest Current Salary. You will see the small arrow on the EmployeeID filter is gone, and an arrow pointing down for Descending Order is visible on the Current Salary filter button.



WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
2038	Maria	Montoya	6/12/2009	8.56	1/30/1942	74	San Diego	FT	$24,373	2.5%	$609.33
1158	Charlotte	Burgess	7/17/2015	2.46	7/12/1959	57	San Diego	FT	$30,150	2.5%	$753.75
1130	Santos	Bennett	6/10/2010	7.56	4/20/1966	50	San Diego	FT	$32,530	2.5%	$813.25
1146	Thomas	Bradley	4/12/2008	9.73	7/13/1986	30	San Diego	FT	$34,685	2.5%	$867.13
1318	Robert	George	8/28/2015	2.35	11/24/1951	65	Seattle	FT	$35,304	3.5%	$1,235.64
3210	Robert	Rosenberg	8/2/2010	7.42	7/26/1962	54	San Diego	FT	$36,671	2.5%	$916.78
3218	Marc	Sanchez	11/5/2007	10.16	5/31/1951	65	San Diego	FT	$37,090	2.5%	$927.25
1358	Douglas	James	6/7/2015	2.57	5/8/1976	40	San Diego	FT	$38,083	2.5%	$952.08
2030	Elizabeth	Miller	12/8/2015	2.07	12/4/1961	55	Seattle	FT	$38,420	3.5%	$1,344.70
3282	Susan	Wilson	11/20/2004	13.12	11/2/1950	66	Seattle	FT	$38,683	3.5%	$1,353.91
1334	Maudie	Guerrero	8/28/2015	2.35	2/5/1976	40	San Francisco	FT	$39,545	3.0%	$1,186.35
3274	Jason	Web	11/26/2013	4.10	3/2/1955	61	Seattle	PT	$41,204	3.5%	$1,442.14
1106	Elizabeth	Allen	11/6/2015	2.15	11/23/1991	25	Seattle	FT	$42,182	3.5%	$1,476.37
1378	Brenda	Jung	2/12/2010	7.89	7/12/1974	42	Seattle	FT	$42,664	3.5%	$1,493.24

Figure 5.28 Current Salary Sort

Skill Refresher

Sort a Column

1. Click on the filter Click arrow to the right of the header in the column you want to sort.
2. Click on the choice AZ↑ or ZA↓ to sort your data by that column.

CUSTOM SORT

When you need to sort by more than one level, you must use the Custom Sort option. Complete the following steps to organize the data by Store, Last Name, Current Salary, all in Ascending Order (A-Z).

1. Select the Data tab, and click the Sort button. Notice the last column sorted by is listed. Change the column heading name by dropping down the **Sort by** menu and select **Store**.
2. Click Add Level.

Mac Users: click the + symbol 

3. Click the down arrow in the **Then by** section, and choose the column heading names **as shown below in Figure 5.29**. Note to click Add Level to add the next column heading. The order you select the headings will determine how the table information is sorted.

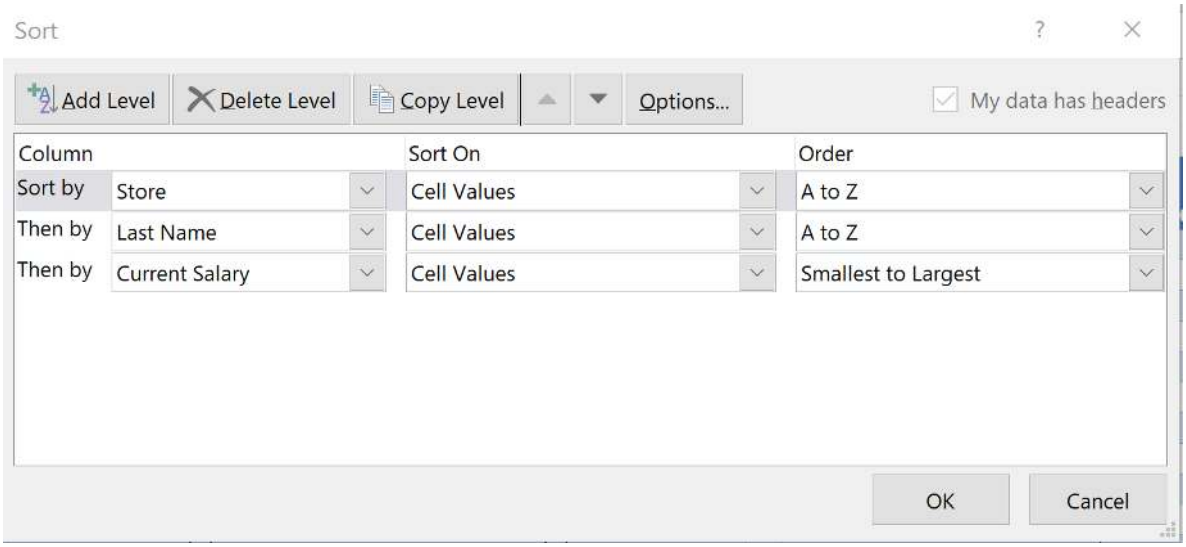


Figure 5.29 Sort Dialogue Box

4. Once you select to Sort by column headings, choose the Order by selecting to sort in ascending order (A-Z) for the Store and Last name fields, and Smallest to Largest, for the Current Salary field.
5. Click OK.

Notice the information is now sorted by three levels, per **Store** , each employee is organized by **Last Name** , and **Current Salary** in ascending order (smallest to largest). Each of the filter buttons indicates the sort with the up arrow.

WCM Analytics
Employee Database

Per store, employees are organized by Last Name, and Current Salary.

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increase
1102	Vanesa	Allen	7/10/2012	3.48	4/11/1961	55	Portland	FT	$106,010	2.0%	$2,120.20
1110	James	Anderson	12/4/2015	2.08	10/15/1966	50	Portland	FT	$92,254	2.0%	$1,845.08
1118	Ina	Baker	5/23/2009	6.61	2/15/1962	54	Portland	FT	$102,567	2.0%	$2,051.34
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
1150	Linda	Brown	3/13/2012	5.81	7/8/1949	67	Portland	FT	$96,944	2.0%	$1,938.88
3299	Jackson	Brown	7/15/2013	4.00	3/16/1953	63	Portland	FT	$98,655	2.0%	$1,973.10
1154	Santina	Bryant	8/8/2015	2.40	12/1/1956	60	Portland	FT	$92,091	2.0%	$1,841.82
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72
1346	Dina	Henderson	3/7/2009	8.82	2/15/1965	51	Portland	FT	$83,415	2.0%	$1,668.30
2006	Alberta	Lunsford	8/28/2012	3.35	12/15/1985	31	Portland	FT	$75,818	2.0%	$1,516.36
2010	Kathy	Marciano	4/24/2015	2.69	9/24/1968	48	Portland	FT	$46,142	2.0%	$922.84
2022	Shannon	Merrill	3/5/2015	2.83	5/2/1958	58	Portland	FT	$93,248	2.0%	$1,864.96
2026	Vernon	Merritt	3/1/2013	4.84	12/7/1977	39	Portland	FT	$101,822	2.0%	$2,036.44
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64
3002	Stephen	Rodriguez	6/3/2010	7.58	6/16/1953	63	Portland	FT	$89,391	2.0%	$1,787.82

EmployeeData | COLA | AdvancedFilter

Figure 5.30 Custom Sort Visual

Skill Refresher

Custom Sort (Multiple Level Sort)

1. Select the Data tab, and click the Sort button.
2. Choose Add Level.
3. Click the down arrow in the Column field and choose the column heading to sort by.
4. Repeat the above steps to add another level and select the next column heading to sort by.
5. The order you select the headings will determine how the table information is sorted.

CUSTOM LIST SORT

When sorting you can create custom lists that allow sorting by characteristics that do not sort alphabetically. Example, text items such as high, medium, and low—or S, M, L, XL. Dates commonly require custom lists so you can vary in the way data is sorted by days of the

week or months of the year.

In our case, we want to create a custom list that sorts our stores, which is not, in ascending or descending order. The human resources office likes to order the stores based on the location size. The company headquarters is in Seattle and employs the most people. The next biggest location is San Diego etc. Follow the below steps to create a custom list ordering the stores as shown below:

Seattle

San Diego

Portland

San Francisco

Mac Users: The steps to create a **custom sort list are different for Excel for Mac. Please skip the below steps and follow the alternate steps below Figure 5.34.**

Follow the below steps to create a custom list ordering:

1. While clicked in the table, choose the Data tab and click the **Sort** button.
2. In the Sort by row, click the drop-down menu in the Order Column for the **Store** heading. Choose **Custom List**.

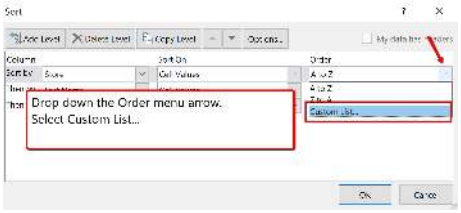


Figure 5.31 Custom List Dialogue Box

3. Click in the **List entries:** box and type **Seattle**, and press enter. Type the remainder of the locations shown in Figure 5.32, pressing enter after each store location typed. Once all locations are entered, click **Add**. Then choose **Ok**.

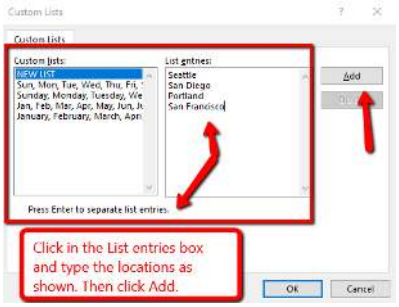


Figure 5.32 Custom List Entries dialogue box

4. You will see the Order of the Store sort update. Click **OK** to close the Sort dialogue box.

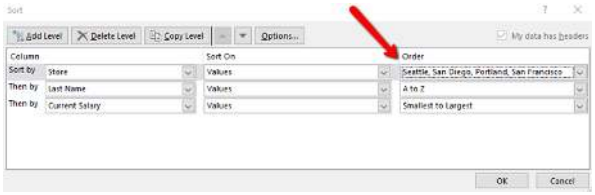


Figure 5.33 Sort_Dialogue Box Custom List Order

The custom sort is applied and the table is now sorted by Store, using the custom order, then the Last Name of the employee and then by the Current Salary column.

WCM Analytics

Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
1106	Elizabeth	Allen	11/6/2015	2.15	11/23/1991	25	Seattle	FT	$42,182	3.5%	$1,476.37
1114	Katherine	Baker	3/24/2003	14.78	12/8/1964	52	Seattle	FT	$69,250	3.5%	$2,423.75
1134	James	Bennett	1/20/2016	1.95	3/21/1957	59	Seattle	FT	$94,502	3.5%	$3,307.57
1142	Gregory	Blackshear	7/16/2009	6.47	2/8/1986	30	Seattle	FT	$70,346	3.5%	$2,462.11
1174	Jason	Chavez	8/7/2012	3.40	10/28/1956	60	Seattle	FT	$76,947	3.5%	$2,693.15
1178	Eva	Cook	5/29/2015	2.59	8/21/1950	66	Seattle	FT	$96,449	3.5%	$3,375.72
1190	Carla	Davis	1/8/2004	13.99	12/23/1991	25	Seattle	FT	$94,346	3.5%	$3,302.11
1186	Michael	Davis	1/1/2016	2.00	6/10/1966	50	Seattle	FT	$96,960	3.5%	$3,393.60
1194	Larry	Diaz	4/20/2007	10.71	6/30/1956	60	Seattle	FT	$94,441	3.5%	$3,305.44
1198	Robert	Dunton	6/15/2007	10.55	9/29/1950	66	Seattle	FT	$90,338	3.5%	$3,161.83
1302	Martin	Elamin	6/15/2012	5.55	7/31/1963	53	Seattle	PT	$49,890	3.5%	$1,746.15
1306	Erin	Erwin	7/10/2015	2.48	5/5/1960	56	Seattle	FT	$68,681	3.5%	$2,403.84
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
1314	Bobbi	Floyd	10/16/2015	2.21	7/15/1984	32	Seattle	FT	$92,221	3.5%	$3,227.74

Figure 5.34 Custom List Sort Visual

Mac Users alternate steps for creating a custom sort list:

1. Click the **Excel** menu option and choose **Preferences**
2. Click on the **Custom List** button
3. Type the list of cities in the "List entries" box as shown in **Figure 5.32 above** then click the **Add** button and close the Custom List dialog box
4. Click anywhere in the table, and then click the **Data tab** and click the **Sort** button
5. Click the drop-down menu in the **Order** Column for the **Store** heading. Choose **Custom List**
6. Click on the custom list of cities that you just created and then click the **OK button twice**
7. The custom sort is applied and the table is now sorted by Store, using the custom order, then the Last Name of the employee and then by the Current Salary column. See **Figure 5.34 above.**

Skill Refresher

Custom List Sort

1. Select the Data tab, and click the Sort button.
2. Click the drop-down menu in the Order Column of the field needing a custom list created.
3. Choose Custom List.
4. Click in the List entries box and type the custom list desired.
5. Then click Add.
6. Click Ok.

FILTER DATA

If your worksheet contains a lot of data, it can be difficult to find information quickly. Applying **Filters** is an efficient and effective way to only show the information needed. Typically when filtering you are searching the data for specific information. Generally speaking, you are searching the data based on a question, or in other words, querying the data, and returning only the information that satisfies the question. The process of filtering records based on one or more filter criteria is called a query. Filtering data hides the rows whose values do not match the search criteria. The information that does not display is not deleted, it is just hidden, and will be redisplayed by removing the filter or applying a new filter.

Like sorting, Filter options are located in the filter button alongside each field name. By clicking the filter button, you can choose which values in that field to display, hiding the rows or records that do not match that value. The filter lets you choose to display only those records that meet specified criteria such as color, number, or text. In this situation, criteria is defined as; a logical rule by which data is tested and chosen.

For example, you can filter the table to display a specific name or item by typing it in a Search box. The name you selected acts as the criterion for filtering the table, which results in Excel displaying only those records that match the criterion. The selected checkboxes indicate which items will appear in the table. By default, all of the items are selected. If you deselect an item from the filter menu, it is removed from the filter criterion. Excel will not display any record that contains the unchecked item. As with the previous sort techniques, you can include more than one column when you filter by clicking a second filter button and making choices. After you filter data, you can copy, find, edit, format, chart, or print the filtered data without rearranging or moving it.

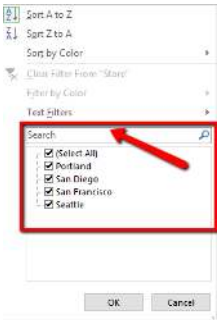


Figure 5.35 Filter Search Menu

Complete the following steps and filter data according to each query.

How many employees are at a Part-Time (PT) status?

1. Click the filter button on the **Job Status** column heading.

2. Click **Select All**, to deselect options.
3. Click the **PT** box to only display the part-time employees.
4. From the total row, in cell **I108**, choose the **Count function** count the number of employees at a PT status.

The answer to the question is there are currently are 11 employees at a PT time status. The total row will display the part-time total current salaries, and what the projected salary increase for part-time help will be after COLA adjustments.

WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increas
2034	Billy	Miller	8/11/2009	6.39	1/10/1959	57	Seattle	PT	$53,582	3.5%	$1,875.37
3234	Sherri	Spaulding	3/13/2009	6.81	5/12/1969	47	Seattle	PT	$64,598	3.5%	$2,260.93
3274	Jason	Web	11/26/2013	4.10	3/2/1955	61	Seattle	PT	$41,204	3.5%	$1,442.14
1330	Robert	Griffin	3/11/2010	7.81	3/3/1958	58	San Diego	PT	$45,657	2.5%	$1,141.43
3222	Mary	Smith	7/17/2015	2.46	10/15/1984	32	San Diego	PT	$51,639	2.5%	$1,290.98
1138	June	Bennett	5/4/2012	5.66	6/28/1967	49	Portland	PT	$45,671	2.0%	$913.42
2090	James	Price	11/27/2012	3.10	6/8/1952	64	San Francisco	PT	$64,826	3.0%	$1,944.78
3278	Jeffery	Whiting	8/25/2004	13.36	5/13/1964	52	San Francisco	PT	$65,978	3.0%	$1,979.34
3280	Jennifer	Wiliams	9/6/2008	9.32	6/26/1967	49	San Francisco	PT	$96,354	3.0%	$2,890.62
Total								**11**	**$628,997**	**3.0%**	**$19,221.08**

Figure 5.36 PT Filter Visual

USING CRITERIA FILTERS

The filters created are limited to selecting records for fields matching a specific value or set of values. For more general criteria, you can use criteria filters, which are expression involving dates and times, numeric values, and text strings. Excel will identify what criteria filter to display based on the information in the column. For example, you can filter the employee data to show only those employees hired within a specific date range. Notice the criteria filter changes to **Date Filters.** If we were looking at the Current Salary column, the filter would be a Numbers Filter.

Using criteria filters, follow the below steps to search for employees who have been with the company for a specific time period.

Identify employees who have been with the company between 2013-2016.

1. While clicked in the table, clear any sort or filter applied by clicking the Data tab. In the Sort & Filter group choose the **Clear** button. 
2. Click the Filter button in the **Hire Date** column. Select Date Filters, and choose the Between criteria.

Mac Users: uncheck the **Select All** checkbox **before** choosing the **Between** option.

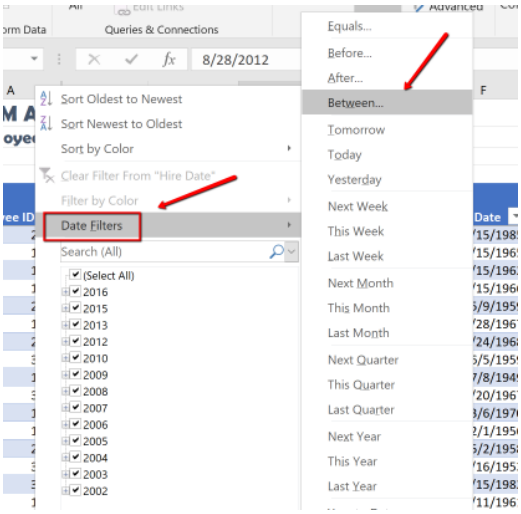


Figure 5.37 Date Filter Menu

3. Search for employees with a hire date between 2013, and 2016. In the "**is after or equal to"** section type **1/01/2013**, and typing in the "**is before or equal to"** section type **12/31/2016**. Then click **OK**.

Mac Users: Excel for Mac sections simply say "**After"** and **"Before"**



Figure 5.38 Date Filter Between Dialogue Box

4. Sort the filtered table from **Oldest to Newest** by Date Hired.
5. In the total row section, count the last name names of the employees by applying the count function in cell B108.
6. In the total row, select cell **I108**, and choose **None** to turn off the count function in the Job Status Column.

Notice the table total row show 47 employees hired between the specified dates. These employees will be evaluated for a COLA adjustment.

Notice the filter button displays a filter symbol and an up arrow indicating the column is filtered and sorted in ascending order.

WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64
2030	Elizabeth	Miller	12/8/2015	2.07	12/4/1961	55	Seattle	FT	$38,420	3.5%	$1,344.70
2046	Michael	Morgan	12/18/2015	2.04	1/6/1968	48	San Francisco	FT	$71,020	3.0%	$2,130.60
1186	Michael	Davis	1/1/2016	2.00	6/10/1966	50	Seattle	FT	$96,960	3.5%	$3,393.60
1134	James	Bennett	1/20/2016	1.95	3/21/1957	59	Seattle	FT	$94,502	3.5%	$3,307.57
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
1362	John	Jenkins	1/22/2016	1.94	4/2/1991	25	San Francisco	FT	$54,945	3.0%	$1,648.35
3206	Larry	Roeder	1/29/2016	1.92	11/1/1982	34	Seattle	FT	$54,368	3.5%	$1,902.88
1354	Edwin	Jackson	3/12/2016	1.81	3/20/1979	37	San Diego	FT	$53,826	2.5%	$1,345.65
2094	Robert	Ramos	4/19/2016	1.70	4/11/1962	54	Seattle	FT	$76,677	3.5%	$2,683.70
Total			**47**						**$3,569,059**	**3.0%**	**$106,540.55**

Figure 5.39 Date Filter and Sort

SLICERS

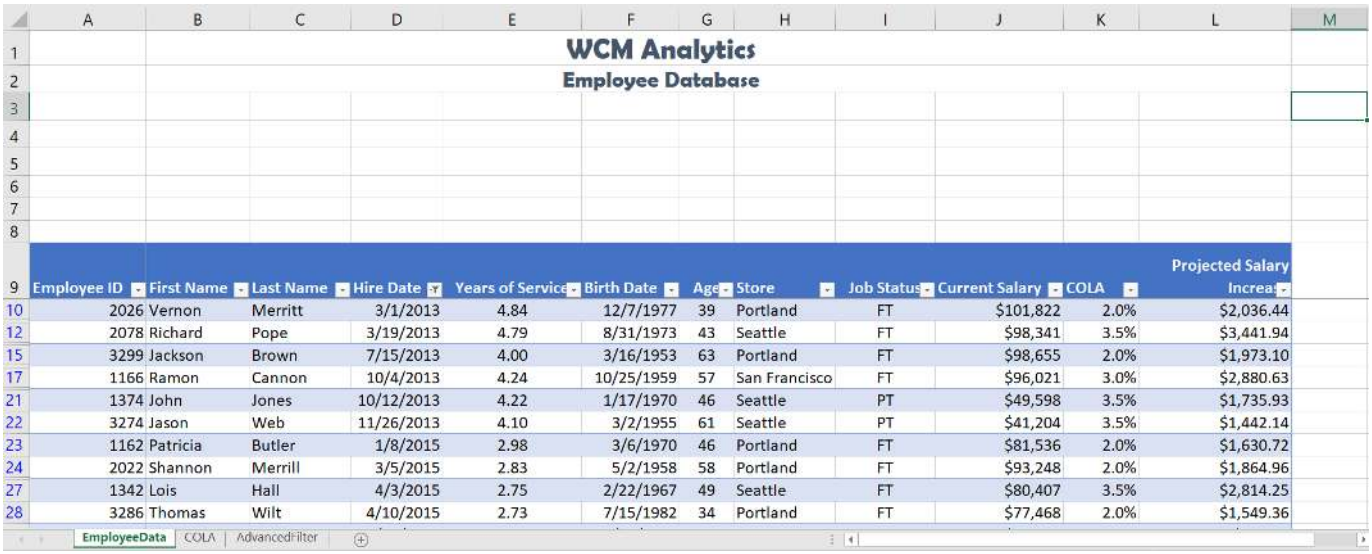
Another way to filter an Excel table is with slicers. Slicers, generally speaking, are visual filter buttons you can click to filter the table data. Slicers show the current filtered category, which makes it easy to understand what exactly is displayed. For example, a slicer for the Store field would have buttons for the Seattle, San Diego, Portland, and San Francisco locations.

When slicer buttons are selected, the data is filtered to show only those records that match the criteria. Multiple buttons can be selected at the same time, and a table can have multiple slicers, each linked to a different field. When multiple slicers are used, Excel uses the AND logical operator so filtered records must meet all of the criteria indicated in the slicer. When selecting multiple buttons in a Slicer, use the shift key to select adjacent field names. If the field names are not adjacent, use the non-adjacent selection method, pressing the CTL button, and selecting the field names needed.

Follow the below steps to filter the table using visual Slicer buttons.

1. Click in the table area. From the Data tab, choose **Clear** to remove the current sort and filter applied to the data.
2. To make room for the **Slicer** buttons at the top of the table, we will add 4 rows between the title and the table area. Right-click cell A3. Choose Insert. Select **Entire Row**. Repeat these steps until the table heading starts in row **A9**.

Mac users should hold down **CTRL key** and click cell A3. Then repeat until the table heading starts in row **A9.**



WCM Analytics
Employee Database

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
2026	Vernon	Merritt	3/1/2013	4.84	12/7/1977	39	Portland	FT	$101,822	2.0%	$2,036.44
2078	Richard	Pope	3/19/2013	4.79	8/31/1973	43	Seattle	FT	$98,341	3.5%	$3,441.94
3299	Jackson	Brown	7/15/2013	4.00	3/16/1953	63	Portland	FT	$98,655	2.0%	$1,973.10
1166	Ramon	Cannon	10/4/2013	4.24	10/25/1959	57	San Francisco	FT	$96,021	3.0%	$2,880.63
1374	John	Jones	10/12/2013	4.22	1/17/1970	46	Seattle	PT	$49,598	3.5%	$1,735.93
3274	Jason	Web	11/26/2013	4.10	3/2/1955	61	Seattle	PT	$41,204	3.5%	$1,442.14
1162	Patricia	Butler	1/8/2015	2.98	3/6/1970	46	Portland	FT	$81,536	2.0%	$1,630.72
2022	Shannon	Merrill	3/5/2015	2.83	5/2/1958	58	Portland	FT	$93,248	2.0%	$1,864.96
1342	Lois	Hall	4/3/2015	2.75	2/22/1967	49	Seattle	FT	$80,407	3.5%	$2,814.25
3286	Thomas	Wilt	4/10/2015	2.73	7/15/1982	34	Portland	FT	$77,468	2.0%	$1,549.36

Figure 5.40 Added Rows

3. Click back into the table area. Choose the **Insert** tab. Click **Slicer**. When the Insert Slicers dialogue box opens, click the **Store** and **Job Status** field names to display as slicers. Click **OK**.

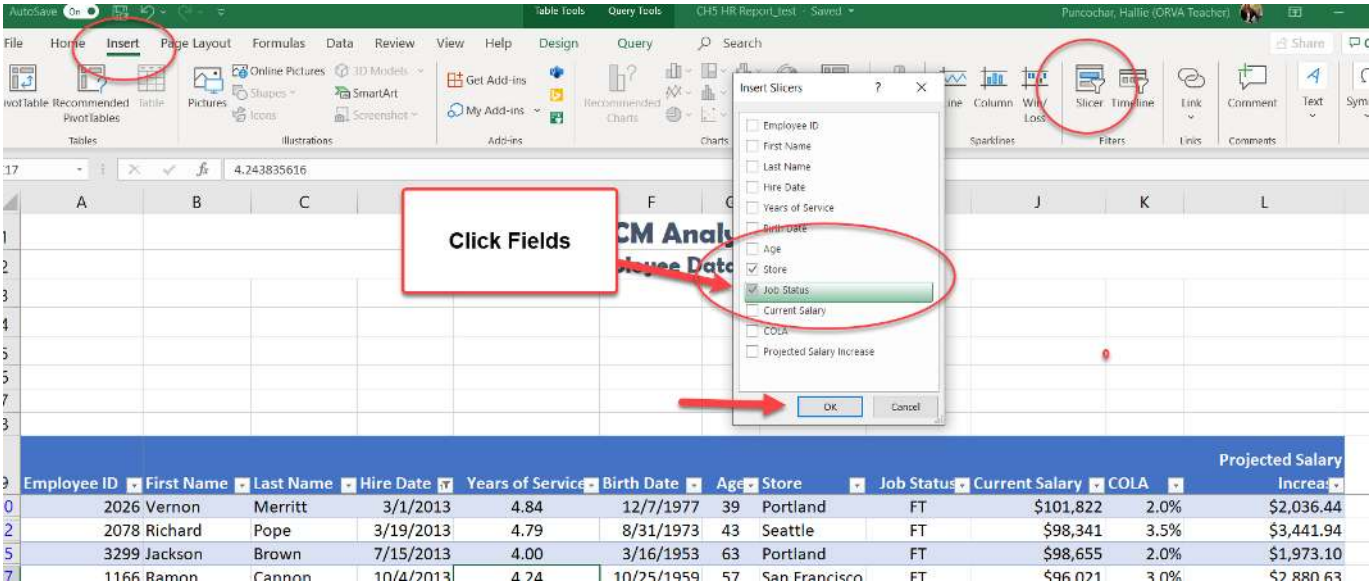


Figure 5.41 Slicer Dialogue Box

4. Move, and re-size the Slicer boxes to fit in the **approximate** area of **I1:J8** and **K1:L8**. Make sure the buttons remain visible. Below is a visual example.

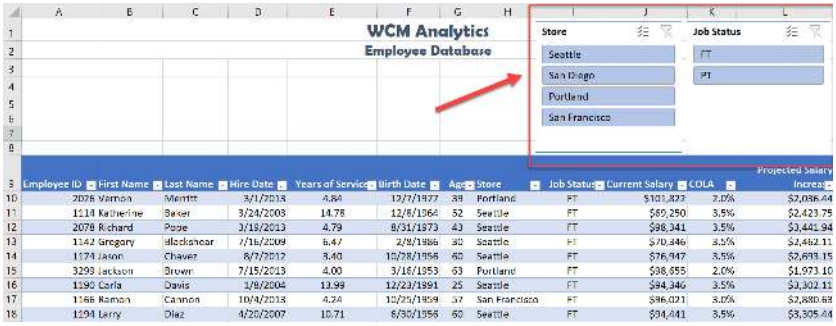
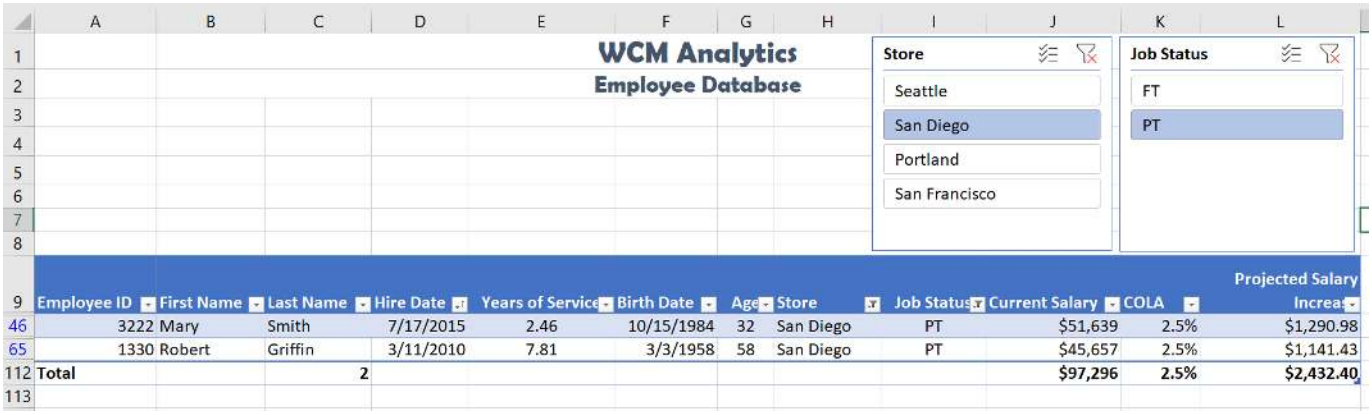


Figure 5.42 Slicer Layout Example

5. From the **Store** slicer, click the **San Diego** button. Notice the data filters to only show the data for San Diego.
6. From the **Job Status** slicer click **PT**. Notice the data filters to only show the data for PT employees in San Diego.



Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
3222	Mary	Smith	7/17/2015	2.46	10/15/1984	32	San Diego	PT	$51,639	2.5%	$1,290.98
1330	Robert	Griffin	3/11/2010	7.81	3/3/1958	58	San Diego	PT	$45,657	2.5%	$1,141.43
Total		2							$97,296	2.5%	$2,432.40

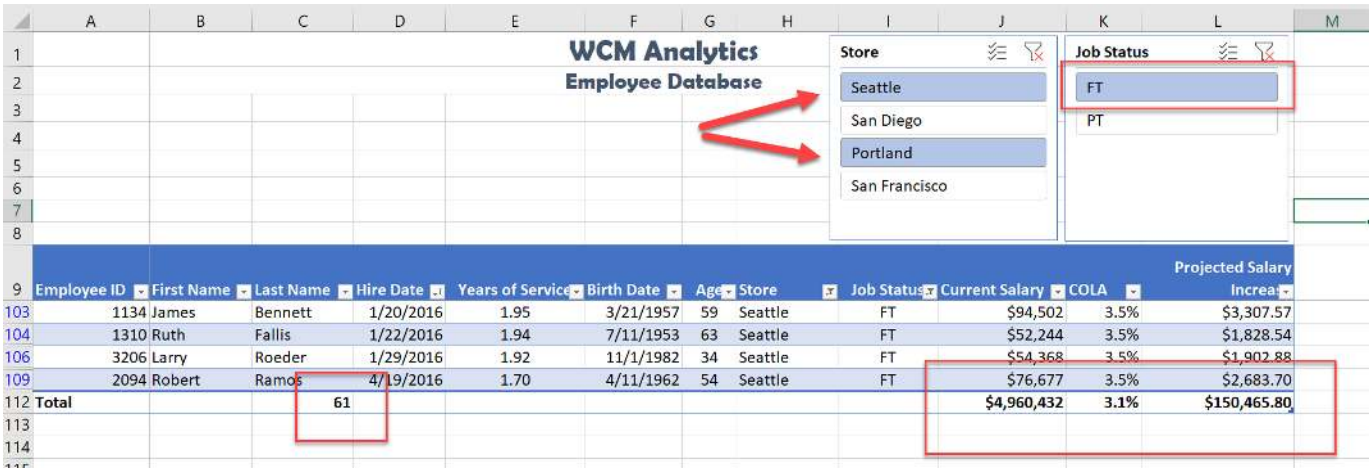
Figure 5.43 Slicer Solution

7. Return to the Store slicer and choose **Seattle** and **Portland**. Note the non-adjacent selection method is needed. Select Seattle first, then press and hold the Ctrl button on the keyboard, and then select **Portland**.

Mac Users: hold down the Command key not the Ctrl key before you click on Portland.

8. Change the Job Status slicer selection to **FT**.

The table results show there are **61** FT employees in Seattle and Portland. The Projected Salary Increase after the COLA adjustment for the Northwest region is $150,465.80.



Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increa
1134	James	Bennett	1/20/2016	1.95	3/21/1957	59	Seattle	FT	$94,502	3.5%	$3,307.57
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
3206	Larry	Roeder	1/29/2016	1.92	11/1/1982	34	Seattle	FT	$54,368	3.5%	$1,902.88
2094	Robert	Ramos	4/19/2016	1.70	4/11/1962	54	Seattle	FT	$76,677	3.5%	$2,683.70
Total		61							$4,960,432	3.1%	$150,465.80

Figure 5.44 Non-Adjacent Slicer Solution

ADVANCED FILTERS

Filter buttons are limited to combining fields using advanced logic or complex criteria. If the data you want to filter requires complex criteria, you can use the **Advanced Filter** dialog box. The Advanced Filter works differently from the **Filter** command in several important ways:

- It displays the **Advanced Filter** dialog box instead of the AutoFilter menu.
- You type the advanced criteria in a separate criteria range in a worksheet and above the range of cells or table that you want to filter. Excel uses the separate criteria range in the **Advanced Filter** dialog box as the source for the advanced criteria.

For example, you searched records for employees in the Seattle and San Diego offices AND for employees working at full-time bases, AND have a base salary between the below Salary Ranges:

Store	Job Status	Current Salary	Current Salary
• Seattle • San Diego	• Full Time • Full Time	• >=$50,000 • >=$70,000	• <=$60,000 • <=$80,000

Figure 5.45 Advanced Filter Criteria

To run the above complex criteria mentioned above follow the below steps:

1. From the **EmployeeData** sheet, click in the table, then select the Data tab and clear the current filters by selecting the Clear button.
2. Select the Table Tools Design tab and turn off the Total Row.

Mac Users: just click the Table tab and turn off the Total Row

3. Select the **Advanced Filter** sheet. Click cell A10. The criteria mentioned in the above example has already been entered for this advanced filter exercise. Next, you will use an advanced filter to copy the records that match these criteria.
4. From the **Data** tab, click the **Advanced** button. The Advanced Filter dialog box opens.
5. Click the **Copy to another location** option button to copy matching records from the data range.
6. Click in the List range box to make it active, and then navigate to the EmployeesData sheet, click **cell A9**, and then press and hold the **CTRL** and **SHIFT** and **SPACEBAR** to select the entire table. In the List range box, you will see **Employee_DB[#All]** in the list range box.

Mac Users: The keyboard shortcut of "CTRL, SHIFT, SPACEBAR" **does not work** in Exel for Mac. You should click in **Cell A9**, scroll down to the end of the data, hold down the **Shift key** and click in C**ell L112** to select the entire table

7. Click, or press the tab key, to move to the Criteria Range box.
8. From the Advanced Filter sheet, select A6:D8. You will see **'Advanced Filter'!Criteria** populate in the criteria range box.

9. Click, or press the tab key, to move to the Copy to box, and then click cell A10 to specify the location for inserting the copied records. You will see **'Advanced Filter'!$A$10** in the Copy to criteria range box.

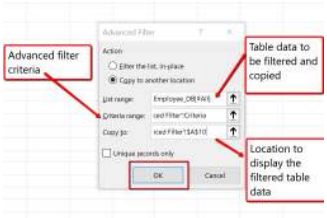


Figure 5.46 Advanced Filter Dialogue Box

10. Click **OK** to copy the records that match the advanced filter criteria. Save your work.

The advanced search results list 7 employees that meet the criteria. Of these 7 employees, only 1 full-time employee in San Diego has a current salary between $70,000 and $80,000 dollars, and 6 full-time Seattle employees have a current salary between $50,000 and $60,000 dollars.

WCM Analytics
Advanced Filter Criteria
Seattle & San Diego Current Salaries

Store	Job Status	Current Salary	Current Salary
Seattle	FT	>=50000	<=60000
San Diego	FT	>=70000	<=80000

Employee	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increase
1394	Shanika	Lloyd	8/24/2004	13.36	8/11/1966	50	Seattle	FT	$53,186	3.5%	$1,861.51
3242	Charles	Taylor	2/5/2012	3.90	1/18/1947	69	Seattle	FT	$58,291	3.5%	$2,040.19
3258	Johnny	Vazquez	9/18/2006	11.29	6/16/1953	63	Seattle	FT	$52,125	3.5%	$1,824.38
3214	Robert	Ross	8/28/2015	2.35	9/24/1974	42	Seattle	FT	$58,309	3.5%	$2,040.82
1350	Patrice	Hutton	12/29/2009	6.01	4/4/1953	63	San Diego	FT	$75,037	2.5%	$1,875.93
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
3206	Larry	Roeder	1/29/2016	1.92	11/1/1982	34	Seattle	FT	$54,368	3.5%	$1,902.88

Figure 5.47 Advanced Filter Results

INSERT TABLE

Let's review another away to turn a range of data into a table.

1. Select the **Advanced Filter** sheet, and click cell A10.
2. From the Insert tab, choose **Table**.
3. The Create Table dialogue box will appear.
4. Make sure "My table has headers" is selected so Excel recognizes the column headings.
5. Click **OK**. Excel turns our advance search data into a table.
6. Sort the table in ascending order (A-Z), by Store, and Employee ID, then Last Name. **Hint: Click the Data tab, Click the Sort button, add levels for the three fields.**
7. Autofit the column widths and row height to make sure the heading row is visible.
8. Save your work.

Excel turns the information into a table and sorts accordingly:

WCM Analytics
Advanced Filter Criteria
Seattle & San Diego Current Salaries

Store	Job Status	Current Salary	Current Salary
Seattle	FT	>=50000	<=60000
San Diego	FT	>=70000	<=80000

Employee ID	First Name	Last Name	Hire Date	Years of Service	Birth Date	Age	Store	Job Status	Current Salary	COLA	Projected Salary Increase
1350	Patrice	Hutton	12/29/2009	6.01	4/4/1953	63	San Diego	FT	$75,037	2.5%	$1,875.93
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
1394	Shanika	Lloyd	8/24/2004	13.36	8/11/1966	50	Seattle	FT	$53,186	3.5%	$1,861.51
3206	Larry	Roeder	1/29/2016	1.92	11/1/1982	34	Seattle	FT	$54,368	3.5%	$1,902.88
3214	Robert	Ross	8/28/2015	2.35	9/24/1974	42	Seattle	FT	$58,309	3.5%	$2,040.82
3242	Charles	Taylor	2/5/2012	3.90	1/18/1947	69	Seattle	FT	$58,291	3.5%	$2,040.19
3258	Johnny	Vazquez	9/18/2006	11.29	6/16/1953	63	Seattle	FT	$52,125	3.5%	$1,824.38

Figure 5.48 Advanced Filter Table

ANALYZING WORKSHEET DATA

INTRODUCTION TO PIVOT TABLES

Another way to analyze table information is with PivotTables. A PivotTable is a powerful tool that calculates, summarizes, and analyzes table data to compare, patterns, and trends. PivotTables are inserted directly from a table, linking the table data. Generally speaking, when you pivot on the table data you are reorganizing the table information to reveal different levels of detail that allow you to analyze specific subgroups of information and summarize data quickly and easily without having to change the structure or layout of the original table area.

When you pull table data into a PivotTable there are four main area fields: Rows, Columns, Values, and Filters. The Rows and Columns fields can interchange quickly to summarize the data in different ways or to run new reports based on the question or criteria being asked. The Value field is data from the table that can be calculated, or that contain values that the PivotTable will summarize. The Values field has multiple settings to choose how you want to calculate the data; SUM, COUNT, AVERAGE, MIN, MAX, and can even show the displayed values as a percentage of the total, column total, grand total, and so on. Lastly, is the Filters area, which restricts the PivotTable to only show the values matching specified criteria.

Four Primary PivotTable Areas:

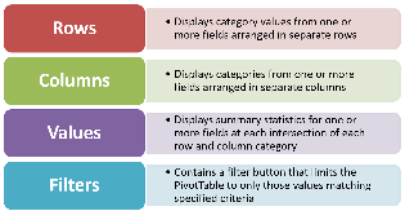


Figure 5.49 Four Primary PivotTable Areas

In our situation, shown below, we will create a PivotTable to summarize employee data to show Projected Salary Increases, for both Part-Time (PT) and Full -Time (FT) employees for all store locations.

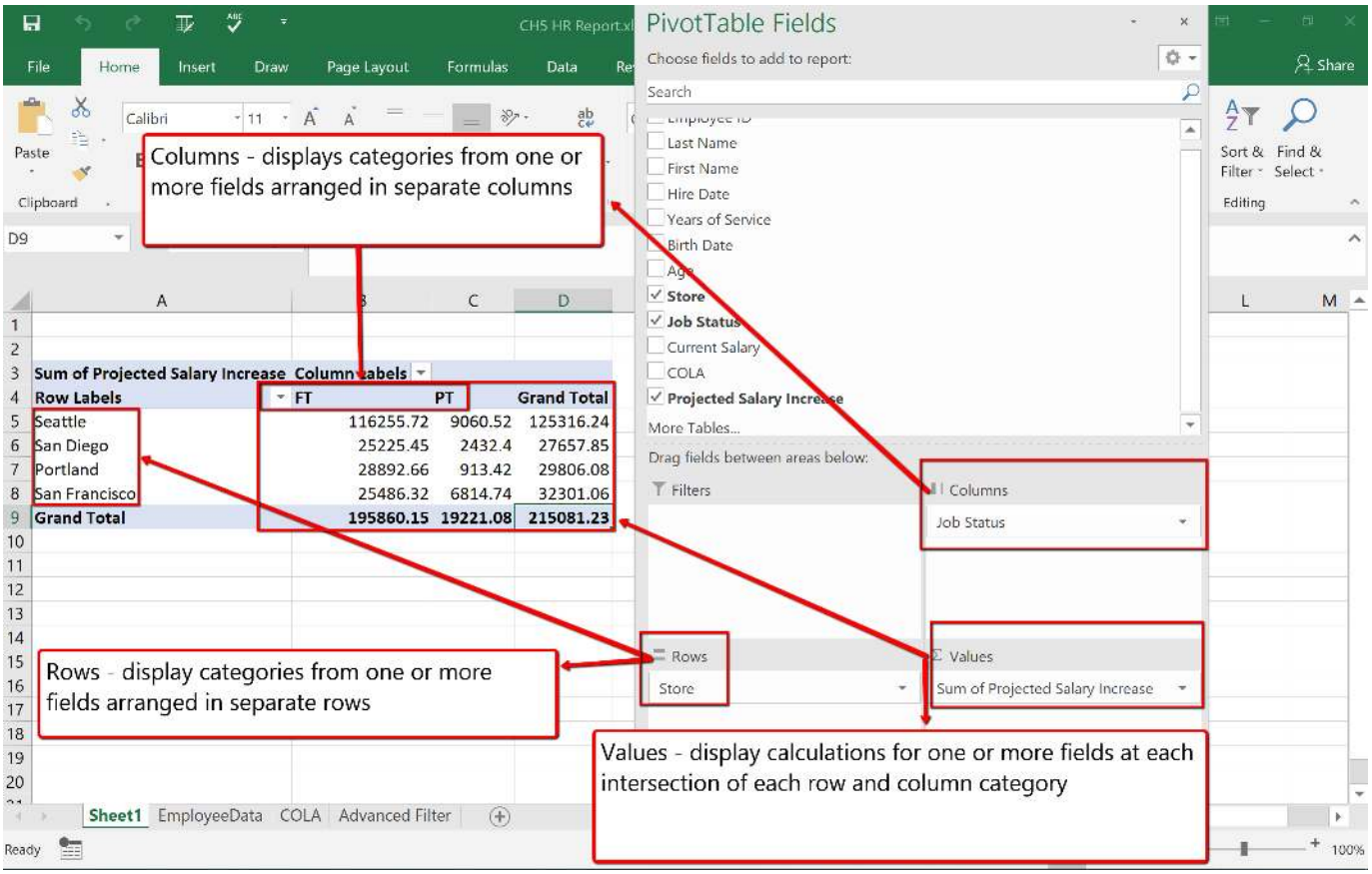


Figure 5.50 Parts Of A PivotTable

Follow the below steps to explore and build a PivotTable report.

1. Click the **EmployeeData** sheet. Click anywhere in the table area.
2. From the **Insert** tab, choose **PivotTable**.

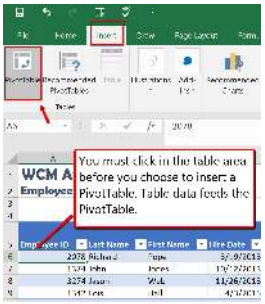
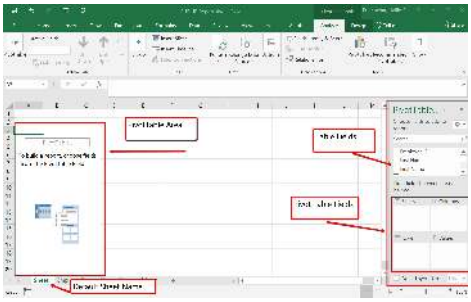


Figure 5.51 Insert PivotTable

3. From the Create PivotTable dialogue box, make sure the PivotTable report will be placed in a **New Worksheet**, and click **OK**.


Figure 5.52 Create PivotTable Dialogue Box

4. Notice a new sheet (Sheet1) is inserted, at the bottom of the workbook, that contains the PivotTable1 area and fields dialogue box. Rename the default name (Sheet 1) to **StorePT**.


Figure 5.53 PivotTable Window

5. From the PivotTable pane, drag and drop the **Store** heading to the **Rows** section of PivotTable field area.

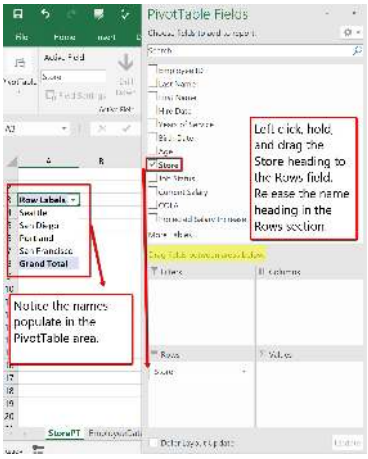


Figure 5.54 PivotTable Row Selection

6. From the PivotTable fields list drag and drop the **Projected Salary Increase** heading to the **Values** section.

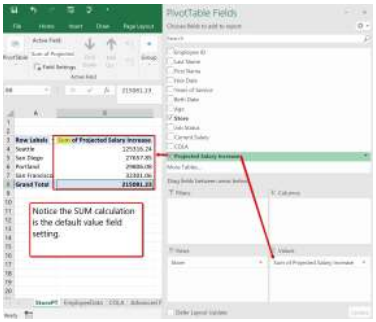


Figure 5.55 PivotTable Value Selection

7. Drag and Drop the **Job Status** heading to the **Columns** field section. Notice the Job Status categories display. In this case, displaying Full-Time (FT) and Part-Time (PT) employees.

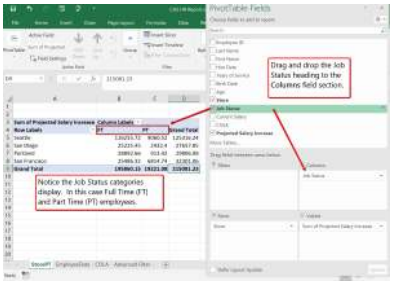


Figure 5.56 PivotTable Columns Selection

FORMATTING PIVOT TABLES

After creating a PivotTable and adding the fields that you want to analyze, you may want to enhance the report to include slicers, or graphs and or format the data to make it easier to read and scan for details. When clicked in the PivotTable area you will see a contextual tab appear on the ribbon, containing PivotTable Tools and two specific tabs; Analyze and Design. **Mac Users: there is not a "PivotTable Tools" tab but you will see two tabs named: PivotTable Analyze and Design. They are only visible when you have clicked inside the PivotTable area.**

The Analyze tab contains tools specifically for examining data, for example, the ability to insert Slicers, or PivotCharts. The Design tab contains tools that specifically tie to how the table and data visibly display. For example, when you have a lot of data in your PivotTable, it may help to show banded rows or columns for easy scanning or to highlight important data to make it stand out.

Follow the below steps to add format the PivotTable, and add a PivotChart.

1. Click in the PivotTable. From the PivotTable Tools choose the Design tab.
2. In the PivotTable Styles gallery select the Light Blue, Pivot Style Medium Style 2 format.

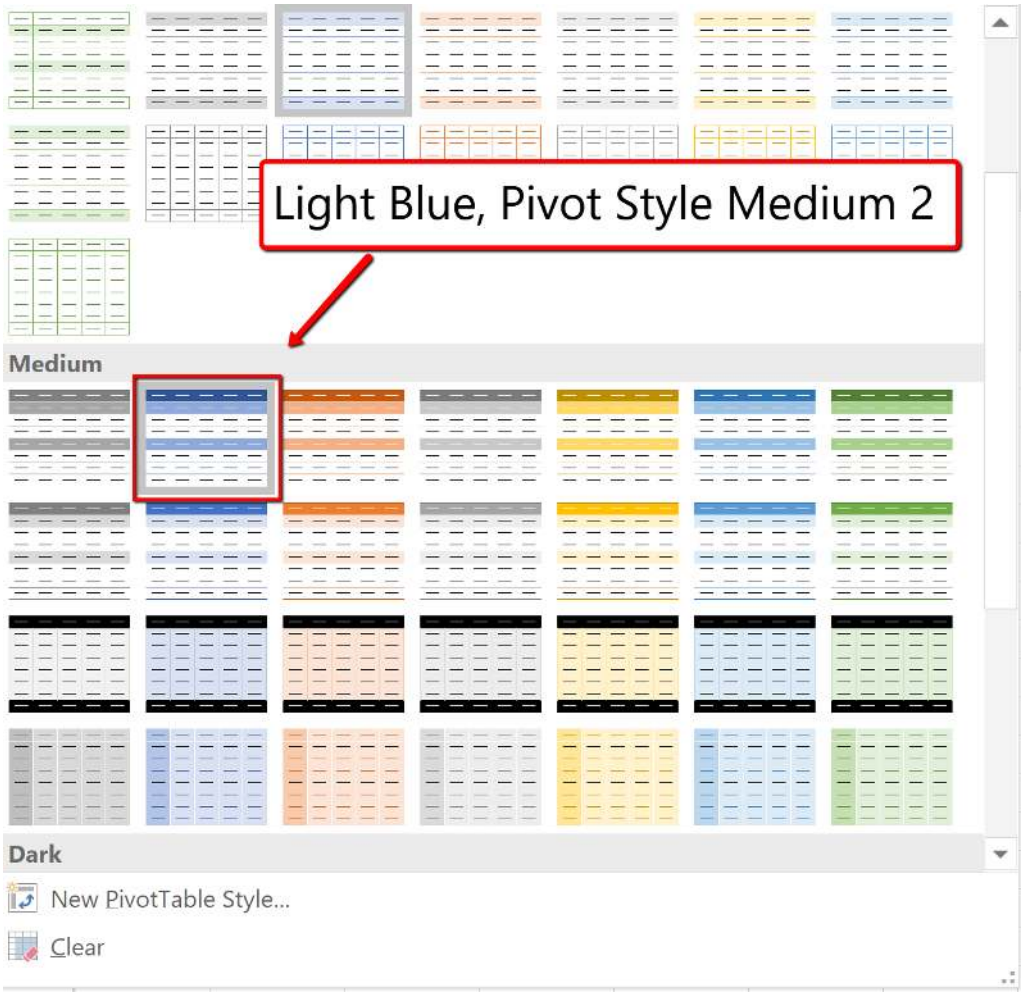


Figure 5.57 Light_Blue Medium Style Pivot 2

3. To format the PivotTable numbers, select B5: D9. Click the Home tab. Apply the Currency number format and decrease the decimal place to zero decimals.

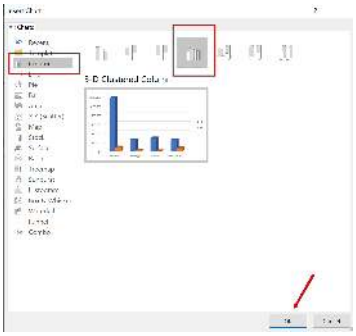
(The alternative method to number formatting in a PivotTable is to expand the menu on value field; Sum of Projected Salary Increase. Click the Value Field Settings. Choose Number Format and apply the desired number format option. Mac Users should click the small circle with an "i" next to "Sum Projected Salary Increase" in the Values section then click the Number button to change the Number Format.  *)*

NOW LET'S CREATE A PIVOTCHART!

4. Click in the PivotTable. Click the Analyze tab. Choose the PivotChart button on the Ribbon.
5. From the listed chart types, choose Column. And select the 3D Clustered Column option. Click OK.

Mac Users: Only a basic, 2D column chart is available when clicking the **Pivot Chart** button. In order to select a different chart type, such as the 3D clustered column option, you must do the following:

- Click on the 2D chart that was just inserted
- Click the **Design tab** on the Ribbon
- Click the **Change Chart Type** button
- Select the 3D Clustered Column option


Figure 5.58 3D Clustered_Column Chart

6. Move the PivotChart under the PivotTable area. Resize accordingly. Save your work.

Note the formatting changes in the new chart below. The “Job Status” and “Store” buttons are column and row “filters” for the Pivot Chart.

Mac Users: Excel for Mac does not insert these formatting changes within a Pivot Chart. You can add a chart title by clicking the “Add Chart Element” button from the Design tab. It is **not possible** to add the “chart filter” buttons as shown in Figure 5.59. The filters on the pivot table can be used to also filter the columns and rows in the Pivot Chart.



Sum of Projected Salary Increase	Column Labels		
Row Labels	FT	PT	Grand Total
Seattle	$119,600	$9,061	$128,661
San Diego	$25,225	$2,432	$27,658
Portland	$30,866	$913	$31,779
San Francisco	$25,486	$6,815	$32,301
Grand Total	$201,178	$19,221	$220,399

Figure 5.59 PivotTable Solution

SUBTOTALS

Another way to summarize data is by using subtotals. Analyzing a large data range usually includes making calculations on the data. You can summarize the data by applying summary functions such as COUNT, SUM, and AVERAGE to the entire organized range of information. Subtotals, in general, are summary functions applied to parts of an organized data range.

For example, you can SUM Current Salaries for employees from each Store location. To subtotal the information the data must first be sorted by the Store field. For subtotals, the field that you sort is referred to as the control field. For example, if you choose the Store location as your control field, all of the Seattle, San Diego, Portland, and San Francisco entries will be grouped together within the data range. The SUM function then can be applied to SUM the Current Salary fields for each Store location. Excel calculates and displays the subtotal each time the Store location changes.

A new row containing a subtotal of that particular location will be inserted, and wherever the field changes a value will display; a subtotal group of records. Excel updates the subtotal automatically when the control field is changed. In theory, when subtotaling, you are adding a calculation row to the set of data. Adding rows that total information in the middle of a table would compromise the integrity of data in the table. The table tools would look at the total as a record, not a calculation. Therefore the Subtotal feature cannot be used in tabling, and can only be applied to a normal range of data. You must convert all tables to a range prior to subtotaling.

Multiple functions can be applied within the same Subtotal. For example, we will explore how you can SUM Current Salary’s and also provide the AVERAGE Current Salary for each Store location within the same Subtotal. Note Subtotal data can also be filtered.

The best practice when subtotaling is to follow four rules:

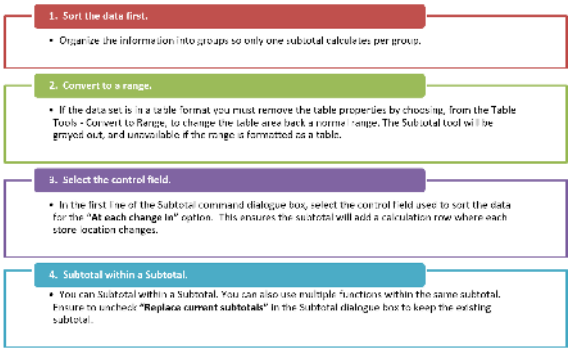
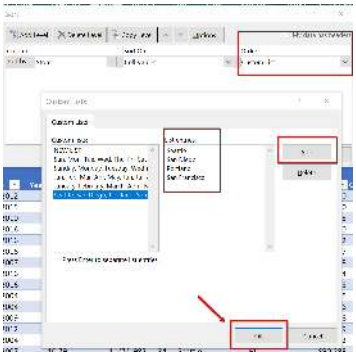


Figure 5.60 Subtotal Rules

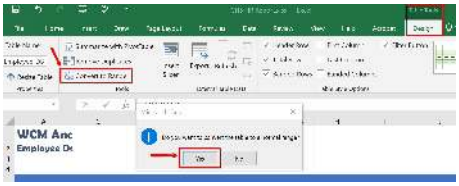
Follow the below steps to Subtotal the Employee Data and provide a total Current Salary per Store.

1. Select the **Employee Data** sheet. If necessary clear any filters applied to the data by clicking the Data tab and choosing the Clear filter option.
2. From the Data tab, choose Sort button. Sort the Store Location, using the preferred Custom List order of Seattle, San Diego, Portland, and San Francisco. If the list we set up previously is not available type the entries in the List entries area. Choose Add, and then OK.


Figure 5.61 Custom Sort, Custom List Dialogue Box.

3. Choose the Table Tools Design tab. **Mac Users:** just click the **"Table" tab.**

   Select "**Convert to Range**." Excel will display a message asking if you really want to convert the table back to a normal range. Choose **Yes.**


Figure 5.62 Convert To A Range

4. Click the Data tab, in the Outline group find and select the Subtotal Command. (Notice the heading row no longer has filters buttons. The data looks like a table but is not a table. The table tools are not active, and the information is a normal range.)
5. In the Subtotal dialogue box, choose the Store field in the "**At each change in.**" For the "**Use Function**," choose **Sum**, and only check **Current Salary**. Click OK**.**

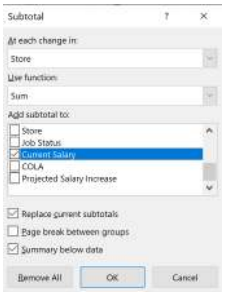
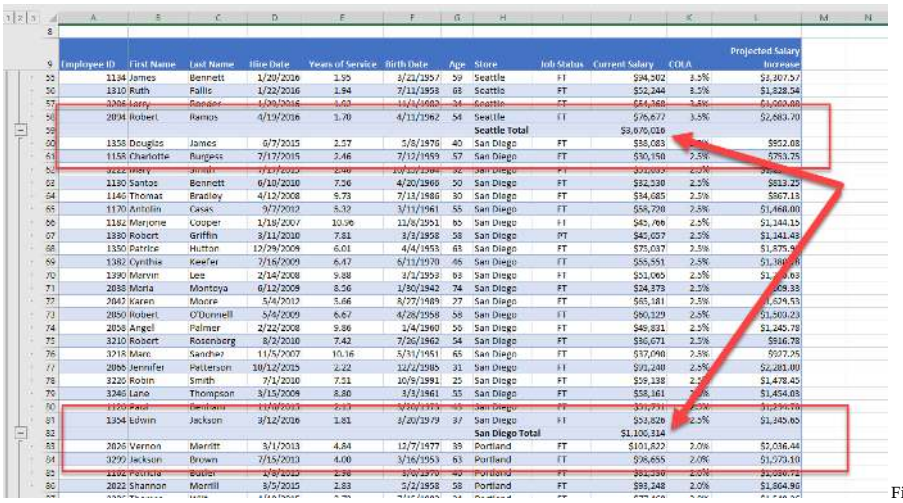


Figure 5.64 Subtotal Dialogue Box

6. Notice the Current Salary column is totaled, per location. Save your work.


Figure 5.65 Subtotal Solution

SUBTOTAL OUTLINE VIEW

The Outline views, located on the left side panel, show summary statistics. The Outline tool, with levels, allows you to control the expanse of detail displayed in the worksheet. The EmployeeData worksheet has three levels in the outline of its data range:

- Level 1, displays only the grand totals.
- Level 2, displays the total spent at each Store.
- Level 3, displays the total Salary.

Figure 5.66 above shows the Level 3 Outline, all the employee detail per store location. Clicking the outline buttons located to the left of the row numbers lets you choose how much detail you want to see in the worksheet. (Note that the three level numbers are at the top left side of the worksheet, just below the Name box.)

You will use the outline buttons to expand and collapse different sections of the data range.

1. Click level 1. Notice it displays the Grand Total.
2. Click level 2. Notice the totals for all store locations are displayed.



Figure 5.66 Subtotal Outline Level 2

ADDING A SUBTOTAL WITHIN A SUBTOTAL

As mentioned at the beginning of the section, you can use multiple functions within the same subtotal. We will now explore how you can SUM Current Salary's and also provide the Average Current Salary for each Store location within the same Subtotal.

1. Click within the Subtotal data, go to the Outline, click Level 3, to display all the subtotal data.
2. From the Data tab, and click Subtotal.
3. In the Subtotal dialogue box, select the Store field for the "**At each change in:"** option.
4. In the "**Use function:"** section select to display the **Average**.
5. Only check the **Current Salary** field in the **"Add subtotal to section:"**. (Note Excel will default check something in this area. Uncheck any other fields.)
6. Uncheck **"Replace current subtotals"**; we do not want to replace the current subtotal summing the Current Salary.
7. Click OK



Figure 5.67 Subtotal Within A Subtotal

8. Notice each location is now subtotaled showing the Average and Total Current Salary. Excel has also added 4th level to the Outline, accounting for the Averages. Save your work.

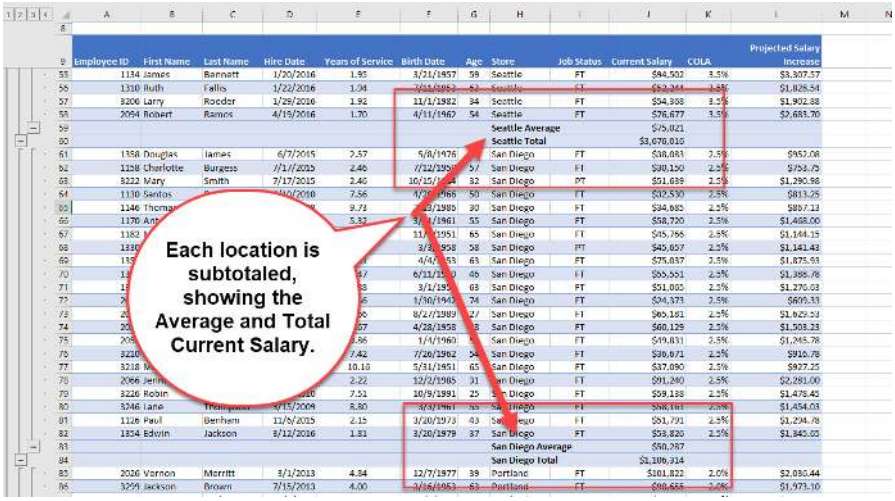


Figure 5.68 Solution, Subtotal Within A Subtotal

Key Takeaways

- A table is made up of a data set that is organized into columns and rows representing fields and records, such as employee information.
- You can create a table by clicking formatting the data set as a table, or using the Insert Table feature.
- Excel offers pre-built table styles, and options to choose from to format a table.
- You can add records (rows) and our fields (columns) to a table. You can then sort to reorganize your data.
- Freezing heading keeps your column headings displayed while you scroll through your table data.
- You can use the filter arrows in the table headings to sort by a single column. When sorting by more than one field, use the Custom Sort option.
- Custom List Sorts can be used when a field needs to be sorted in a special way.
- A slicer is a visual filter button (object) used to filter data in an Excel table. Each unique value in the field is a button.
- A PivotTable is an interactive table that summarizes data from a data source such as a data range or an Excel table.
- The Subtotal tool includes summary statistics for each group of records. Excel organizes subtotals using an outline that can be expanded or contracted to view or hide details about the data.

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6.4: Advanced Formatting Techniques

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Create custom formats for worksheet or table for appearance
- Create custom formats for a worksheet or table for content
- Copy formatting from one range of data to a new range of data

It is important for organizations to use uniform branding and style, which can appear anywhere, from emails to invoice templates to Excel files. Having a uniform style within an organization adds a level of professionalism and consistency to the business, and these may be tied to the company's intellectual property and similar protections. Many organizations provide guidelines or manuals for all files produced to ensure that all employees can easily follow the same style or use the same templates.

Microsoft Excel offers many prepackaged themes and styles that can be easily applied to tables and spreadsheets. But it is also possible to create your own custom format. This can be ideal for businesses that want their products to look a certain way and contain specific branding.

Custom Formats for Appearance

The tables and datasets you've been working with were finished versions, with color, font, table size, and background set. Here, you'll create these tables step-by-step with themes and other style elements.

Using Existing Themes

To make formatting easy to use and high-quality, Excel offers Themes. Applying a Theme can quickly change the color scheme, fonts, and size of a table or graph. For example, you could easily change the formatting of a table without manually readjusting everything. If your objective is to save time when changing the overall formatting, choose a default theme, and all the formatting will be handled automatically.

To access Themes, go to the Page Layout tab and select the Themes icon (Figure 10.59a). Then, choose any of the available themes. ("Wisp" is shown in Figure 10.61.) All of the formatted tables and graphs in that particular workbook will be changed. If you have a simple worksheet with no specific formatting, such as colors, font style, and the like, when you choose a theme, nothing will change. However, if you have a worksheet with formatted headings and charts, you will notice changes when you select a theme. The Color combo box lets users further modify the theme by selecting a different color palette (Figure 10.59b).

For additional changes, the Home tab has a combo box called Cell Styles that lets users select other font sizes or background colors, as shown in Figure 10.60. Depending on your selection in the Colors menu in the Themes command group (Page Layout tab), the options in the Styles menu will change. For instance, use Blue from the palette, and in the Styles combo box, select Heading 3 and Accent 5, 40%. If an orange color palette from the Color menu was chosen, the Styles options would be orange tones.

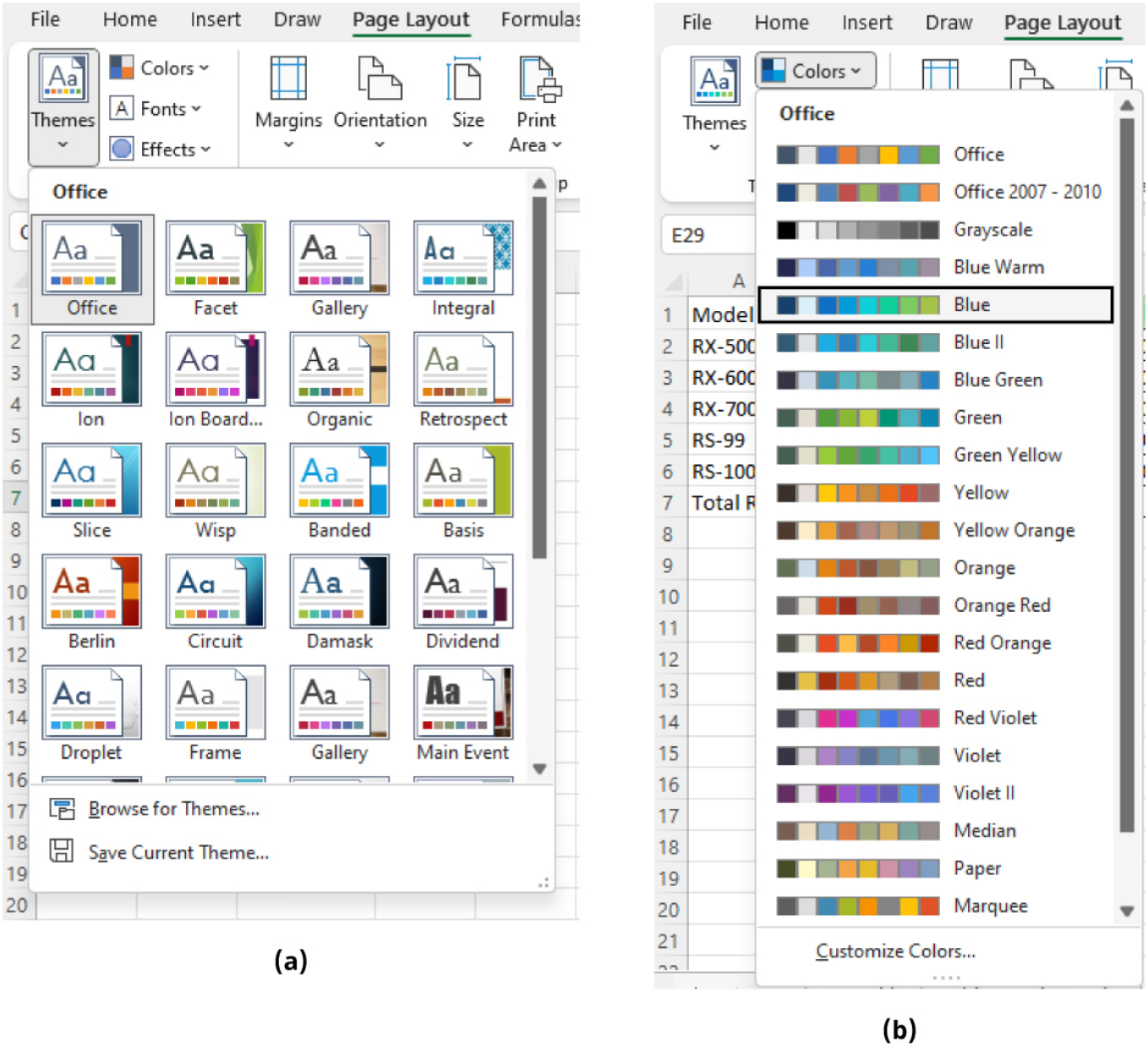


Figure 10.59: (a) Themes are useful if your company has a custom theme to apply for all charts. (b) Color schemes can be customized to meet your needs. (Used with permission from Microsoft)

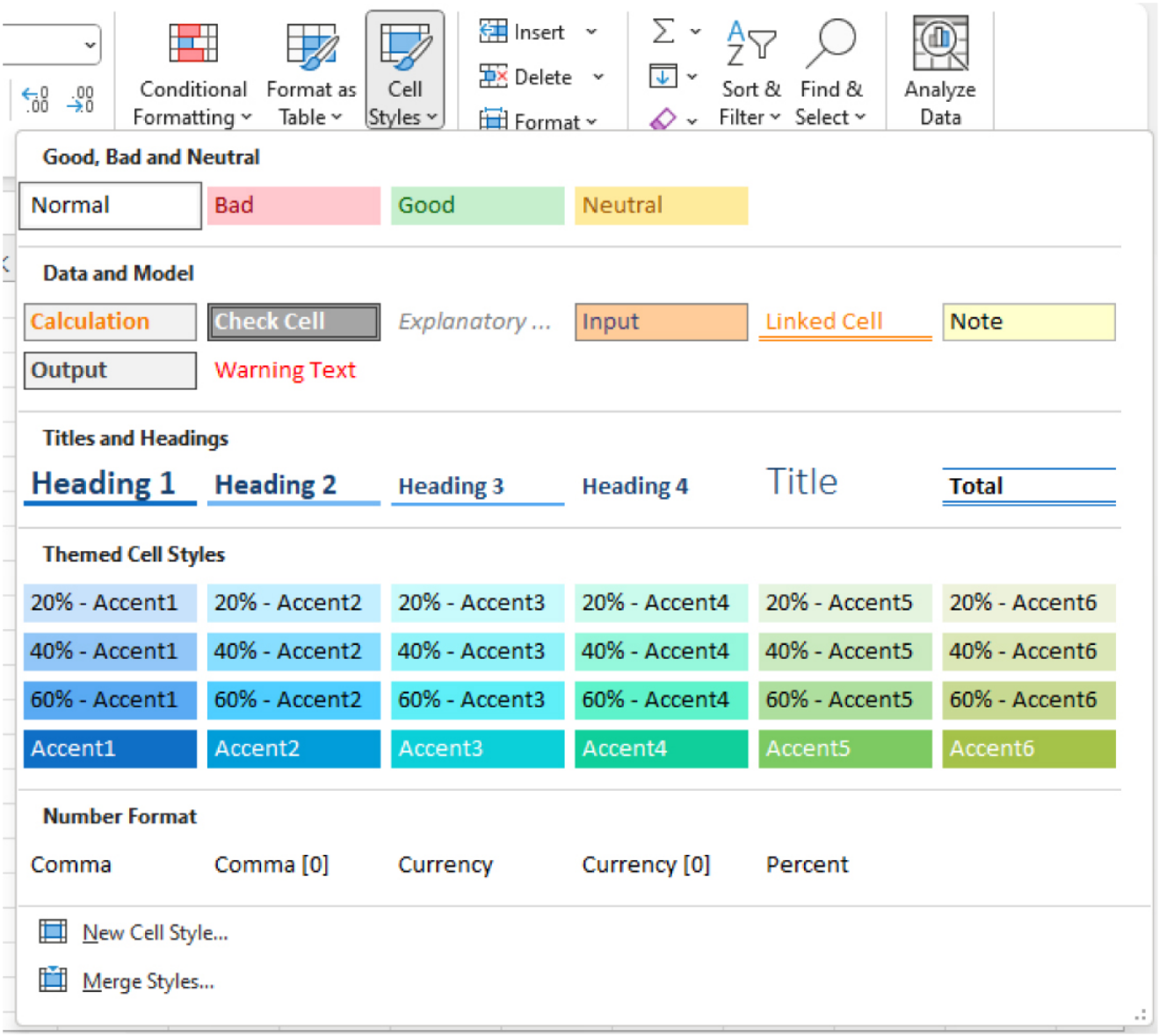


Figure 10.60: You can use the built-in themes to automatically format heading and numbers. (Used with permission from Microsoft)

	A	B	C
1	**Model**	**Price**	**Units Sold**
2	RX-500	$17.99	5000
3	RX-600	$25.99	4000
4	RX-700	$35.99	3000
5	RS-99	$99.00	2000
6	RS-100	$114.99	1000
7	Total Revenue		$ 614,870.00

Figure 10.61: Applying a theme is easier than formatting each section of the table individually. (Used with permission from Microsoft)

Creating Custom Themes

Often, companies will have a color scheme for all communications and materials within and outside of the company. The palette is usually linked to the company logo and is an essential part of creating a unified and professional appearance for marketing

purposes and legal usage. If a company has a specific theme, it can be saved and used by all employees. The saved theme file can be shared company-wide to ensure consistency. Moreover, the saved theme can be used across all Microsoft products.

There are two ways to create a custom theme. First, users can create the theme from scratch. This means you define the font, color, and other elements of the theme. Second, and perhaps easier, is to start with an existing theme that is close to the desired theme. You can then make the needed adjustments, such as changing the font or modifying heading colors slightly. First, format your table using the desired settings, and then choose Save Current Theme at the bottom of the Themes menu to save the theme as a file that can be used in other Microsoft products and/or shared with others.

Link to Learning

Go to Microsoft's theme repository and look for Excel themes. Think about how they might be used in a business. Look for themes that might be appropriate for an accounting department or a human resources department.

Other Formatting Tools

Another time-saving strategy is using the Format as Table tool. On the Home tab, select the Format as Table combo box to see many options for formatting tables (Figure 10.62). The background color, heading font, and borders can be changed; additionally, column widths will change automatically to fit the text. This feature also automatically adds filters to the columns, which can help with organizing the data in a table Figure 10.63. However, using the Format as Table feature does not format cells according to their content, such as currency.

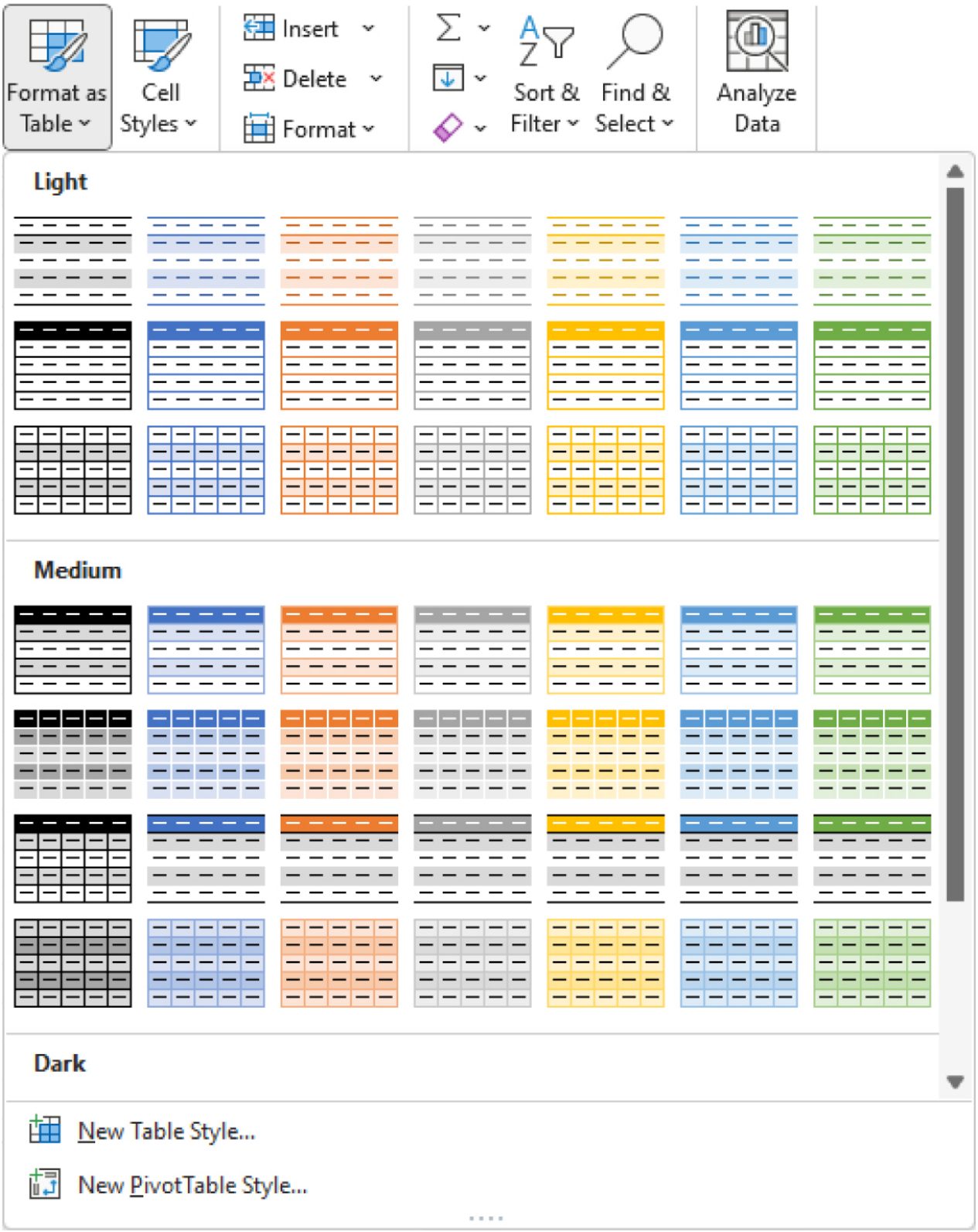


Figure 10.62: The Format as Table tool is a simple way to add full formatting to basic tables. When you format the selection as a table, there are several color options and themes to choose from. (Used with permission from Microsoft)

	A	B	C
1	Model	Price	Units Sold
2	RX-500	17.99	5000
3	RX-600	25.99	4000
4	RX-700	35.99	3000
5	RS-99	99	2000
6	RS-100	114.99	1000
7	Total Revenue		614870

Figure 10.63: You get a filter option after the selection is formatted as a table. (Used with permission from Microsoft)

Adding Images to the Background

Beyond formatting cell content, you can also add an image to a table's background. The background is a canvas that is displayed behind the cell contents of a worksheet. It could be useful to add a logo or a topic-related image to the background of a table, especially for an internal or client-facing presentation. Often, this feature is used to indicate that documents are not finalized but are in a "draft" stage.

To add an image in the background, first select the table, then go to the Page Layout tab and select Background. You will then be prompted to select an existing file, or you can search online for an image. An image of the word "Confidential" has been added in Figure 10.64 to show that this report should be kept confidential and not shared. You may insert an existing file or search the internet for a picture.

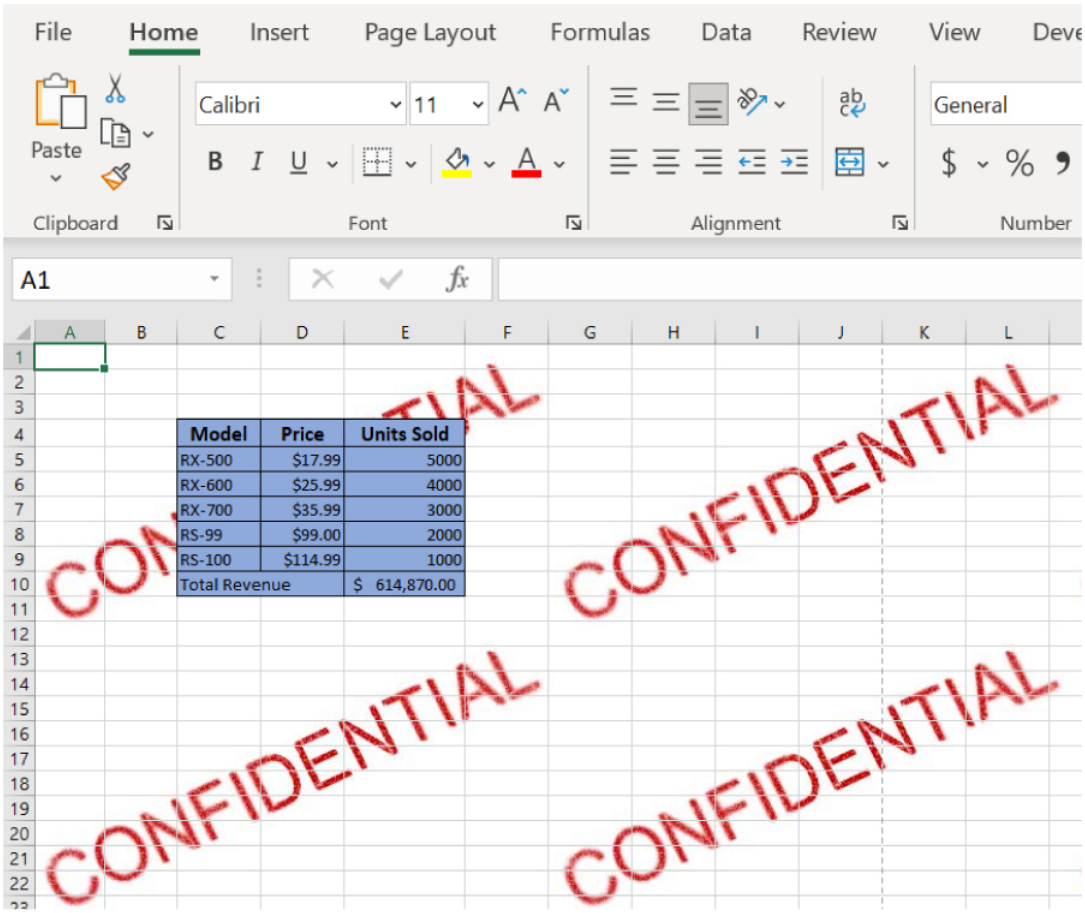


Figure 10.64: The background change tool is useful for design purposes or for company branding. (Used with permission from Microsoft)

Custom Formats for Content

Custom formats for content allow users to design a format for data contained in cells. For example, you can use custom formatting to set a format type for how your purchase order numbers are input into your company's system, or to change how dates are displayed. This feature is different from merely changing a cell's format, such as the decimal points displayed or how months are abbreviated. Instead, the custom format can be saved as a format that is then widely applied to worksheets. You can create a format from scratch, but it is easier to use one of the built-in formats and adjust if necessary. You can customize most aspects of the formatting—from spacing to displayed decimals, to font color.

Shortening Large Numbers

Sometimes, the appearance of many repeated large numbers in a spreadsheet can be overwhelming. Other times, you may simply want to reduce numbers to estimates. Excel can shorten large numbers so that they are summarized by a letter, such as K (for "thousands") or M (for "millions"). Figure 10.65 shows that the estimated COGS varies depending on the quantity sold and the unit cost.

Unit Cost	$ 85		$ 19,170,900	$ 70	$ 75	$ 80	$ 85
Quantity Sold	225,540		155,000	$ 10,850,000	$ 11,625,000	$ 12,400,000	$ 13,175,000
COGS	$ 19,170,900		180,000	$ 12,600,000	$ 13,500,000	$ 14,400,000	$ 15,300,000
			205,000	$ 14,350,000	$ 15,375,000	$ 16,400,000	$ 17,425,000
			255,000	$ 17,850,000	$ 19,125,000	$ 20,400,000	$ 21,675,000

Figure 10.65: Shortening estimated figures can be useful for presentations and reports, as they will be easier to read than these long numbers. (Used with permission from Microsoft)

Since these figures are estimations for the coming period, they can be abbreviated to the million by marking with an "m." To do this, select the cells on which to perform this process, and then right-click and select Format Cells. In the Format Cells dialog box, go to Custom, as shown in Figure 10.66. In the Type field, delete the existing text, type [0,,"m"], and then click OK. Using the 0 indicates no decimal points and to use only whole numbers. The "m" is used to round to the million units. Excel will change the figures in the selected cells to be rounded up to the nearest million, as shown in Figure 10.66.

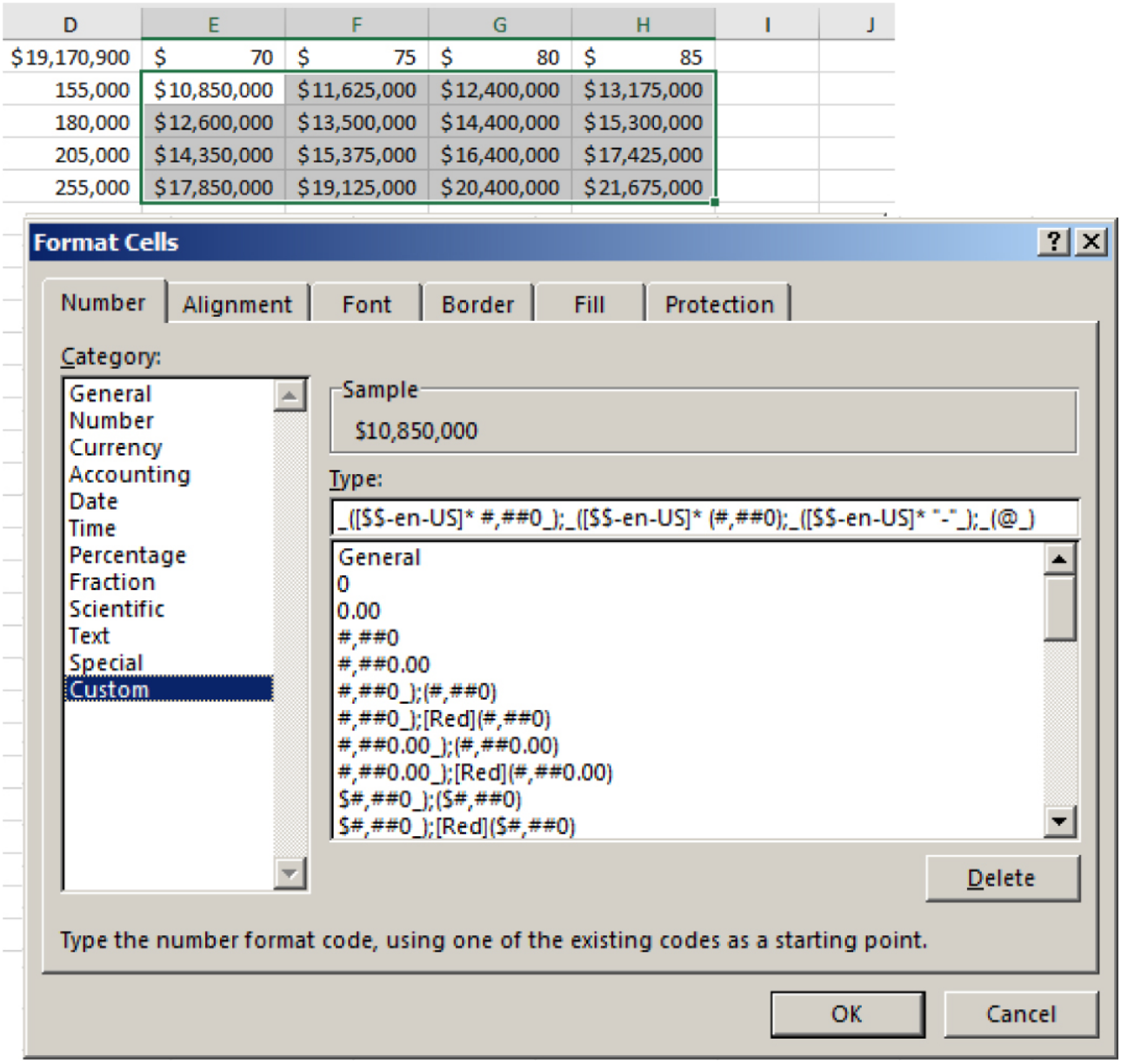


Figure 10.66: There are multiple “Custom” formatting codes, as you can see in the list. (Used with permission from Microsoft)

D	E	F	G	H
$19,170,900	$ 70	$ 75	$ 80	$ 85
155,000	11m	12m	12m	13m
180,000	13m	14m	14m	15m
205,000	14m	15m	16m	17m
255,000	18m	19m	20m	22m

Figure 10.67: Choosing to format large numbers to display as millions can make a table more readable. The finished product could now be further formatted for appearance. (Used with permission from Microsoft)

Common Number Formats

Some number formats come up frequently, such as addresses, phone numbers, or Social Security Numbers (SSNs). Their formats may be consistent in a specific region (like SSNs in the United States), or they may be similar with variations (like phone numbers with all hyphens, hyphens and parentheses, or spaces).

In Figure 10.68, you can see a table of names and contact information. However, there are some issues with the data: the numbers all look the same. Phone numbers should be separated by parentheses for the area code and a hyphen after the exchange, and SSNs use hyphens around the middle two digits. Zip codes should be five digits long, but some are showing up as only four digits; this is because Excel does not recognize the leading zero. As is, the data in the current table is confusing. Microsoft offers a standard command to format cells in these situations.

	A	B	C	D	E	F	G
1	Name	Address	City	State	Zip Code	Phone	SSN
2	Floyd Altenwerth	9543 Lakewood Dr	Newark	NJ	7101	8195930263	272921446
3	Brian Collins	1686 Dovetail Dr	Chicago	IL	60089	7402464512	625861065
4	Jill Fowler	6474 Franklin Av	Hatfield	MA	1038	9733067727	313042959
5	Sheri Foley	2002 Cornier St	Trezevant	TN	38258	8049761222	290113577

Figure 10.68: There are ways to fix the formatting issues in this table without having to manually fix each one. (Used with permission from Microsoft)

First, select each column separately, right-click each column, select Format Cells, and then select Special. For formatting zip codes (Figure 10.69), select the Zip Code column values (but not the header), and in the Special format cell dialog box, select Zip Code, and choose OK. Follow the same steps for formatting phone numbers (Figure 10.70). As you can see in the result shown in Figure 10.71, Excel already has special formats for these number types.

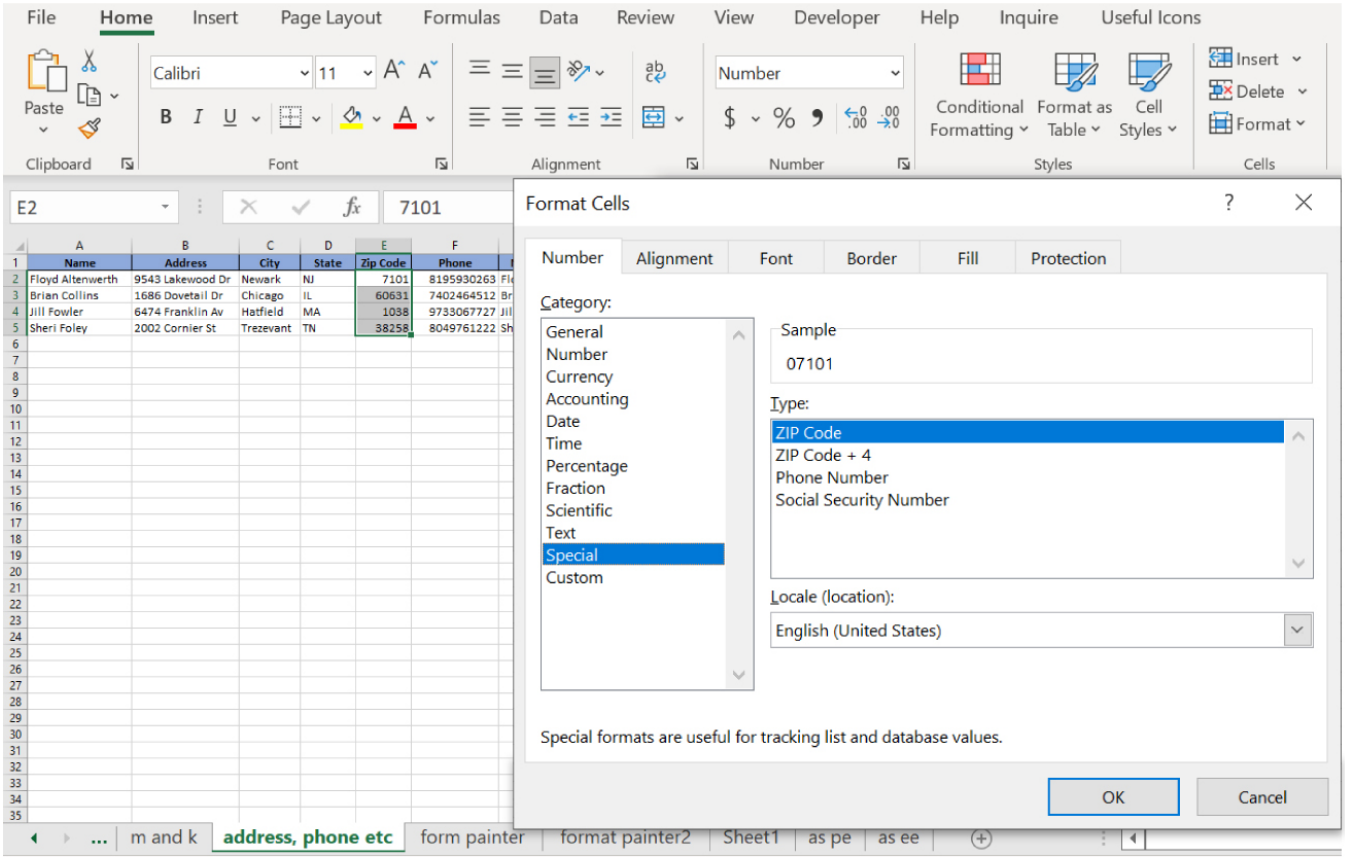


Figure 10.69: Microsoft already has preset formatting for many number types, including zip codes. (Used with permission from Microsoft)

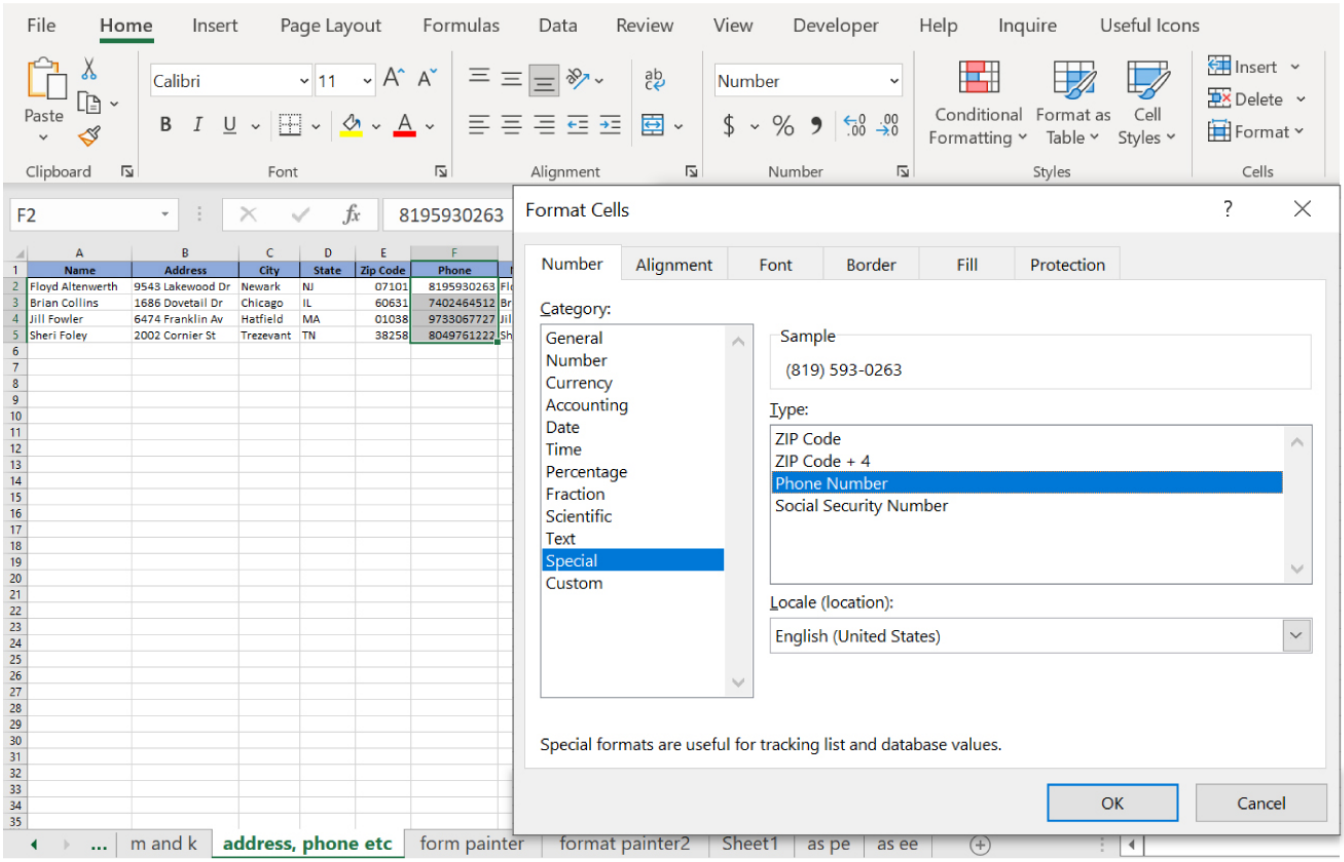


Figure 10.70: Another preset formatting is for phone numbers. (Used with permission from Microsoft)

	A	B	C	D	E	F
1	Name	Address	City	State	Zip Code	Phone
2	Floyd Altenwerth	9543 Lakewood Dr	Newark	NJ	07101	(819) 593-0263
3	Brian Collins	1686 Dovetail Dr	Chicago	IL	60631	(740) 246-4512
4	Jill Fowler	6474 Franklin Av	Hatfield	MA	01038	(973) 306-7727
5	Sheri Foley	2002 Cornier St	Trezevant	TN	38258	(804) 976-1222
6						

Figure 10.71: The finished product can save the consuming process of writing the parentheses or hyphens manually and decreases data entry errors. (Used with permission from Microsoft)

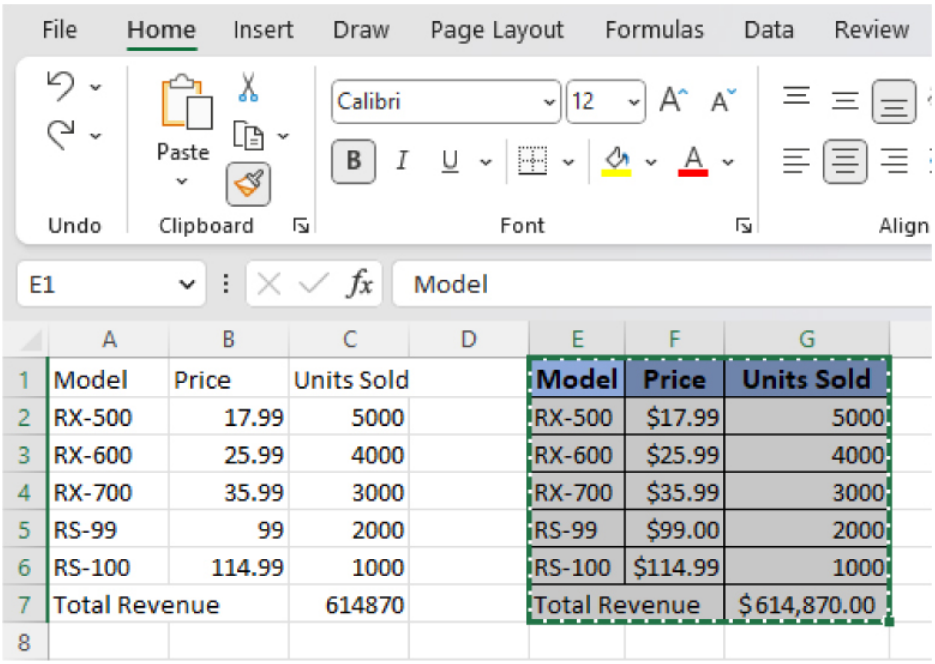
Link to Learning

The mail merge feature of Microsoft Word allows the user to create letters, mailing labels, or envelopes from a list of names and addresses, such as a customer list. This can make the process much quicker than formatting each letter or envelope individually. Often, lists of customers with contact information such as addresses and emails will be organized in a spreadsheet. Mail merge connects a Word document to an Excel data table to seamlessly create the documents needed for mailing. Watch this tutorial from *Business Insider* on Mail Merge to learn the steps.

Copy Formatting

Copying the format of a given cell is one of the most used commands in Microsoft Office because it is available not only in Excel, but in all other Office applications. The Format Painter command lets a user copy a certain range's formatting and apply it to a new range by selecting the cell with the desired format to be copied, and then selecting the Format Painter icon on the Home tab. Format Painter can be used to transfer the formatting from one cell or a whole table to another cell or table. The Format Painter tool is the paintbrush icon on the Home tab in the Clipboard command group. To use the tool, first select the cell or cells that have the

formatting you want to apply to other cells. Figure 10.72 shows the selected cells E1 to G7. Then, click on the paintbrush icon on the Home tab. As you do, your cursor will change to a paintbrush. With that paintbrush, select the range of cells to which you want to apply the formatting. In this example, those cells are A1 to C7. The unformatted table will then be formatted in the same manner as the formatted table. The result is apparent in Figure 10.73. The only step left is adjusting the columns by clicking on the border of each column on top.



	A	B	C	D	E	F	G
1	Model	Price	Units Sold		Model	Price	Units Sold
2	RX-500	17.99	5000		RX-500	$17.99	5000
3	RX-600	25.99	4000		RX-600	$25.99	4000
4	RX-700	35.99	3000		RX-700	$35.99	3000
5	RS-99	99	2000		RS-99	$99.00	2000
6	RS-100	114.99	1000		RS-100	$114.99	1000
7	Total Revenue		614870		Total Revenue		$614,870.00
8							

Figure 10.72: The Format Painter tool allows you to copy the formatting from one table and apply it to another. Notice the cursor paintbrush next to it. (Used with permission from Microsoft)

	A	B	C	D	E	F	G
1	Model	Price	Units Sold		Model	Price	Units Sold
2	RX-500	$17.99	5000		RX-500	$17.99	5000
3	RX-600	$25.99	4000		RX-600	$25.99	4000
4	RX-700	$35.99	3000		RX-700	$35.99	3000
5	RS-99	$99.00	2000		RS-99	$99.00	2000
6	RS-100	$114.99	1000		RS-100	$114.99	1000
7	Total Revenue		########		Total Revenue		$614,870.00

Figure 10.73: Both tables are formatted using the same font, fill color, and number format. (Used with permission from Microsoft)

Mac Tip

The Mac version uses Cell Styles to format cells.

There are also other ways to copy formatting. Another way is to use the Paste Special tool. You first select the whole formatted table and press Ctrl+C (to copy it), then select your entire unformatted table (Figure 10.74a). Then, on the Home tab, choose Paste Special from the Paste menu and click on Formatting (R) from the last row, as shown in Figure 10.74b. This tool will paste just the formatting from your original selection; it will not paste any of the values or formulas (Figure 10.74c).

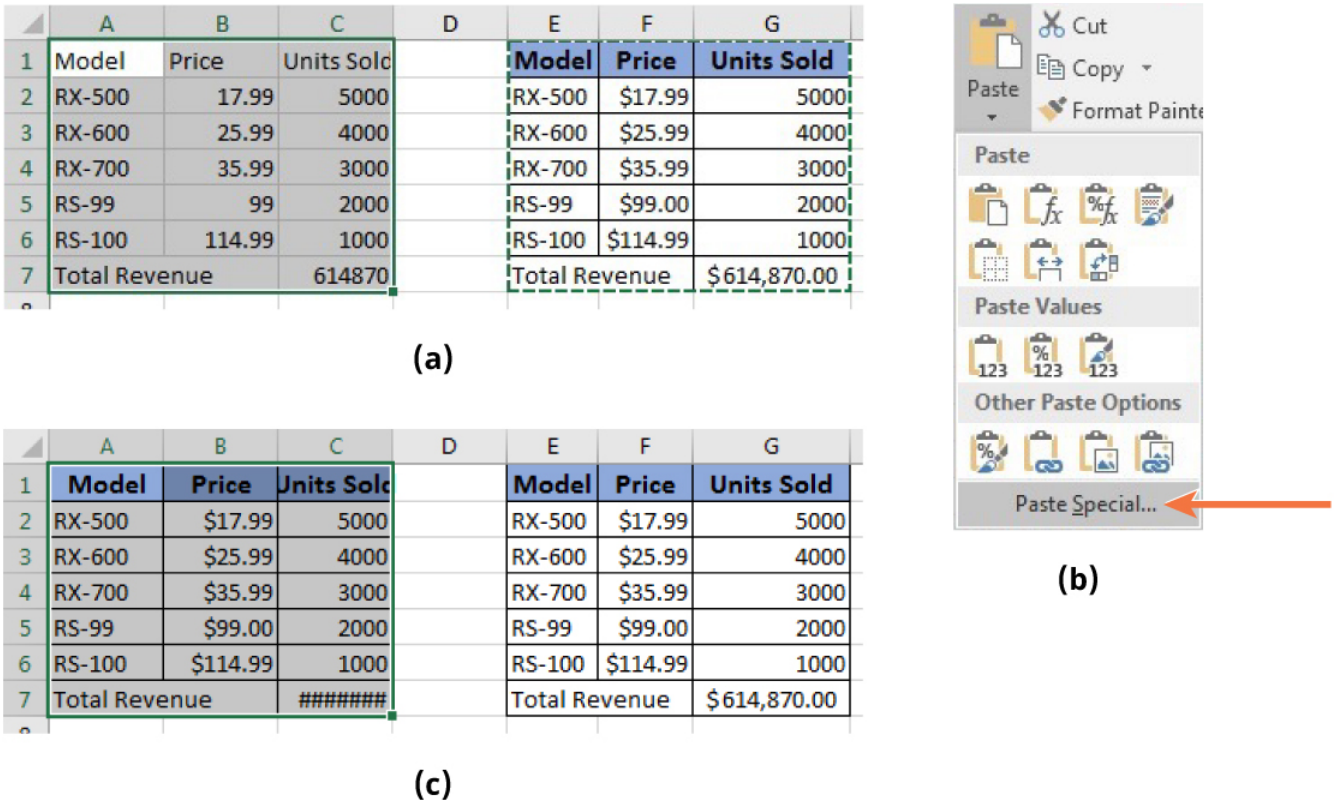


Figure 10.74: Paste Special can be used instead of the Format Painter tool. (a) First, copy the table with the formatting you want to apply. Then, highlight the table where you want to apply the formatting. (b) Choose Paste Special. (c) The tool applies the formatting only; it does not copy any of the cell contents. You would then adjust your column widths to avoid the error. (Used with permission from Microsoft)

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6.5: Preparing to Print

This page is a draft and is under active development.

Learning Objectives

- Adjust page settings for printing.
- Add footer information for user integrity.
- Preview a worksheet, adjust settings to print in a professional manner.
- Insert a 3D Model to enhance the visual appearance of a worksheet.

Previewing a Worksheet

Although printing large data sets is uncommon, it is an industry curiosity to set up Excel workbooks to print correctly, and to also add documentation as to when data was revised. Follow the below steps to prepare the worksheets to print.

1. Click on the **AdvancedFilter** worksheet. At the bottom of the screen choose the Page Layout option.



Figure 5.67 Page Layout View

2. At the bottom of the page, click into the left section, of the Add Footer panel.

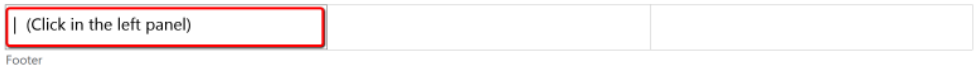


Figure 5.68 Footer Area Left Section

3. From the Header and Footer Design tab, choose to insert the Current Date field.



Figure 5.69 Date field in the Footer Area Left Section

4. Click in the right panel section, insert the File Name field.



Figure 5.70 File Name Footer Area Right Section

5. Click back into the spreadsheet to close the Header and Footer section, and choose the Normal page layout.
6. From the File tab, select Print. Change the Orientation to Landscape. In the Scaling section, choose **Fit Sheet on One Page.**

   Mac Users: click the **"Scale to Fit" option**

7. Save your work. You don't have to actually print this sheet. Go back to your worksheet.

Follow the below steps to add a footer to indicate when the last update was made and apply settings to the **EmployeeData** worksheet to ensure it will print correctly if needed.

1. Click the EmployeeData worksheet. At the bottom of the screen choose the Page Layout option. You may get a message telling you that Page Layout and Freeze Panes are not compatible. You should click **OK** to remove the Freeze Panes setting.
2. At the bottom of the page, click into the left section, of the Add Footer panel type **Revision Date:** add a space, then click the **Current Date button from the Ribbon**. Example: Revision Date: 1/01/2020.
3. Click in the center panel, add the page number field.
4. Click in the right panel section, type **Revised by:** then type Y**our Name**. Example: Revised by: Jane Doe
5. Click back into the spreadsheet to close the Header and Footer section, and choose the Normal page layout.
6. From the File tab, select Print. Change the Margins to **Narrow**. In the Scaling section, choose **Fit All Columns on One Page.**

Mac Users: set the "**Scale to Fit**" option to **1 page wide by 2 pages tall**. 

7. Save your work. Again, you do not have to print this sheet. Go back to the worksheet.

2054	Ruth	Olson	11/26/2004	13.10	10/4/1971	45	Seattle	FT	$64,845	3.5%	$2,269.58
2058	Angel	Palmer	2/22/2008	9.86	1/4/1960	56	San Diego	FT	$49,831	2.5%	$1,245.78
2062	Jose	Parham	12/4/2015	2.08	9/16/1970	46	Seattle	FT	$76,706	3.5%	$2,684.71
2066	Jennifer	Patterson	10/12/2015	2.22	12/2/1985	31	San Diego	FT	$91,240	2.5%	$2,281.00
2070	James	Pearce	12/4/2015	2.08	5/9/1959	57	Portland	FT	$96,282	2.0%	$1,925.64

Revision Date: (Type the Current Date) 1 Revised by: Student Name

Figure 5.65 Footer EmployeeData

INSERTING A 3D MODEL TO ENHANCE A WORKSHEET

Insert a 3D Model to the worksheet to enhance its appearance. In Excel, you can either insert Pictures, Shapes, Icons, SmartArt, Screenshots or 3D Models.



Figure 5.66 Illustrations Group

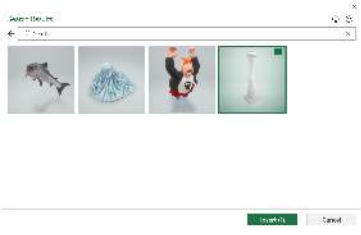
In this example, we will insert (from online) a 3D Model that looks like the Seattle Space Needle.

1. Click the Advanced Filter sheet tab, then click the Insert tab on the ribbon.
2. Click 3D Models button from the Illustrations group. (If necessary choose **From Online Sources or Stock 3D Models**.)



Mac Users: click the 3D Model icon button and then choose "**Stock 3D Models…**". 

3. In the Search box type **Tower,** and hit **Enter** from the keyboard.
4. From the results window, choose a model that looks like the Space Needle. And click Insert. **Again, if the Space Needle is not available in the gallery, click the Back arrow and find an alternate building or tower from the 3D Model "Buildings" category.**


Figure 5.67 3D Model Search Box

5. Notice the model can be manipulated 360 degrees tilted up and down to show a specific feature of the object. Adjust based on your preference.

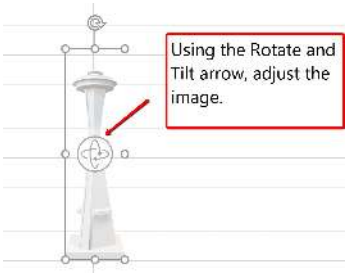


Figure 5.68 3D Model Image

6. Place, and resize the image to the upper left-hand corner of the sheet, above the last column of data. Make sure it does not overlap on the table.
7. Check the spelling on all of the worksheets and make any necessary changes. Save your work. Submit **CH5 HR Report** as directed by your instructor.

WCM Analytics
Advanced Filter Criteria
Seattle & San Diego Current Salaries

Store	Job Status	Current Salary	Current Salary
Seattle	FT	>=50000	<=60000
San Diego	FT	>=70000	<=80000

Employee ID	First Name	Last Name	Hire Date	Years of Servic	Birth Date	Age	Store	Job Statu	Current Salary	COLA	Projected Salary Increa
1350	Patrice	Hutton	12/29/2009	6.01	4/4/1953	63	San Diego	FT	$75,037	2.5%	$1,875.93
1310	Ruth	Fallis	1/22/2016	1.94	7/11/1953	63	Seattle	FT	$52,244	3.5%	$1,828.54
1394	Shanika	Lloyd	8/24/2004	13.36	8/11/1966	50	Seattle	FT	$53,186	3.5%	$1,861.51
3206	Larry	Roeder	1/29/2016	1.92	11/1/1982	34	Seattle	FT	$54,368	3.5%	$1,902.88
3214	Robert	Ross	8/28/2015	2.35	9/24/1974	42	Seattle	FT	$58,309	3.5%	$2,040.82
3242	Charles	Taylor	2/5/2012	3.90	1/18/1947	69	Seattle	FT	$58,291	3.5%	$2,040.19
3258	Johnny	Vazquez	9/18/2006	11.29	6/16/1953	63	Seattle	FT	$52,125	3.5%	$1,824.38

Figure 5.69 3D Model Solution

Key Takeaways

- When working with Excel workbooks, the final step should always be to review the worksheets in Print Preview to make sure they are printing appropriately.
- You can add images you have saved, or images you find online, to a worksheet to enhance its appearance. Be sure to resize and move them appropriately so they do not detract from the data.

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6.6: Chapter Practice

This page is a draft and is under active development.

Tables for a Tourism Company

Download Data File: PR5 Data

Travel and tour companies need to keep track of client data, as well as, travel/tour options and tour guides. Keeping up-to-date, accurate records is essential to their bottom line. To run a tour company, employees must be able to manipulate their data quickly and easily. This exercise illustrates how to use the skills presented in this chapter to generate the data needed on a daily basis by a tourism company.

1. Open the data file **PR5 Data** and save the file to your computer as **PR5 Canyon Trails**.
2. Click Sheet 1. Choose cell B3.
3. From the Home tab, choose Format as Table. Choose the Orange, Table Style Medium 3.
4. In J4, calculate Total Cost (number of Guests *Per Person Cost). Note Excel will add the formula to the entire column. (If prompted, choose to overwrite the formula to the cells below.)
5. Format Columns I and J with Accounting format, no decimal places.
6. Center all headings in Row 3.
7. Adjust column widths within the table so that all the headings are completely visible.
8. Rename Sheet 1 **Current Tours**. Sort this sheet alphabetically (A to Z) by Last Name.

Tours By Canyon



First Name	Last Name	Guests	Average Age	Home Country	Tour Canyon	Tour State	Days	Per Person Cost	Total Cost
Santos	Albert	2	58	Brazil	Grand Canyon National Park	Arizona	5	$ 550	$ 1,100
Ian	Armstrong	2	62	United States	Cedar Breaks National Monument	Utah	5	$ 550	$ 1,100
Laurie	Black	2	66	Canada	Fall Canyon Death Valley National Park	California	7	$ 900	$ 1,800
Richard	Branson	2	65	United Kingdom	Zion National Park	Utah	7	$ 900	$ 1,800
Vanessa	Burleigh	4	30	United Kingdom	Grand Canyon National Park	Arizona	7	$ 900	$ 3,600
Jim	Carrey	1	54	Canada	Canyon de Chelly National Monument	Arizona	5	$ 550	$ 550
Jennifer	Connelly	2	45	United States	Canyon de Chelly National Monument	Arizona	5	$ 550	$ 1,100
Ellen	Cronan	2	68	Canada	Bryce Canyon National Park	Utah	7	$ 900	$ 1,800
James	Doug	2	50	United Kingdom	Zion National Park	Utah	7	$ 900	$ 1,800
Marianne	Eliot	2	50	United States	Yellowstone National Park	Wyoming	5	$ 550	$ 1,100
Jonas	Finamore	2	45	United Kingdom	Yellowstone National Park	Wyoming	3	$ 450	$ 900
James	Gardipee	1	46	United States	Grand Canyon National Park	Arizona	5	$ 550	$ 550
Sharon	Glatz	2	63	Australia	Cedar Breaks National Monument	Utah	3	$ 450	$ 900
Sofia	Guthenberg	1	60	Canada	Glen Canyon National Recreation Area	Arizona	3	$ 450	$ 450
Yoko	Hanamoto	2	29	Japan	Black Canyon of the Gunnison National Park	Colorado	7	$ 900	$ 1,800
Charles	Hector	2	56	United States	Zion National Park	Utah	7	$ 900	$ 1,800
Scarlett	Johansson	3	31	United States	Fall Canyon Death Valley National Park	California	7	$ 900	$ 2,700
Sally	Kee	4	57	Canada	Glen Canyon National Recreation Area	Arizona	3	$ 450	$ 1,800
Frank	Kee	3	58	United States	Zion National Park	Utah	7	$ 900	$ 2,700
Rosella	Kim	2	40	United States	Zion National Park	Utah	7	$ 900	$ 1,800
Deborah	Klein	2	65	Germany	Fall Canyon Death Valley National Park	California	5	$ 550	$ 1,100
Nick	Kopec	2	65	United Kingdom	Black Canyon of the Gunnison National Park	Colorado	5	$ 550	$ 1,100
Grace	Kruger	2	56	Germany	Black Canyon of the Gunnison National Park	Colorado	7	$ 900	$ 1,800
Erik	Laarson	2	63	Canada	Black Canyon of the Gunnison National Park	Colorado	5	$ 550	$ 1,100
Samuel	Larocca	2	59	Brazil	Cedar Breaks National Monument	Utah	7	$ 900	$ 1,800

Figure 5.70 Current Tours

9. Make a copy of the Current Tours sheet and rename it **Tours by Canyon**. One way to make a copy of a worksheet is to right-click on the worksheet tab (**Mac Users**: Ctrl+click) and select Move o **Copy** box. Place the Tours by Canyon sheet to the right of the Current Tours sheet.
10. Sort the Tours by Canyon sheet by **Tour Canyon, Home Country,** and then **Last Name** all in Ascending order (A to Z).



Figure 5.71 Tours by Canyon

11. Make another copy of the Current Tours sheet and rename it **US Guests**. Place the US Guests sheet to the right of the Tours by Canyon sheet.
12. Filter the **US Guests** sheet to display customers who live in the United States. Sort the filtered data alphabetically (A to Z) by Tour State. Add a Total Row that sums the Guests and Total Cost columr

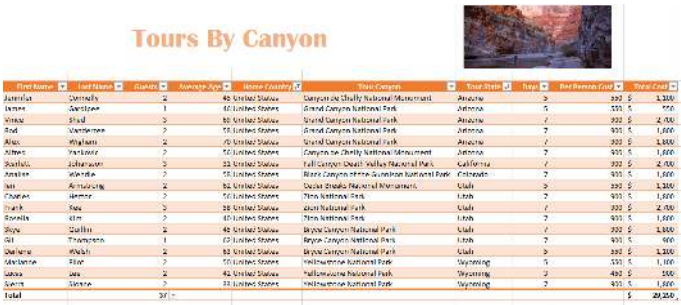


Figure 5.72 US Guests

13. Make another copy of the Current Tours sheet and rename it, **European Guests**. Place the European Guests sheet to the right of the US Guests sheet.
14. Insert a slicer in the **European Guests** sheet for Home Country. Move the top left corner of the slicer to the top left-hand corner of cell L3. Resize the slicer so all buttons display. Format the slicer to match the table.
15. Using the slicer, filter the data to display customers from Germany and the United Kingdom.
16. Sort the filtered data by the Home Country, and Last Name fields displaying both in Ascending order (A to Z).



Figure 5.73 European Guests

17. Click the Advanced Filter sheet. Using the Advanced Filter option, filter the Current Tours table based on the criteria given. Determine how many guests from Canada are taking tours in Arizona and Utah between the costs indicated in the criteria table. Place the results in A10.
18. Turn the results into a table. Format the table to match the criteria area. Turn on the total row and show the Sum of the Total Cost column.

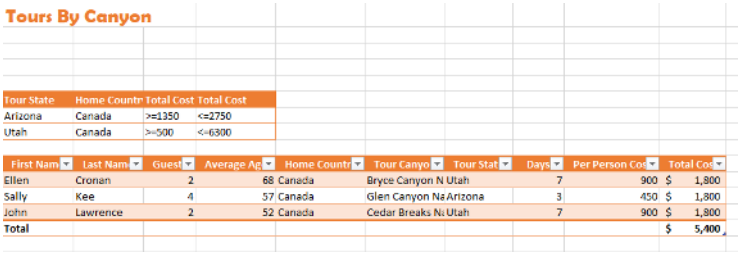


Figure 5.74 Advanced Filter

19. Select the Current Tours sheet. Click in the table area and insert a PivotTable as a new sheet. Name the sheet **ToursPT.** Run a report to show the Total Cost per Home Country, for each available Tour States. Format the numbers in currency format, zero decimal places. Choose a PivotStyle format to match the current orange theme.

Sum of Total Cost	Column Labels					
Row Labels	Arizona	California	Colorado	Utah	Wyoming	Grand Total
Australia	$1,800			$2,000	$2,200	$6,000
Brazil	$2,900			$1,800		$4,700
Canada	$3,900	$3,600	$1,100	$3,600	$2,200	$14,400
Germany	$1,800	$1,100	$3,600			$6,500
Japan			$1,800	$1,800		$3,600
United Kingdom	$5,400		$1,100	$6,300	$2,700	$15,500
United States	$9,750	$2,700	$1,800	$11,200	$3,800	$29,250
Grand Total	**$25,550**	**$7,400**	**$9,400**	**$26,700**	**$10,900**	**$79,950**

Figure 5.75 ToursPT

20. Make one more copy of the Current Tours sheet and rename it **Tours by State**. Place the Tours by State sheet to the right of the European Guests sheet. Go to the Table Tools and turn off the Banded Rows.
21. Subtotal the data by State, summing the Total Cost column. (**Note:** Remember to follow the four rules of subtotaling!)
22. After you subtotal, turn on filters and filter out 3-day tours in the table.



Tours By Canyon

First Name	Last Name	Guests	Average Age	Home Country	Tour Canyon	Tour State	Days	Per Person Cost	Total Cost
Santos	Albert	2	58	Brazil	Grand Canyon National Park	Arizona	5	550	$ 1,100
Vanessa	Burleigh	4	30	United Kingdom	Grand Canyon National Park	Arizona	7	900	$ 3,600
Jim	Carrey	1	54	Canada	Canyon de Chelly National Monument	Arizona	5	550	$ 550
Jennifer	Connelly	2	45	United States	Canyon de Chelly National Monument	Arizona	5	550	$ 1,100
James	Gardipee	1	46	United States	Grand Canyon National Park	Arizona	5	550	$ 550
Leonora	Maag	2	45	Brazil	Grand Canyon National Park	Arizona	7	900	$ 1,800
Raymond	Mah	2	55	Canada	Grand Canyon National Park	Arizona	5	550	$ 1,100
Pat	Rhinehart	2	73	Germany	Grand Canyon National Park	Arizona	7	900	$ 1,800
Vince	Shad	3	69	United States	Grand Canyon National Park	Arizona	7	900	$ 2,700
Indira	Singh	2	55	United Kingdom	Glen Canyon National Recreation Area	Arizona	7	900	$ 1,800
Rod	Vanderzee	2	58	United States	Grand Canyon National Park	Arizona	7	900	$ 1,800
Alex	Wigham	2	70	United States	Grand Canyon National Park	Arizona	7	900	$ 1,800
Alfred	Yankovic	2	56	United States	Canyon de Chelly National Monument	Arizona	7	900	$ 1,800
						Arizona Total			$ 21,500
Laurie	Black	2	66	Canada	Fall Canyon Death Valley National Park	California	7	900	$ 1,800
Scarlett	Johansson	3	31	United States	Fall Canyon Death Valley National Park	California	7	900	$ 2,700
Deborah	Klein	2	65	Germany	Fall Canyon Death Valley National Park	California	5	550	$ 1,100
Jolene	Terry	2	67	Canada	Fall Canyon Death Valley National Park	California	7	900	$ 1,800
						California Total			$ 7,400
Yoko	Hanamoto	2	29	Japan	Black Canyon of the Gunnison National Park	Colorado	7	900	$ 1,800
Nick	Kopec	2	65	United Kingdom	Black Canyon of the Gunnison National Park	Colorado	5	550	$ 1,100
Grace	Kruger	2	56	Germany	Black Canyon of the Gunnison National Park	Colorado	7	900	$ 1,800
Erik	Laarson	2	63	Canada	Black Canyon of the Gunnison National Park	Colorado	5	550	$ 1,100
Ingrid	Schultz	2	57	Germany	Black Canyon of the Gunnison National Park	Colorado	7	900	$ 1,800
Analise	Wendle	2	58	United States	Black Canyon of the Gunnison National Park	Colorado	7	900	$ 1,800
						Colorado Total			$ 9,400

Figure 5.76 Subtotal

23. On each worksheet, make the following print setup changes:
    a. Add a footer with the **current date, worksheet name**, and your name.
    b. Change to Landscape Orientation
    c. Set the scaling to Fit All Columns on One Page
    d. For any worksheets that print on more than one page, add **Print Titles** to repeat the first three rows at the top of each page.
24. Check the spelling on all of the worksheets and make any necessary changes. Save the **PR5 Canyon Trails** workbook. Submit the **PR5 Canyon Trails** workbook as directed by your instructor.

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CHAPTER OVERVIEW

7: Data Analysis With Excel

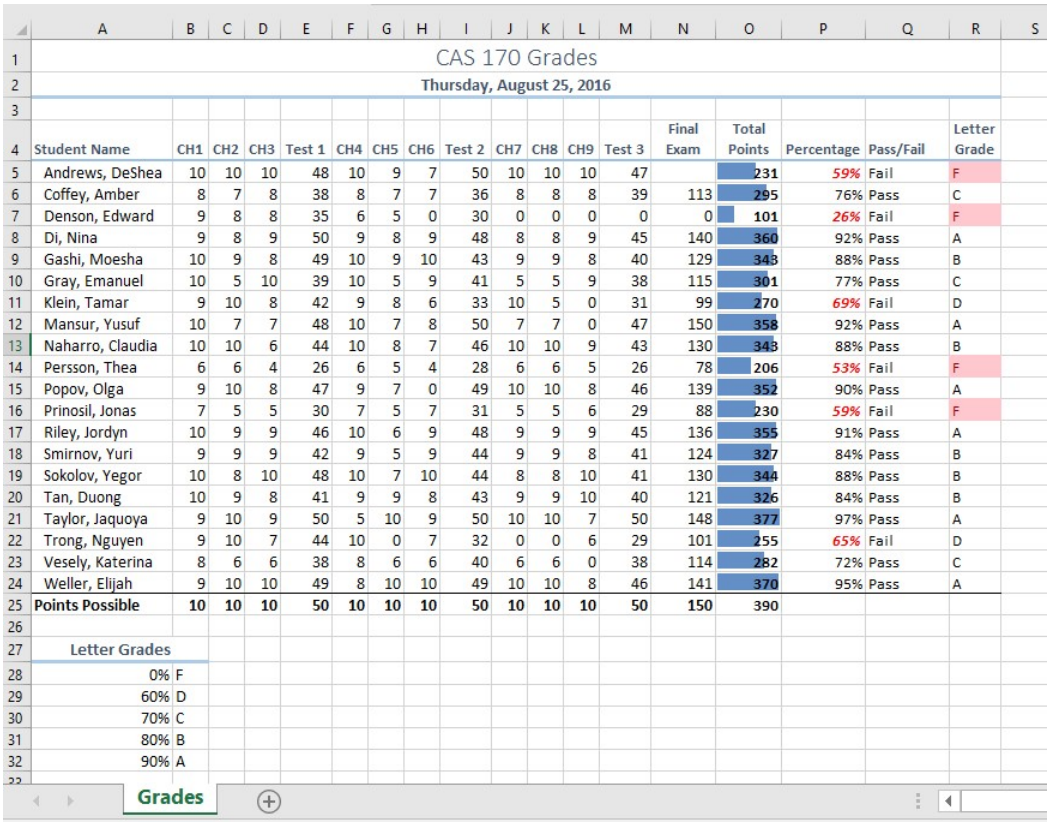
> This page is a draft and is under active development.

Excel workbooks are designed to allow you to create useful and complex calculations. In addition to doing arithmetic, you can use Excel to look up data, and to display results based on logical conditions. We will also look at ways to highlight specific results. These skills will be demonstrated in the context of a typical gradebook spreadsheet that contains the results for an imaginary Excel class.

In this chapter, we will:

- Use the **Quick Analysis Tool** to find the Total Points for all students and Points Possible.
  (**Note for Mac Users**: the Quick Analysis Tool is not available with Excel for Mac. We have alternate steps for Mac Users)
- Write a division formula to find the Percentage for each student, using an absolute reference to the Total Points Possible.
- Write an **IF Function** to determine Pass/Fail – passing is 70% or higher.
- Write a **VLOOKUP** to determine the Letter Grade using the Letter Grades scale.
- Use the **TODAY** function to insert the current date.
- Review common **Error Messages** using Smart Lookup to get definitions of some of the terms in your spreadsheet.
- Apply **Data Bars** to the Total Points values.
- Apply **Conditional Formatting** to the Percentage, Pass/Fail, and Letter Grade columns.
- **Printing Review** – Change to Landscape, Scale to Fit Columns on One Page and Set Print Area.

Figure 3-1 shows the completed workbook that will be demonstrated in this chapter. Notice the techniques used in columns O and R that highlight the results of your calculations. Notice, also that there are more numbers on this version of the file than you will see in your original data file. These are all completed using Excel calculations.



CAS 170 Grades

Thursday, August 25, 2016

Student Name	CH1	CH2	CH3	Test 1	CH4	CH5	CH6	Test 2	CH7	CH8	CH9	Test 3	Final Exam	Total Points	Percentage	Pass/Fail	Letter Grade
Andrews, DeShea	10	10	10	48	10	9	7	50	10	10	10	47		231	59%	Fail	F
Coffey, Amber	8	7	8	38	8	7	7	36	8	8	8	39	113	295	76%	Pass	C
Denson, Edward	9	8	8	35	6	5	0	30	0	0	0	0	0	101	26%	Fail	F
Di, Nina	9	8	9	50	9	8	9	48	8	8	9	45	140	360	92%	Pass	A
Gashi, Moesha	10	9	8	49	10	9	10	43	9	9	8	40	129	343	88%	Pass	B
Gray, Emanuel	10	5	10	39	10	5	9	41	5	5	9	38	115	301	77%	Pass	C
Klein, Tamar	9	10	8	42	9	8	6	33	10	5	0	31	99	270	69%	Fail	D
Mansur, Yusuf	10	7	7	48	10	7	8	50	7	7	0	47	150	358	92%	Pass	A
Naharro, Claudia	10	10	6	44	10	8	7	46	10	10	9	43	130	343	88%	Pass	B
Persson, Thea	6	6	4	26	6	5	4	28	6	6	5	26	78	206	53%	Fail	F
Popov, Olga	9	10	8	47	9	7	0	49	10	10	8	46	139	352	90%	Pass	A
Prinosil, Jonas	7	5	5	30	7	5	7	31	5	5	6	29	88	230	59%	Fail	F
Riley, Jordyn	10	9	9	46	10	6	9	48	9	9	9	45	136	355	91%	Pass	A
Smirnov, Yuri	9	9	9	42	9	5	9	44	9	9	8	41	124	327	84%	Pass	B
Sokolov, Yegor	10	8	10	48	10	7	10	44	8	8	10	41	130	344	88%	Pass	B
Tan, Duong	10	9	8	41	9	9	8	43	9	9	10	40	121	326	84%	Pass	B
Taylor, Jaquoya	9	10	9	50	5	10	9	50	10	10	7	50	148	377	97%	Pass	A
Trong, Nguyen	9	10	7	44	10	0	7	32	0	0	6	29	101	255	65%	Fail	D
Vesely, Katerina	8	6	6	38	8	6	6	40	6	6	0	38	114	282	72%	Pass	C
Weller, Elijah	9	10	10	49	8	10	10	49	10	10	8	46	141	370	95%	Pass	A
Points Possible	**10**	**10**	**10**	**50**	**10**	**10**	**10**	**50**	**10**	**10**	**10**	**50**	**150**	390			

Letter Grades	
0%	F
60%	D
70%	C
80%	B
90%	A

Grades

Figure 3.1 Completed Gradebook Worksheet

7.1: PivotTables/Charts

7.2: More on Formulas and Functions

7.3: Logical and Lookup Functions

7.4: Auditing Formulas and Fixing Errors

7.5: Conditional Formatting

7.6: Preparing to Print

7.7: Chapter Practice

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7.1: PivotTables/Charts

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Manipulate and create calculated fields in a PivotTable
- Add slicers to a PivotTable
- Use timelines in a PivotTable

In business, you will sometimes hear references made to “big data.” In this context, “big data” refers to large, growing, and diverse datasets used by businesses to analyze performance and attract more customers. There are three components of big data: the velocity of data growth, the massive volume of data collected, and the variety of data collected and used in businesses. This data is collected through a process called data mining, which involves using software to make sense of all the data collected by the company and from outside sources. The goal is to analyze and evaluate large quantities of information and discover trends that may be useful to the company. Those trends could show purchasing patterns for a specific demographic group or identify a new competitor that businesses need to combat. The possibilities are as endless as the data that is collected. Through programs such as Excel and sophisticated data analytics software packages, the data can be synthesized to aid in decision-making in the business. The use of data for decision-making is applicable to all types and sizes of businesses and organizations.

You learned about PivotTables in Advanced Excel Formulas, Functions, and Techniques. Here, you will focus on the advanced features of PivotTables that help with data analysis. The PivotTable Analyze tab provides several tools that make data analysis a bit easier. Recall that the PivotTable Analyze tab is available when you have data formatted as a PivotTable, and you click inside the table (Figure 11.72).

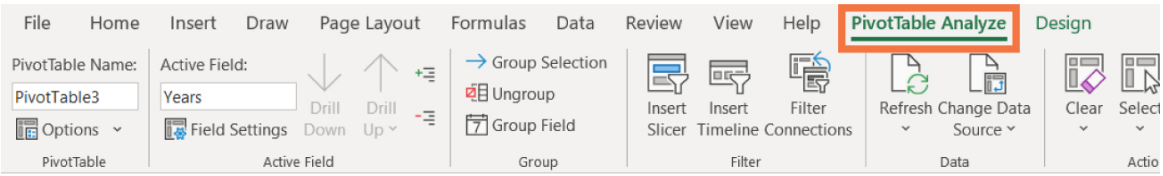


Figure 11.72: The PivotTable Analyze tab provides several tools that make data analysis streamlined. (Used with permission from Microsoft)

The Timeline and Slicer tools offer a more visual way to filter the data in the PivotTable. The Fields, Items, & Sets menu allows you to include more calculations in your analysis. There are additional options in this menu that can help facilitate data analysis in the PivotTable.

Insert Timeline

The Insert Timeline feature for a PivotTable allows you to quickly filter information based on a date field. You must have a field formatted as a date to use the Insert Timeline tool. Using the first four tabs in the Chapter 11 data file workbook ("timeline1," "timeline2," "timeline3," and "timeline4"), you can create a PivotTable using the skills learned in Advanced Excel Formulas, Functions, and Techniques. The PivotTable summarizes the enrollment English Index Score (EN Index Score) for various majors at a university over several years (Figure 11.73). You can use this data to see if there have been changes in the score over time. The Insert Timeline feature on the PivotTable Analyze tab allows you to add a date filter to the table.

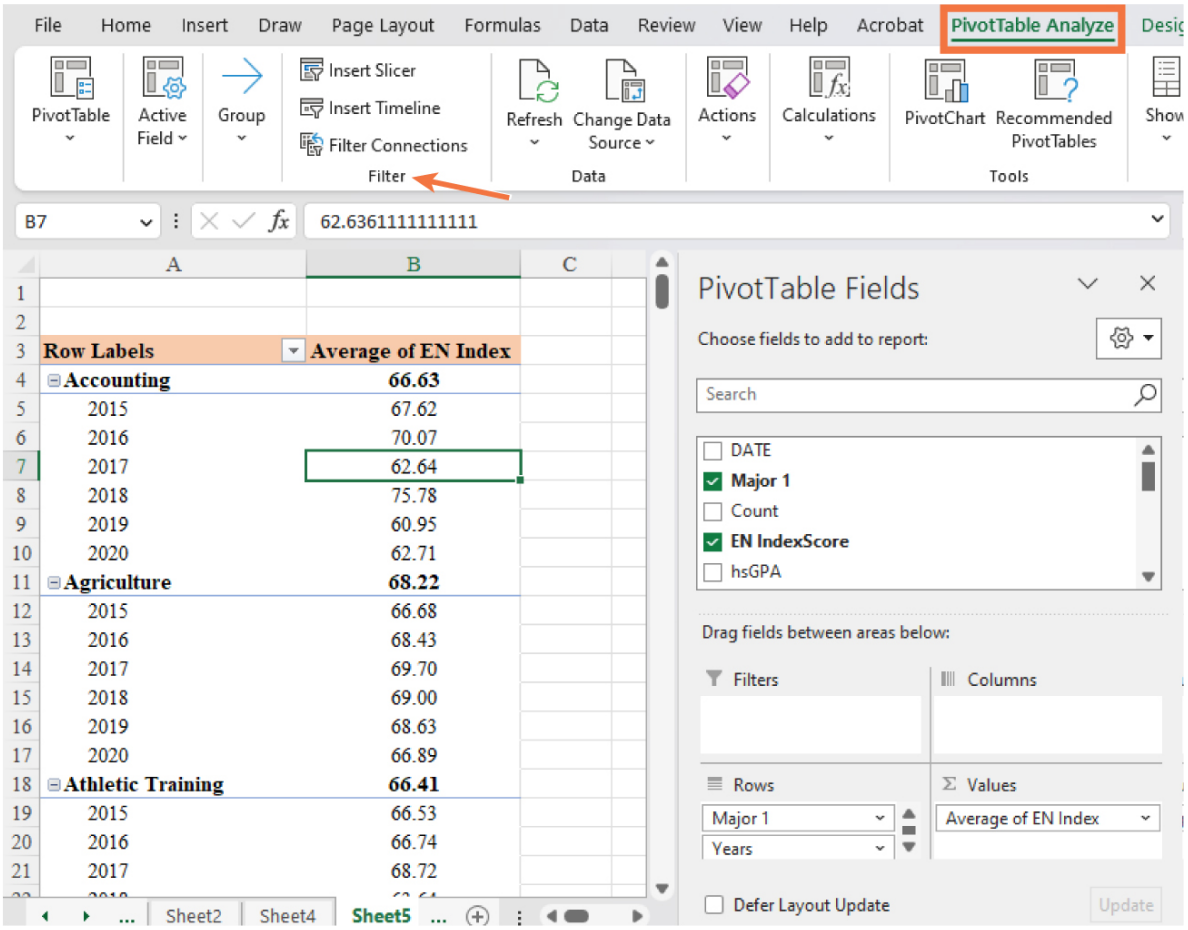


Figure 11.73: A date filter can be applied to a dataset with the Insert Timeline tool. (Used with permission from Microsoft)

Click in the PivotTable to bring up the PivotTable Analyze tab. Choose Insert Timeline from the Filter command group. Click the checkbox next to the field title that contains the date. In this example, the field is called DATE. Click OK. The timeline scroll bar will appear (Figure 11.74). In this case, you only have annual data, so you can change the unit to years instead of quarters, months, or days.

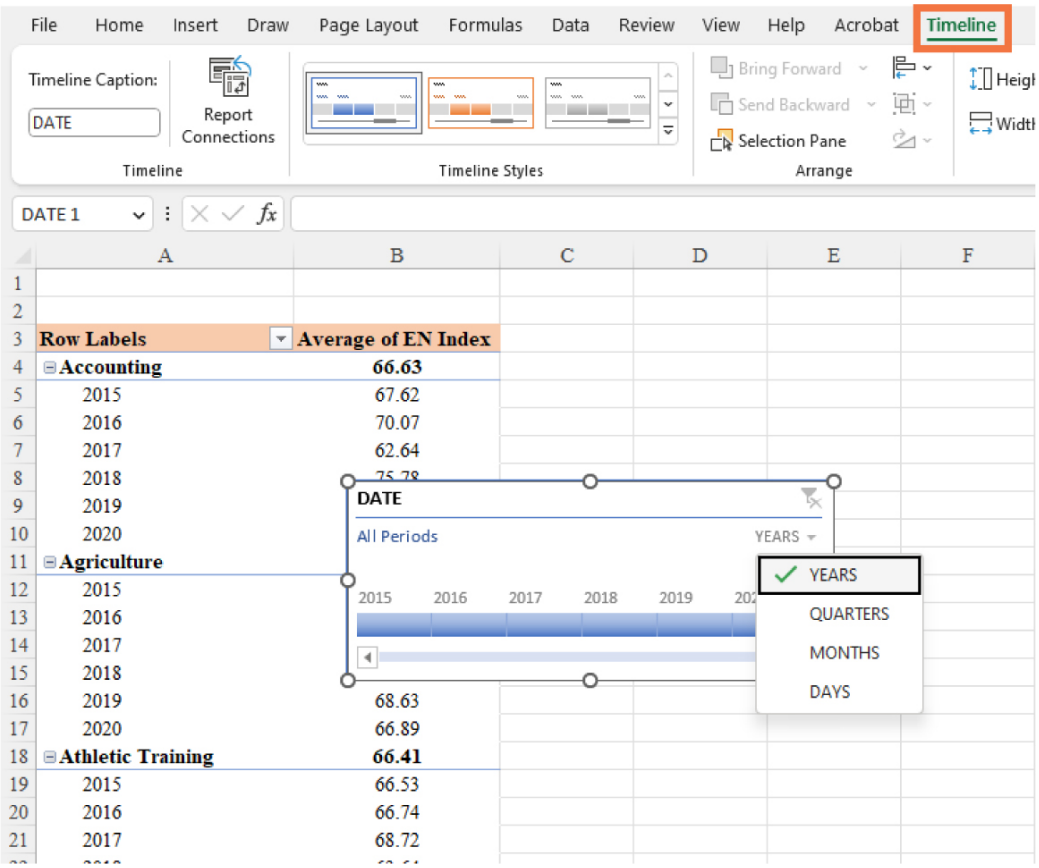


Figure 11.74: The timeline scroll bar offers a quick way to filter data using time such as years. (Used with permission from Microsoft)

Currently, the PivotTable shows all years available in the dataset. You can deselect those years that you do not want and keep only those that you are interested in examining. Let's select 2017 and 2018, which filters the table using those dates only. You can then use this filtered data for more in-depth analysis and calculations. To remove the timeline, right-click on the timeline scroll bar and choose Remove Timeline. If you had already filtered the data with the timeline, the data in the PivotTable will remain filtered to those dates. If you want the table to return to its original form with all of the dates included, be sure to click on the Remove Filter button prior to removing the timeline.

Insert Slicer

A slicer is a visual, interactive way to filter data in a PivotTable. When a PivotTable has slicers available, you can filter the data by clicking on buttons in the slicer as opposed to using the filter options in the column headings of a PivotTable. They are particularly useful when there are multiple users of a PivotTable who need to view the information that is relevant to their needs. You can add slicers through the PivotTable Analyze tab in the Filter command group.

Let's look again at the dataset of enrollment ACT scores. A PivotTable can be created to include the years, major, average high school grade point average (HS GPA), EN Index Score, and average ACT Math. You can insert a slicer to delve deeper into the data. Assume you want to look at the HS GPA for biology and chemistry majors compared with that of accounting and business majors. You can use a slicer to make this process easier. First, click in the PivotTable to access the PivotTable Analyze tab. Then, choose Insert Slicer. A selection window will appear (Figure 11.75). Click the checkbox next to Major 1. Click OK.

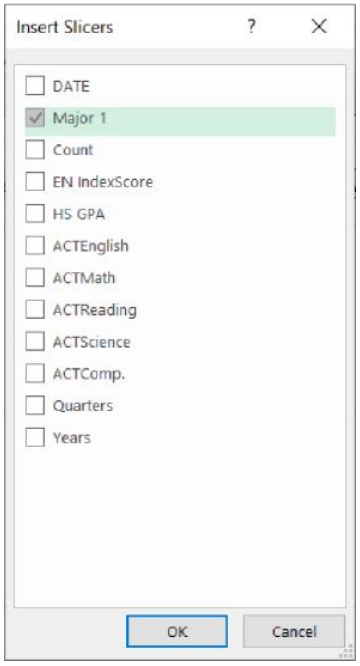


Figure 11.75: The Insert Slicer tool allows you to choose which variable to filter. (Used with permission from Microsoft)

The slicer will appear on the spreadsheet with selection buttons for each of the majors in the list. You can resize and format the slicer to meet your needs. You can also choose various slicer styles under the Slicer tab that becomes accessible when you click inside the slicer (Figure 11.76).

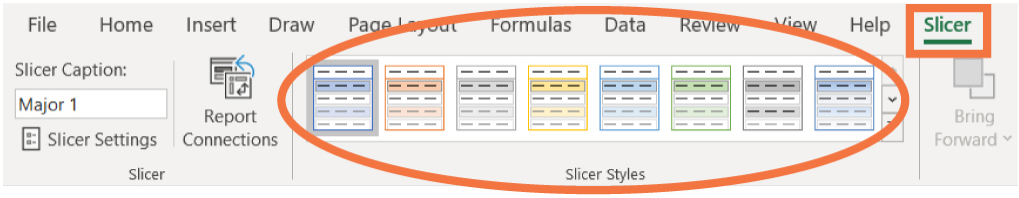


Figure 11.76: The Slicer tab appears when you have inserted a slicer into a PivotTable. (Used with permission from Microsoft)

When you insert the slicer, the default is for all majors to be selected, as indicated by the blue highlighted buttons (Figure 11.77). You can click on the Multi-Select option to remove all the majors and start building your table for analysis. For this example, you want to look at the differences in HS GPA for Biology, Chemistry, Accounting, and Business Administration. You will choose only those majors to be displayed in your PivotTable (Figure 11.78).

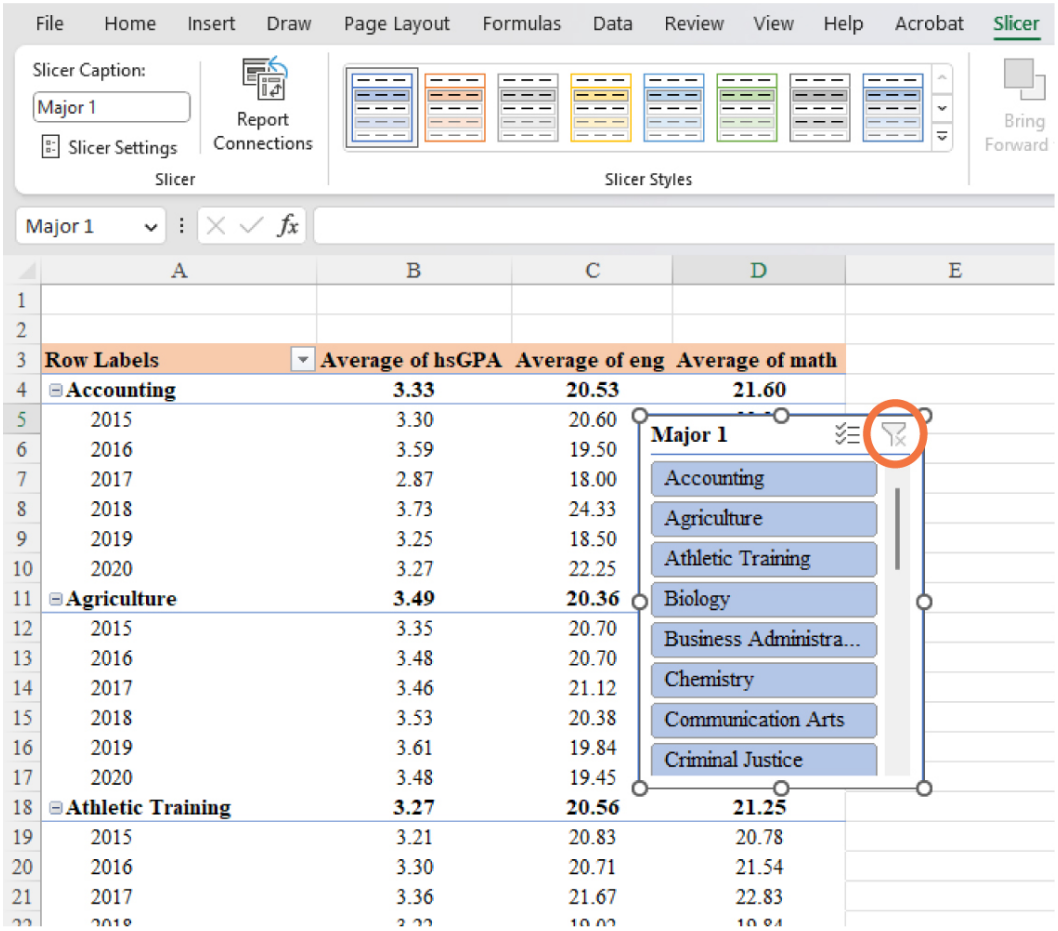


Figure 11.77: By inserting a slicer, a user can quickly filter data by simply clicking on the major of interest in this example. (Used with permission from Microsoft)

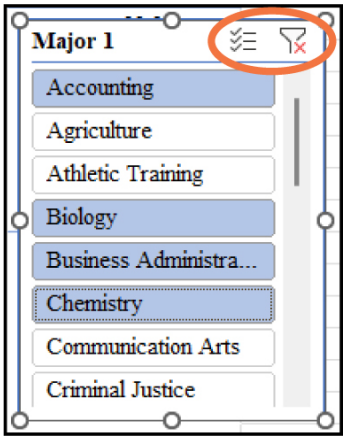


Figure 11.78: To remove a filter, click on the Remove Filter button. (Used with permission from Microsoft)

Choosing only these majors filters the table for an easier and more direct comparison. Remember, you could simply use the filter option in the column heading, but slicers are a convenient and interactive way to filter data. To remove the filter, click on the Remove Filter button in the top right of the slicer window. To remove the slicer entirely, right-click on the slicer and choose Remove Slicer. Be sure to remove the filters first if you want the data to return to its original form. Simply removing the slicer window will not also remove the filters you set in place.

Slicers are also available when you have data in a Data Table. With the data formatted as a Data Table, click inside the Data Table to bring up the Table Design tab. The Insert Slicer option is in the Tools command group (Figure 11.79). The process to insert, format, use, and remove slicers is the same as it is for PivotTables.

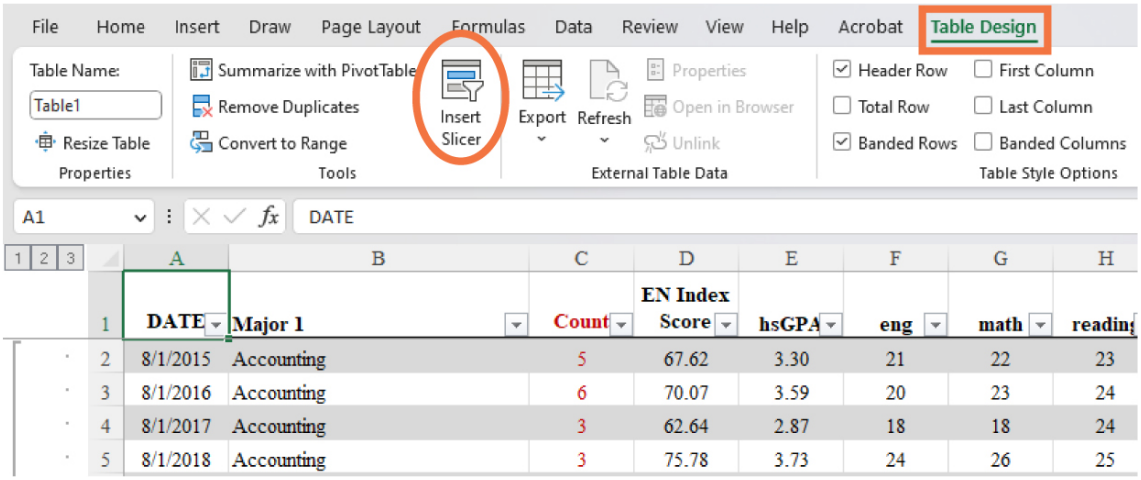


Figure 11.79: Slicers can be used with Data Tables as well through the Table Design tab. (Used with permission from Microsoft)

Link to Learning

PivotTable slicers are a great way to set up an interface so that users can better navigate the data file. You can make a dashboard of slicers to make it easier for users to select the data they need to see from the PivotTable. Read this article that provides a detailed example of setting up a dashboard with both slicers and timelines to learn more.

Calculated Field

The Calculated Field tool allows you to add columns of calculations to your PivotTable. The Calculated Field tool is accessed through the Fields, Items, & Sets menu on the PivotTable Analyze tab (Figure 11.80).

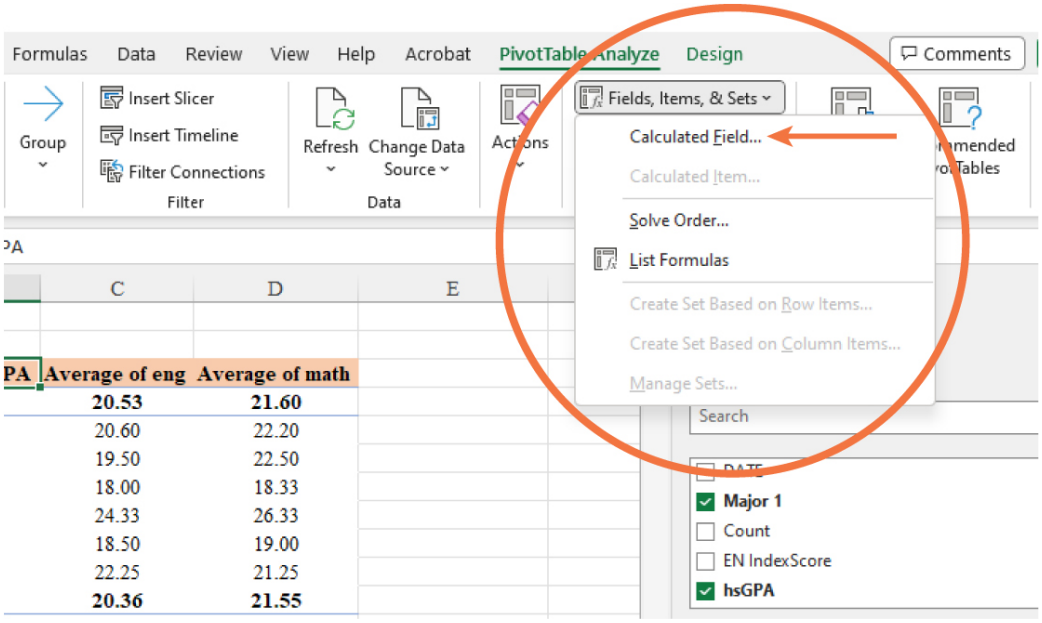


Figure 11.80: Calculated fields are added to a PivotTable through the PivotTable Analyze tab. (Used with permission from Microsoft)

These calculated field columns cannot be used with slicers, but they allow you to analyze the data in other ways. Using the dataset of enrollments and ACT scores, assume you want to get the average ACT scores across the various content areas (English, Math, etc.). You will need to get an average of the four ACT scores as a calculated field column. Click inside the PivotTable to access the PivotTable Analyze tab; choose Fields, Items, & Sets; and click on Calculated Field. An input window will appear (Figure 11.81).

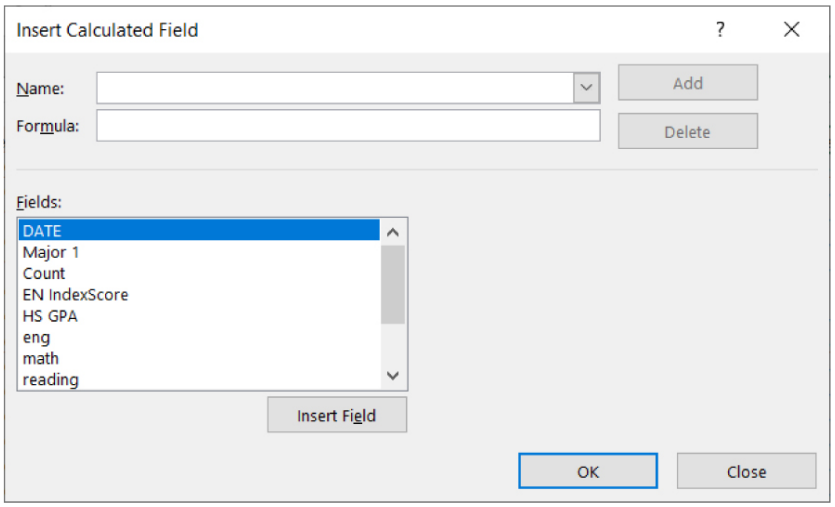
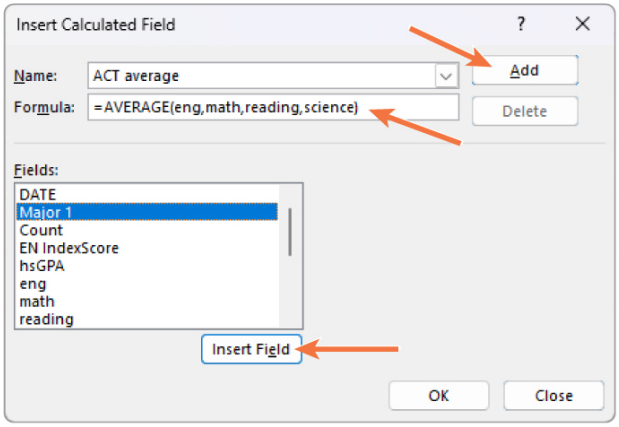
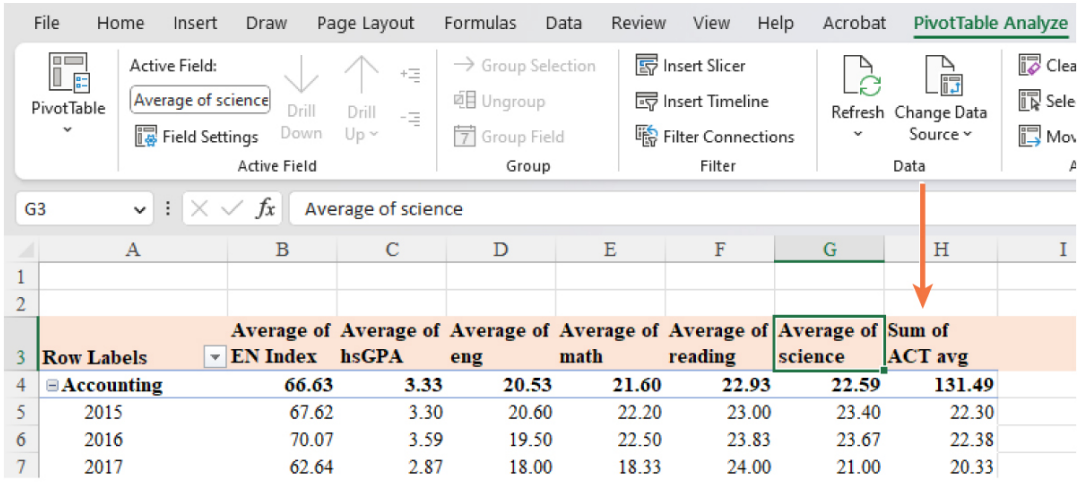


Figure 11.81: Select the variable for the calculated field in the Insert Calculated Field window. (Used with permission from Microsoft)

You will need to name the calculated field—use “ACT average” for this example—and then you can input the formula. Remember that all formulas in Excel need to begin with an equals sign. You can use functions such as AVERAGE, SUM, and IF, as appropriate for your needs. For this example, you want the average of the English, Math, Reading, and Science fields. To accomplish this, type in the Formula input box “=AVERAGE(” to begin. Then, choose “eng” from the Fields list and select Insert Field. Then, type a comma and insert the next field, “math.” At the end of the formula, make sure to close your parentheses and then check for extra spaces in the formula. Then, click Add to create the calculated field. Finally, click OK (Figure 11.82a). You will now see the calculated field column in your PivotTable (Figure 11.82b).



(a)



Row Labels	Average of EN Index	Average of hsGPA	Average of eng	Average of math	Average of reading	Average of science	Sum of ACT avg
Accounting	**66.63**	**3.33**	**20.53**	**21.60**	**22.93**	**22.59**	**131.49**
2015	67.62	3.30	20.60	22.20	23.00	23.40	22.30
2016	70.07	3.59	19.50	22.50	23.83	23.67	22.38
2017	62.64	2.87	18.00	18.33	24.00	21.00	20.33

(b)

Figure 11.82: Using the (a) Calculated Field feature will add (b) a new column to the PivotTable. (Used with permission from Microsoft)

The default setting for the column headings in PivotTables is “Sum of” even though you are calculating an average. When you created the calculated field, you named the field ACT average, but that is not the column heading Excel will use. Excel will automatically add on “Sum of” to the column heading. You can change that by simply clicking on the column heading and deleting the words “Sum of.” Notice the data in the first cell in the ACT average column for each major is much larger than the other numbers in the major. This cell represents the sum of all the averages for the subgroup. For accounting, 131.49 is the sum of the average ACT numbers for the years 2015 to 2020. Excel automatically adds the subtotal to the first field in the Rows list. This number is probably not as valuable as the averages per year under each major. You can delete this value by choosing the field settings for Major 1 and under Subtotals, select None (Figure 11.83).

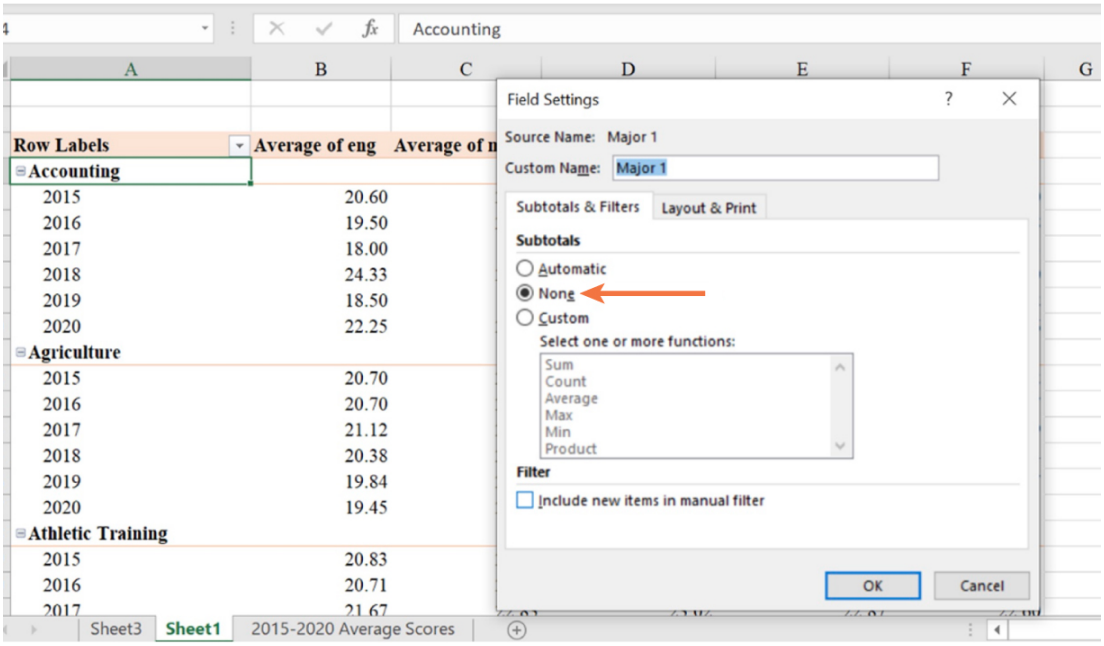


Figure 11.83: The default setting is “Automatic.” This adds the subtotal for the first field in Rows in the PivotTable. (Used with permission from Microsoft)

Adding this calculated field for the accounting majors, you can see that the average ACT was at its lowest in 2019 and at its highest in 2018. Calculated fields can be used with sales and expense information to determine your profit, profit margin, and other similar calculations.

There are other options in the Insert Calculated Field input window that may also be useful. You can select the calculated field from the list and modify it to make changes. You can also select that calculated field and delete it entirely. Click OK after making your changes or deleting the calculated field. If you delete the field, the column will be removed from the PivotTable.

List Formulas

If there are multiple users of a data file, it can be important to ensure everyone is aware of the calculations behind the columns. This will assist the users in understanding the dataset and the information contained within. The List Formulas option in the Fields, Items, & Sets menu creates a separate tab that lists all the formulas (calculated fields) used in a PivotTable (Figure 11.84). This option is accessed when you are in the PivotTable in the PivotTable Analyze tab. Then, go to Field, Items, & Sets to get to List Formulas. It is good practice to include this with all data files that have multiple calculated fields. The list is not dynamic. If you create additional fields after the list is created, you will need to delete the original list and create a new one.

	A	B	C	D	E	F	G
1	*Calculated Field*						
2	**Solve Order**	**Field**	**Formula**				
3	1	ACT average	=AVERAGE(eng,math,reading,science)				
4	2	sum math science	=math+science				
5	3	ratio of math to avg	=math /'ACT average'				
6							
7	*Calculated Item*						
8	**Solve Order**	**Item**	**Formula**				
9							
10							
11	*Note:*	When a cell is updated by more than one formula,					
12		the value is set by the formula with the last solve order.					
13							
14		To change the solve order for multiple calculated items or fields,					
15		on the Options tab, in the Calculations group, click Fields, Items, & Sets, and then click Solve Order.					

Figure 11.84: If there are multiple users for a spreadsheet, use the List Formulas tool to make sure all users are aware of the calculated fields and solve order in a PivotTable. (Used with permission from Microsoft)

Real-World Application - Tracking Spending

PivotTables can be a powerful tool to manage finances in a business or for your personal retirement planning. They allow you to compare data, as well as identify trends and patterns in the data. They are especially useful when you have a large amount of data. PivotTables can summarize this data, as well as provide interactive capabilities that allow you to adjust the different variables and investigate their influence. For instance, perhaps you would like to investigate spending and determine different considerations, such as how much is being spent, by whom, and on what. The same scenario can be applied to your own personal budget. Consider how you can use a PivotTable to track your own spending:

- How might this process be adjusted for a small business?
- What are some other uses of PivotTables in small businesses that you can think of?

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7.2: More on Formulas and Functions

This page is a draft and is under active development.

Learning Objectives

- Review the use of the =MAX function.
- Examine the Quick Analysis Tool to create standard calculations, formatting, and charts very quickly.
- Create Percentage calculation.
  – Use the Smart Lookup tool to acquire additional information about percentage calculations.
  – Review the use of Absolute cell reference in a division formula.

Another use for =MAX

Before we move on to the more interesting calculations we will be discussing in this chapter, we need to determine how many points it is possible for each student to earn for each of the assignments. This information will go into Row 25. The **=MAX** function is our tool of choice.

Download Data File: CH3 Data

1. Open the data file **CH3 Data** and save the file to your computer as **CH3 Gradebook and Parks**.
2. Make B25 your active cell.
3. Start typing **=MAX** (See **Figure 3.2**) Note the explanation you see on the offered list of functions. You can either keep typing (or double click MAX from the list).

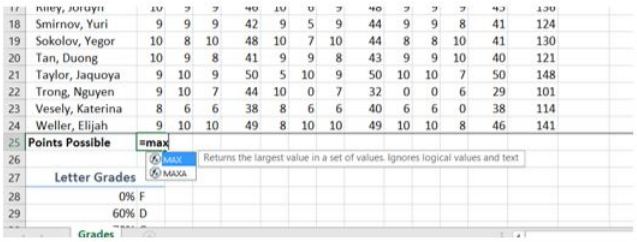


Figure 3.2 Entering a function

4. Select the range of numbers above row 25. Your calculation will be: **=MAX(B5:B24).**
5. Press Enter after selecting the range.
6. Now, use the Fill Handle to copy the calculation from Column B through Column N.
   Note that as you copy the calculation from one column to the next, the cell references change. The calculation in column B reads: **=MAX(B5:B24)**. The one in column N reads: **=MAX(N5:N24)**. These cell references are relative references.

By default, the calculations that Excel copies change their cell references **relative** to the row or column you copy them to. That makes sense. You wouldn't want column N to display an answer that uses the values in column L.

Want to see all the calculations you have just created? Press **Ctrl ~** (See **Figure 3.3**.) **Ctrl ~** displays your calculations (formulas). Pressing **Ctrl ~** a second time will display your calculations in the default view – as values.

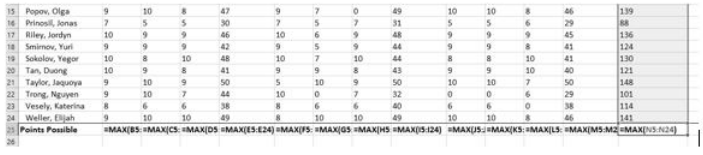


Figure 3.3 Relative References – Displayed as calculations.

Quick Analysis Tool

The Quick Analysis Tool allows you to create standard calculations, formatting, and charts very quickly. In this exercise we will use it to insert the Total Points for each student in Column O.

Mac Users: the Quick Analysis Tool is not available with Excel for Mac. We have alternate steps for Mac Users below. Skip down below Figure 3.5 to continue.)

Be sure to press **Ctrl** ~ to return your spreadsheet to the normal view (the formula results should display, not the formulas themselves).

1. Select the range of cells **B5:N25**
2. In the lower right corner of your selection, you will see the Quick Analysis tool (see **Figure 3.4**).

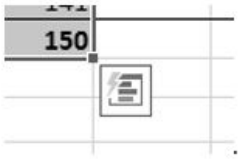


Figure 3.4 Quick Analysis Tool

3. When you click on it, you will see that there are a number of different options. This time we will be using the **Totals** option. In future exercises, we will use other options.
4. Select **Totals**, and then the **SUM** option that highlights the right column (see **Figure 3.5**). Selecting that SUM option places =SUM() calculations in column O.

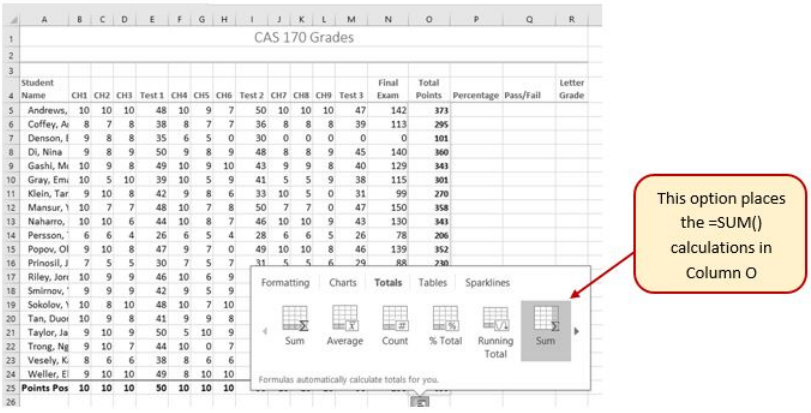


Figure 3.5 Quick Analysis Tool – Totals, Sum Column

Alternate steps for Mac Users:

1. Select the range B5:O25 then click the AutoSum button on the Ribbon (Home tab or Formulas tab)
2. Select the range O5:O25 and click the Bold button.

Percentage calculation

Column P requires a Percentage calculation. Before we launch into creating a calculation for this, it might be handy to know precisely what it is we are looking for. If you are connected to the internet and are using Excel 365, you can use the **Smart Lookup** tool to get some more information about calculating percentages.

In general, the Smart Lookup tool allows you to get more information and definitions about unfamiliar terms or features. This tool is available in all of the Microsoft Office applications.

1. Select cell P4.
2. Find the **Smart Lookup** tool on the **Review** tab (see **Figure 3.6**) and click it. You can also "Right-click" the specific cell and choose **Smart Lookup.**

   Mac Users: The **Smart Lookup** tool is only on the **Review** tab in the latest versions of Excel for Mac. If you can't find the **Smart Lookup** tool on the **Review** tab, you will find it by clicking on the "**Tools**" menu bar option.
   Note for all users: there is a keyboard shortcut for using the Smart Lookup tool. You can hold down the Control key and click in the specific cell (in this case, P4)

3. If this is the first time you have used the Smart Lookup tool, you may need to respond to a statement about your privacy. Press the **Got it** button. We think the Wikipedia article does a pretty good job explaining the calculation, don't you?
4. Close the Smart Lookup pane after reading through the definitions.

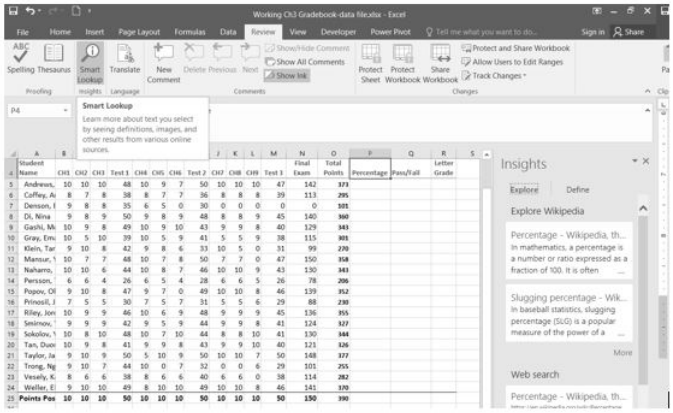


Figure 3.6 Smart Lookup tool

Now that we know what is needed for the Percentage calculation, we can have Excel do the calculation for us. We need to divide the **Total Points** for each student by the **Total Points** of all the **Points Possible**. Notice that there is a different number on each row – for each student. But, there is only one **Total Points Possible** – the value that is in cell **O25**.

1. Make sure that P5 is your active cell.
2. Press = then select cell **O5**. Press /, then cell **O25**. Your calculation should look like this: **=O5/O25**. The result of the formula should be **0.95641026**. (So far, so good. DeShea Andrews is doing well in this class – with a percentage grade of almost 96%. Definitely an "A"!)
3. Next use the Fill handle to copy the calculation down through row 24 to calculate the other students' grades. You should get the error message **#DIV/0!**. This error message reminds us that you can't divide a number by 0 (zero). And that is just what is happening. If you look at the calculation in P9, the calculation reads: =O9/O29. The first cell reference is correct – it points to Moesha Gashi's total points for the class. But the second reference is wrong. It points to an empty cell – O29.

Before copying the calculation, we have to make the second reference (O25) an **absolute cell reference**. That way, when we copy the formula down, the cell reference for O25 will be locked and will not change.

1. Make P5 your active cell. In the Formula Bar click on O25 (see **Figure 3.7**).
2. Press F4 (on the function keys at the top of your keyboard). That will make the O25 reference absolute. It will not change when you copy the calculation (see **Figure 3.8**). (If you are working on a laptop and do not have an F4 function key, you can type in a $ before the O and another one before the 25.)
3. The calculation now looks like this: **=O5/$O$25.**
4. Use the Fill Handle to copy the formula down through P24 again. Now, when you copy the formula, you will get correct values for all of the students.

	Cost		Units
Work in process			
Beginning balance: materials	$ 1,550	Beginning units	650
Beginning balance: conversion	2,500	Transferred in	1,780
Materials	7,441	Transferred out	1,810
Labor	14,520		
Overhead	7,930		

Figure 3.7 Editing a formula

Costs to Account For	
Beginning inventory: materials	$ 5,000
Beginning inventory: conversion	1,000
Direct material	24,170
Direct labor	44,500
Applied overhead	12,400
Transferred-in materials	8,000
Transferred-in conversion	10,200
Total costs to account for	$105,270

Units to Account For	
Beginning work in process	3,500
Units started into production	85,000
Transferred out	84,000

Figure 3.8 Absolute Cell reference – press F4

Those long decimals are a bit nonstandard. Let's change them to % by applying cell formatting.

1. Select the range P5:P24.
2. On the Home tab, in the Number Group, select the % (Percent Style) button.

Skill Refresher

Absolute References

1. Click in front of the column letter of a cell reference in a formula or function that you do not want altered when the formula or function is pasted into a new cell location.
2. Press the F4 key or type a dollar sign ($) in front of the column letter and row number of the cell reference.

Keyboard Shortcuts

Smart Lookup Tool

- Hold down the CTRL key and click the specific cell that you are working with. Then choose "**Smart Lookup**"
- **Mac Users**: Same as above

Key Takeaways

- Functions can be created using cell ranges or selected cell locations separated by commas. Make sure you use a cell range (two cell locations separated by a colon) when applying a statistical function to a contiguous range of cells.
- To prevent Excel from changing the cell references in a formula or function when they are pasted to a new cell location, you must use an absolute reference. You can do this by placing a dollar sign ($) in front of the column letter and row number of a cell reference or by using the F4 function key.
- The #DIV/0 error appears if you create a formula that attempts to divide a constant or the value in a cell reference by zero.

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7.3: Logical and Lookup Functions

This page is a draft and is under active development.

Learning Objectives

- Use an IF Function to make logical comparisons between a value and what you expect.
- Create a VLOOKUP calculation to look up information in a table.
- Understand error messages.
- Understand how to enter and format Date/Time Functions.

In addition to doing arithmetic, Excel can do other kinds of functions based on the data in your spreadsheet. In this section, we will use an **=IF** function to determine whether a student is passing or failing the class. Then, we will use a **=VLOOKUP** function to determine what grade each student has earned.

IF Function

The IF function is one of the most popular functions in Excel. It allows you to make logical comparisons between a value and what you expect. In its simplest form, the IF function says something like:
If the value in a cell is what you expect (true) – do this. If not – do that.

The IF function has three arguments:

- **Logical test –** Here, we can test to see if the value in a selected cell is what we expect. You could use something like “B7=14” or “B7>12” or “B7<6”
- **Value_if_true –** If the requirements in the logical test are met – if B7 is equal to 14 – then it is said to be true. For this argument, you can type text – “True”, or “On budget!” Or you could insert a calculation, like B7*2 (If B7 does equal 14, multiply it by 2). Or, if you want Excel to put nothing at all in the cell, type “” (two quotes).
- **Value_if_false** – If the requirements in the logical test are not met – if B7 does not equal 14 – then it is said to be false. You can enter the same instructions here as you did above. Let’s say that you type the double quotes here. Then, if B7 does not equal 14, nothing will be displayed in this cell.

In column Q we would like Excel to tell us whether a student is passing – or failing the class. If the student scores **70%** or better, he/she will pass the class. But, if he/she scores less than 70%, he/she is failing.

1. Make sure that Q5 is your active cell.
2. On the Formulas tab, in the Function Library group, find the IF function on the Logical pulldown menu (see **Figure 3.9**).
   Mac Users: There is no “Function Library” group for Excel for Mac. Mac Users should click on the Formulas tab, then click the “Logical” tool  list arrow, and choose IF (see **Figure 3.9).**

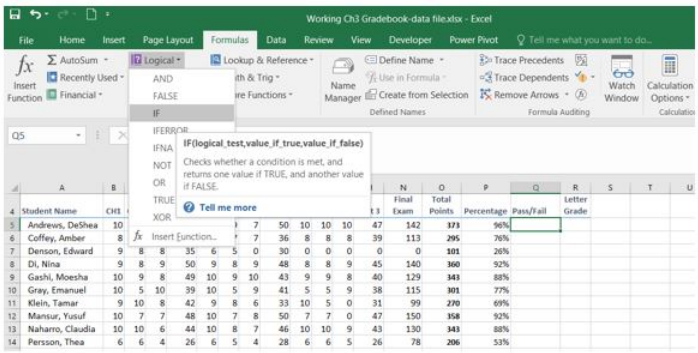


Figure 3.9 IF Function

Now you will see the IF Function dialog box, with a place to enter each of the three arguments.

Mac Users: There is no "dialog box". The "Formula Builder" pane will display at the right side of the Excel window. It has the same layout as Figure 3.10 below.

1. Click in the box for **Logical Test**. We need to test whether a student's score is less than **.7**. So, in this box, type **P5<.7**
2. Click in the box for **Value_if_true**. If the student's score is less than .7, then they are failing the class. In this box, type **Fail**.
3. Click in the box for **Value_if_false**. If the student's score is NOT less than .7, then they are passing the class. In this box, type **Pass**.
4. Make sure that your dialog box matches **Figure 3.10**.

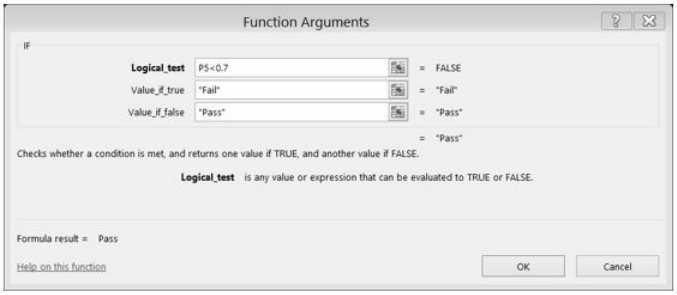


Figure 3.10 IF Function Dialog Box

While we are here, let's take a look at the dialog box. Notice that as you click in each box, Excel gives you a brief explanation of the contents (in the middle below the boxes.) In the lower left-hand corner, you can see the results of the calculation. In this case, DeShae is passing the class. Below that is a link to **Help on this function**. Selecting this link will take you to the Excel help for this function – with detailed information on how it works.

5. Once you have typed in the required arguments and reviewed to make sure they are correct, press OK.
   Mac Users should click the "Done" button, then close the Formula Builder pane.
   (The text Pass should be displayed in Q5 because DeShae is passing the class.)
6. Use the Fill handle to copy the IF function down through row 24.
7. Click on Q5. When you look in the formula bar, you will see the IF calculation: **=IF(P5<0.7,"Fail","Pass")** (see **Figure 3.11**).

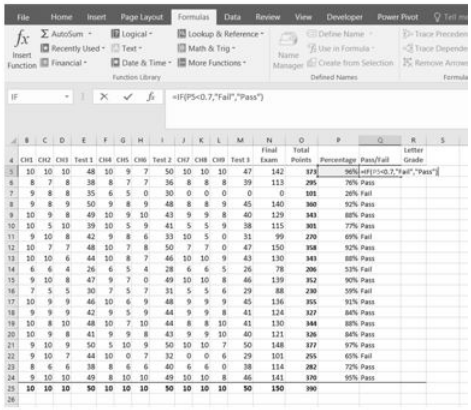


Figure 3.11 IF Function Results

VLOOKUP Function

You need to use a VLOOKUP function to look up information in a table. Sometimes that table is on a different sheet in your workbook. Sometimes it is in another file entirely. In this case, we need to know what grade each student is getting based on their percentage score. You will find the table that defines the scores and the grades in **A28:B32**.

There are four pieces of information that you will need in order to build the VLOOKUP syntax. These are the four arguments of a VLOOKUP function:

- The value you want to lookup, also called the **Lookup_value**. In our example, the lookup value will be the student's percentage score in column P.

- The **Table_array** is the range (table) where the lookup values and the values you want returned by the function are located. In our example, this is the table of percentages and corresponding letter grades in the range A28:B32. The lookup value should always be in the first column in the table array for VLOOKUP to work correctly. For example, in our table_array the lookup value is in cell A28, so the range should start with A.
- The **Col_index_num** is the column number in the range that contains the value to return. In our example, when you specify A28:B32 as the Table_array range, you should count A as the first column (1), B as the second column (2), and so on. You will enter the appropriate column number in this box as 1, 2, or 3 and so on.
- In the **Range_lookup**, you can optionally specify TRUE if you want an approximate match or FALSE if you want an exact match of the return value. If you leave this blank, the default value will always be TRUE, or approximate match.

Let's create the VLOOKUP to display the correct Letter Grade in column R.

1. Make sure that R5 is your active cell.
2. On the Formulas tab, in the Function Library, find the **VLOOKUP** function on the Lookup & Reference pull-down menu (see **Figure 3.12**).

   Mac Users should click the Lookup and Reference tool list arrow 

to find the **VLOOKUP** function.

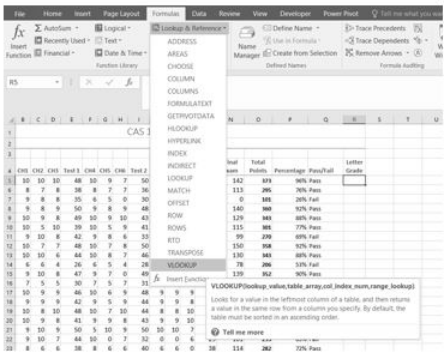


Figure 3.12 VLOOKUP Function

3. Fill in the dialog box so that it looks like the image in **Figure 3.13**.

   Mac Users will use the "Formula Builder" pane at the right side of the Excel Window.

   - **Lookup_value –** In this case, we will use the Percentage score. So, **P5** for the first lookup value.
   - **Table_array** – This is the range that contains the value you want returned by the function. In this case, that range is A28:B32. Note that this range does NOT include the label in row 27; just the actual data. The cell references for the Table_array need to be absolute – $A$28:$B$32. When we copy this function to the other cells, we do not want these cell references to change. It should always be $A$28:$B$32. **This is very important! They must have the absolute reference symbols or the calculations will not work.**
   - **Col_index_number** – This is the column in the table array range that includes the information that we are looking up. In our case, the actual grades are in the 2nd column of the range. So, the column index will be 2.
   - **Range_lookup** – In some cases, you will need something in the Range_lookup box. Since we are looking for an approximate match for the percentages, we want the default value of TRUE, so we do not need to enter anything for this argument.

5. While you are in the dialog box, be sure to look at all the helpful definitions that Excel offers.
6. When you have filled in the dialog box, press OK.

   Mac Users should click the "Done" button, then close the Formula Builder pane.
7. The calculation you will see in the formula bar is: =VLOOKUP(P5,$A$28:$B$32,2)
8. Use the fill handle to copy the function down through row 24. The results displayed should match **Figure 3.14**.

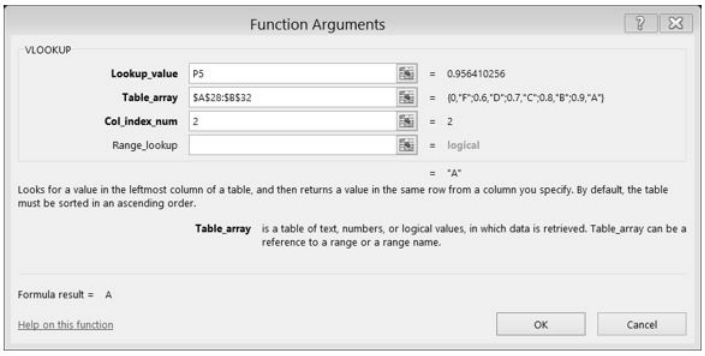
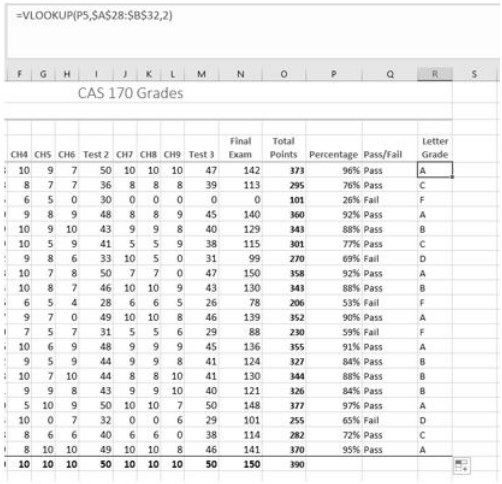


Figure 3.13 VLOOKUP completed dialog box



CH4	CH5	CH6	Test 2	CH7	CH8	CH9	Test 3	Final Exam	Total Points	Percentage	Pass/Fail	Letter Grade
10	9	7	50	10	10	10	47	142	373	96%	Pass	A
8	7	7	36	8	8	8	39	113	295	76%	Pass	C
6	5	0	30	0	0	0	0	0	101	26%	Fail	F
9	8	9	48	8	8	9	45	140	360	92%	Pass	A
10	9	10	43	9	9	8	40	129	343	88%	Pass	B
10	5	9	41	5	5	9	38	115	301	77%	Pass	C
9	8	6	33	10	5	0	31	99	270	69%	Fail	D
10	7	8	50	7	7	0	47	150	358	92%	Pass	A
10	8	7	46	10	10	9	43	130	343	88%	Pass	B
6	5	4	28	6	6	5	26	78	206	53%	Fail	F
9	7	0	49	10	10	8	46	139	352	90%	Pass	A
7	5	7	31	5	5	6	29	88	230	59%	Fail	F
10	6	9	48	9	9	9	45	136	355	91%	Pass	A
9	5	9	44	9	9	8	41	124	327	84%	Pass	B
10	7	10	44	8	8	10	41	130	344	88%	Pass	B
9	9	8	43	9	9	10	40	121	326	84%	Pass	B
5	10	9	50	10	10	7	50	148	377	97%	Pass	A
10	0	7	32	0	0	6	29	101	255	65%	Fail	D
8	6	6	40	6	6	0	38	114	282	72%	Pass	C
8	10	10	49	10	10	8	46	141	370	95%	Pass	A
10	10	10	50	10	10	10	50	150	390			

Figure 3.14 VLOOKUP Complete

Note

What if it didn't work? What if you get a result different from the one predicted? In this case, either you have made a previous error, resulting in different % scores than this exercise anticipated, or you made a mistake entering your VLOOKUP function.

To make repairs in the function, make sure that R5 is your active cell. On the Formula bar, press the Insert Function button (see **Figure 3.15**). That will reopen the dialog box so you can make your repairs. Did you forget to make the cell references for the Table_array absolute? Did you use the wrong cell for the Lookup_value? Press OK when you are done and recopy the corrected function.

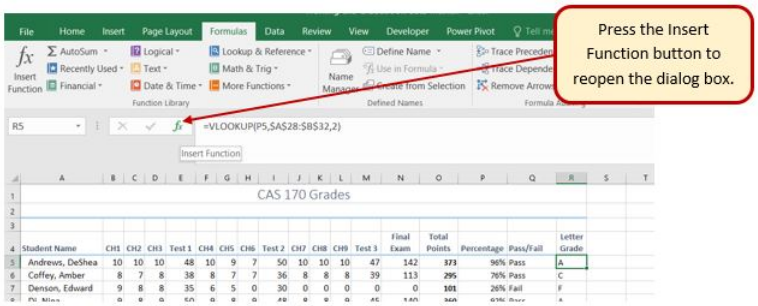


Figure 3.15 Insert Function

Error Messages

Sometimes Excel notices that you have made errors in your calculations before you do. In those cases Excel alerts you with some slightly mysterious error messages. A list of common error messages can be found in **Table 3.1** below.

Table 3.1 – Common Error Messages

Message	What Went Wrong
#DIV/0!	You tried to divide a number by a zero (0) or an empty cell.
#NAME	You used a cell range name in the formula, but the name isn't defined. Sometimes this error occurs because you type the name incorrectly.
#N/A	The formula refers to an empty cell, so no data is available for computing the formula. Sometimes people enter N/A in a cell as a placeholder to signal the fact that data isn't entered yet. Revise the formula or enter a number or formula in the empty cells.
#NULL	The formula refers to a cell range that Excel can't understand. Make sure that the range is entered correctly.
#NUM	An argument you use in your formula is invalid.
#REF	The cell or range of cells that the formula refers to aren't there.
#VALUE	The formula includes a function that was used incorrectly, takes an invalid argument, or is misspelled. Make sure that the function uses the right argument and is spelled correctly.

This table was copied from the internet. Look here for additional information.
http://www.dummies.com/software/microsoft-office/excel/how-to-detect-and-correct-formula-errors-in-excel-2016/

Date Functions

Very often dates and times are an important part of Excel data. Numbers that are correct today may not be accurate tomorrow. So, it is frequently useful to include dates and times on your spreadsheets.

These dates and times fall into two categories – ones that:

- **Remain the same**. For instance, if a spreadsheet includes data for May 15th, you don't want the date to change each time you re-open the spreadsheet.
- **Change to reflect the current date/time**. When it is important to have the current date or time on a spreadsheet, you want Excel to update the information regularly.

Take a look at the list of Date and Time functions offered in the Function Library on the Formulas tab (see **Figure 3.16**).



Figure 3.16 Date & Time Functions

For our gradebook, we want the date and time to be displayed in A2, and it needs to update whenever the workbook file is opened.

1. Make A2 your active cell. Notice that A2 extends all the way from column A to Column R. Previously, someone has used the Merge & Center tool on this cell to make it match the title above.

2. On the Formulas tab, in the Function Library, select **NOW** from the Date & Time drop-down list and then click OK.
   Mac Users click the "Done" button in the "Formula Builder" pane at the right side of the Excel window; then close the pane.
3. The result you will see in the formula bar is: =NOW(). The result you will see in A2 depends on the current date and time. The NOW function is a very handy function. It takes no arguments and is Volatile! That is not as alarming as it may seem. This just means that you don't need to give it any more information to do its job and that your results will change frequently. You can update the date and time whenever you want – you don't have to wait until you open the workbook again.
4. Make sure that A1 is your active cell and press the **F9** function key (along the top of your keyboard.) The time will update.

Excel will update this field independently whenever you save and re-open the file, or print it. It may happen more frequently than that – depending on how you have set this up in your installation of Excel.

Another variation of the current date is the **TODAY** function. Let's try that one next.

1. Make sure A2 is your active cell. Press Delete to remove the NOW function.
2. From the Date & Time drop-down list in the Function Library on the Formulas tab (see **Figure 3.16**), select TODAY and then click OK.
   Mac Users click the "Done" button in the "Formula Builder" pane; then close the pane.
3. The result you will see in the formula bar is: =TODAY(). The result you will see in A2 depends on the current date. Since we haven't asked for the time, the time you are seeing is likely 12:00. That is not very helpful so we need to change the format of the date.
4. On the Home tab, in the Number group, press the Number Format Launcher button (see **Figure3.17**).
5. In the **Format Cells**dialog box, click the Number tab. Choose the **Date**category and select **Wednesday, March 14, 2012**(this format is called **Long Date**).
   Mac Users: there is no Number Format Launcher button or "Format Cells" dialog box.
   Click the list arrow next to "Date" and choose **"Long Date"** 

6. The current day and date will display in A2.

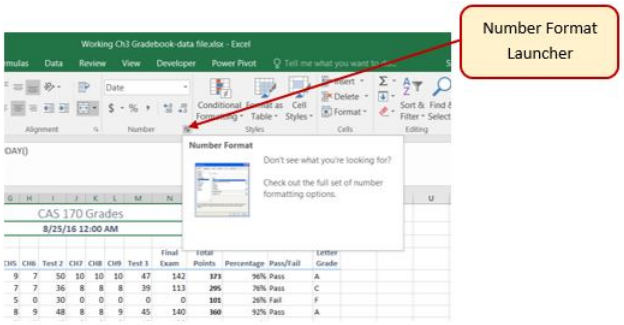


Figure 3.17 Number Format Launcher

Keyboard Shortcuts

Sometimes you want the date or the time to show up in your spreadsheet, but you don't want it to change. You can simply type in the date or time. Or, you can use shortcut keys.

- CTRL ; (semi colon) will bring you the current date
  Mac Users: same as above
- CTRL : (colon or CTRL SHIFT ;) will bring you the current time.
  Mac Users: SHIFT COMMAND

Key Takeaways

- Functions don’t always have to be about arithmetic. Excel provides functions that will help you perform logical evaluations, look things up, and work with dates and times.
- Excel displays error messages when your formulas and functions are not constructed properly.

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7.4: Auditing Formulas and Fixing Errors

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Explain the reasons formulas may need to be audited
- Identify the various errors that may be present in worksheets and tables
- Identify the cells involved in a formula
- Implement the appropriate options for auditing various aspects of formulas

WorldCorp receives many client orders every day, and the corporation needs to have an accurate count of inventory to ensure that they have the capacity to deliver orders on time. This real-time inventory handling and customer relationship management can only happen by implementing computer systems that track these business activities. Microsoft Excel can be programmed to help in fulfilling these tasks with the right data. Yet, as you can imagine, this enormous data load can be daunting, and occasionally, small errors may be made in some formulas. Excel has various tools for the user to identify such errors, and thus correct them.

Reasons to Audit Formulas

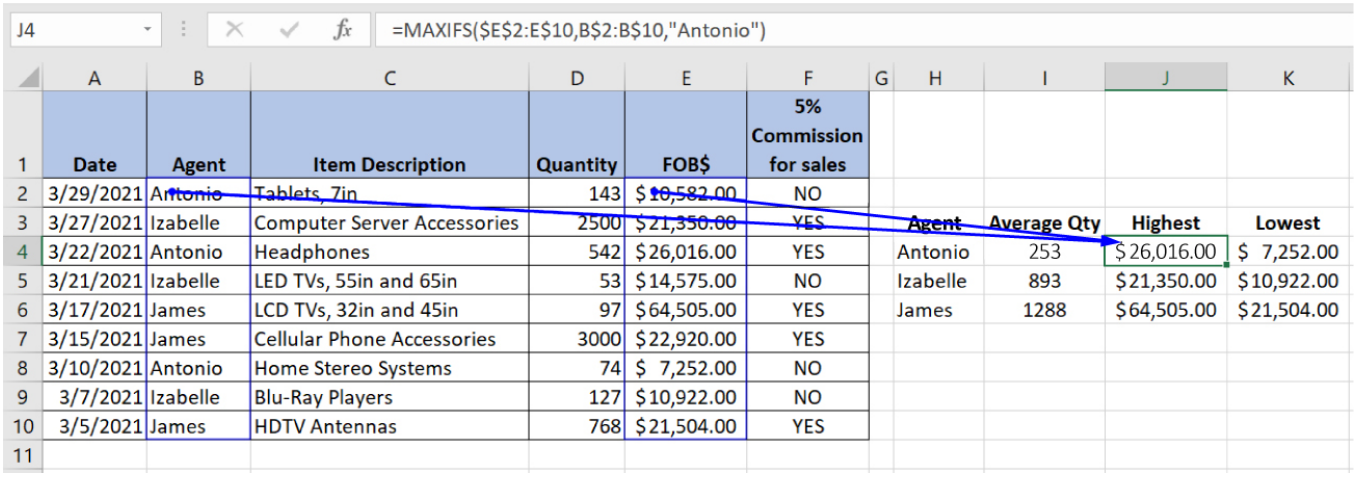
As a business grows, its activities grow in complexity, requiring higher-level and concurrent data analyses. As a result, managers build large Excel workbooks to handle these business operations, designing spreadsheets with a wide selection of formulas, functions, PivotTables, arrays, data ranges, What-If Data Tables, and other Excel data exploration tools. Each of these tools requires user input, which makes them inevitably subject to user error. The process of using Excel tools to monitor and fix errors in worksheets is called auditing formulas.

Remember that almost all formulas or functions have relationships to other areas of the workbook. Cell references or named ranges may even refer to other cell references, creating a complex web of references. If the key data points do not have the right formula or function, the resulting value will not be correct. You may also see an error message in Excel if the user settings are set to alert the user when a formula or function has a broken link or incorrect syntax.

Identifying Errors in Worksheets and Tables

There are many ways to check for errors in your workbook. These include tracing precedent functions, tracing dependent functions, showing the formula, and automated checking of errors. When tracing precedent or dependent functions, you are finding the relationships between cells.

When you are tracing precedent functions, you are finding the source of an error in a formula by locating the cells that provide the data to perform the calculation in the active cell. The arrows will point to the cells that are used to construct the formula used in the active cell so you may review them before making a correction. When you are tracing dependent functions, you are finding any cells affected by the active cell. You would want to do this before deleting a cell from a worksheet. These specifically relate to checking cell references and the information found within them. Figure 10.42 shows the output when tracing precedents for a cell.



	A	B	C	D	E	F	G	H	I	J	K
1	Date	Agent	Item Description	Quantity	FOB$	5% Commission for sales					
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00	NO					
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$21,350.00	YES		Agent	Average Qty	Highest	Lowest
4	3/22/2021	Antonio	Headphones	542	$26,016.00	YES		Antonio	253	$26,016.00	$ 7,252.00
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$14,575.00	NO		Izabelle	893	$21,350.00	$10,922.00
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$64,505.00	YES		James	1288	$64,505.00	$21,504.00
7	3/15/2021	James	Cellular Phone Accessories	3000	$22,920.00	YES					
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	NO					
9	3/7/2021	Izabelle	Blu-Ray Players	127	$10,922.00	NO					
10	3/5/2021	James	HDTV Antennas	768	$21,504.00	YES					
11											

Figure 10.42: The arrows point to cells B2 and E2 that are used to determine the highest value in the formula. (Used with permission from Microsoft)

Showing the formula is simply looking at a certain formula or function and manually checking its syntax. There is a command on the Formulas tab called Show Formulas that will automatically show which cells contain formulas. The actual formula in the cell is displayed, replacing the value that was calculated from that formula. It changes the content of the worksheet to show exactly what formulas are in the cells. This is a good first step to finding errors in formulas. To hide the formulas and return to the original spreadsheet with the computed values, simply select the Show Formulas command again. There is also an Error Checking command, which can help to identify specific errors in formulas.

Before any error checking can occur, first make sure that your version of Excel is tracking the errors when they happen. Click on the File tab and select Options. In the dialog box, choose the Formulas tab, and check the “Enable background error checking” option. You should also check all of the “Error checking rules” boxes, and then click OK, as shown in Figure 10.43.

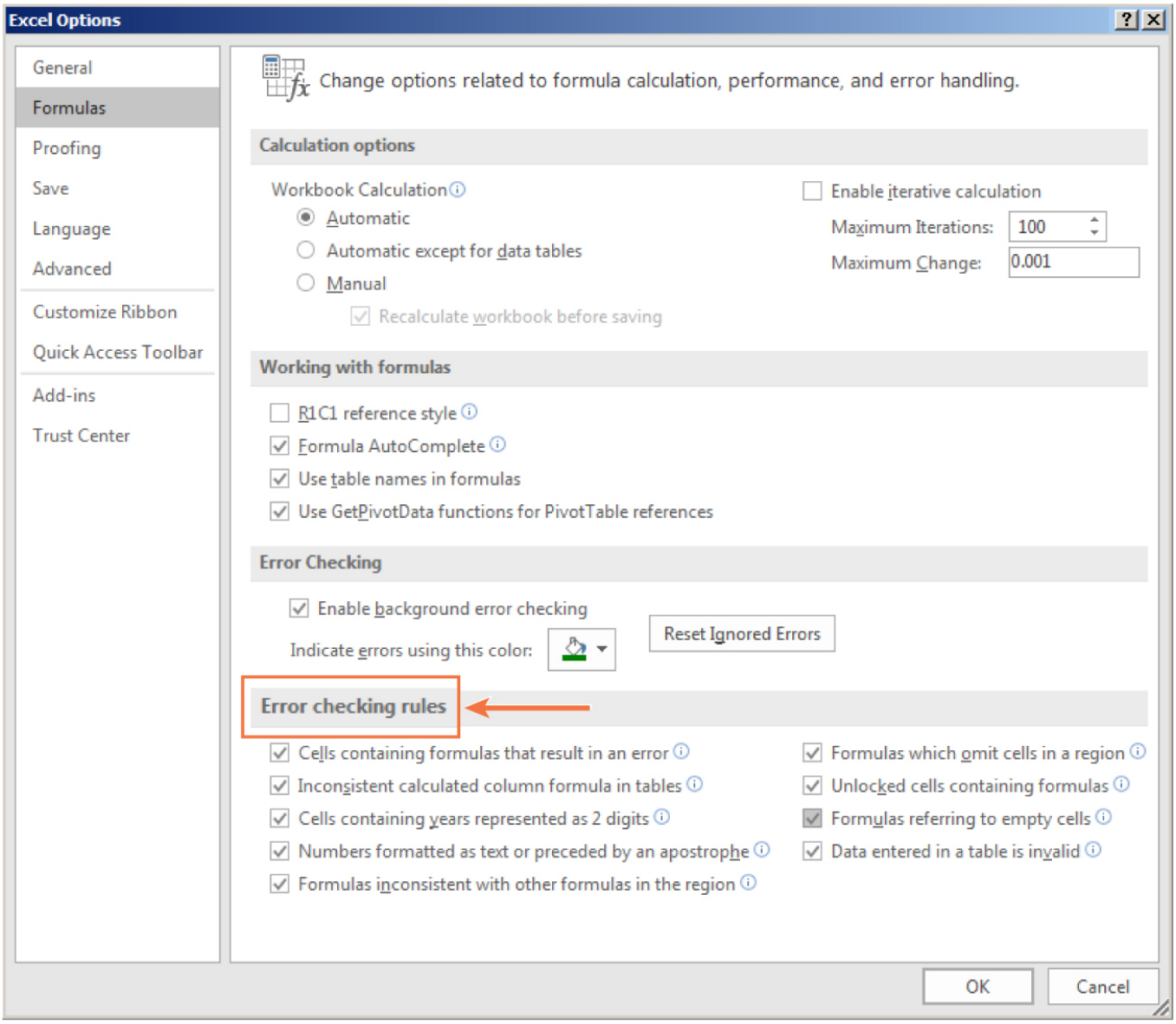


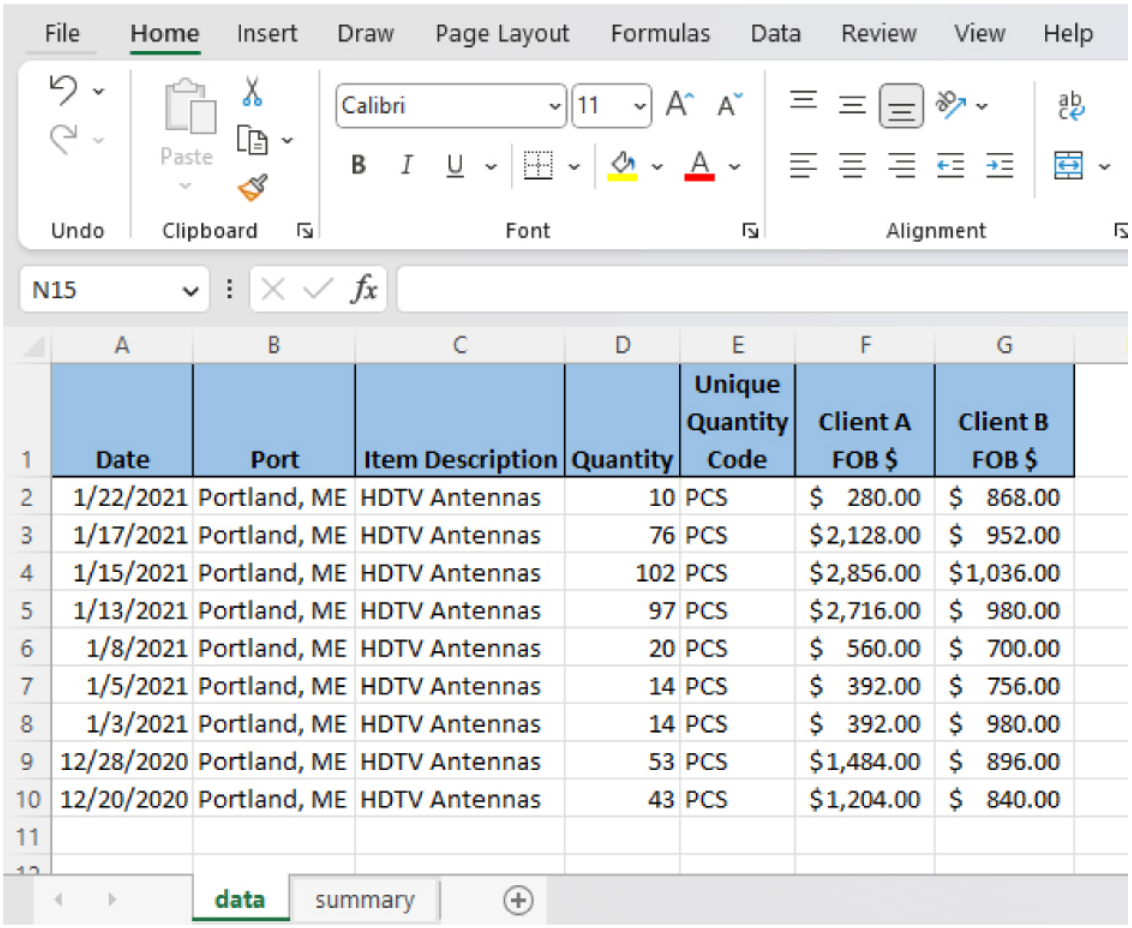
Figure 10.43: Error checking starts with having Excel notify you if any error happens. (Used with permission from Microsoft)

Remember that there are two main characteristics that all formulas have:

1. All formulas must start with the equals sign (=).
2. Formulas have constants, cell references, or both, and operators, functions, or both.

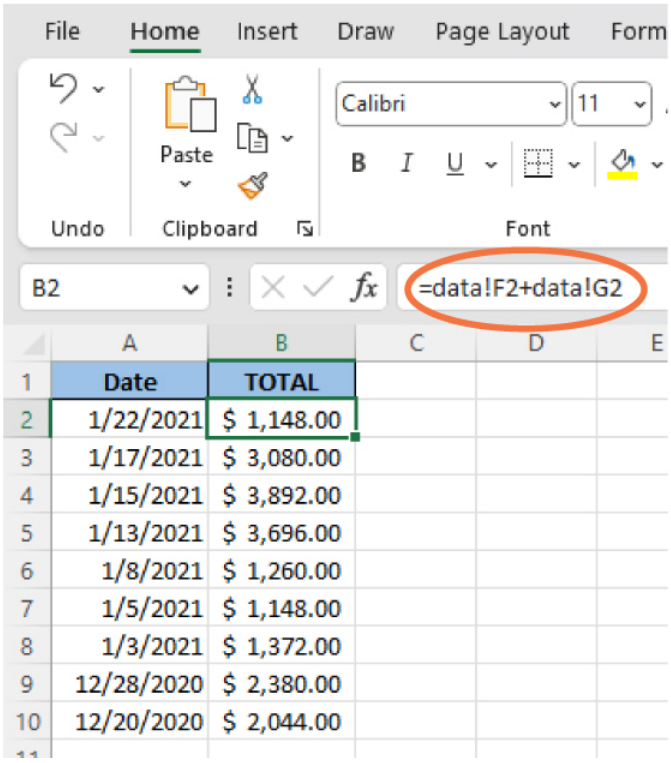
Constants are numbers that are typed inside a formula; they can be integers or rational numbers. Operators are math notation signs for performing different calculations, such as +, –, *, /, and ^. These operators must respect the order of operations (PEMDAS). If the formula is complex—if it has multiple functions, for example—you must ensure that the function's syntax rules are obeyed. For example, the PV function must include values for RATE, NPER, PMT, and FV, in that order, or the function will not work.

There are several types of potential errors. You may have syntax errors (not having the right argument in the function or having too few or too many arguments); capacity errors (in Excel, you cannot have more than 64 functions in a cell); or sheet or cell reference errors. It is worth noting that, when linking a formula in one worksheet to a cell in another worksheet, Excel automatically adds the sheet's name and "!" after the sheet's name; you must double-check that you didn't delete this mark. For example, WorldCorp's data for two clients is seen in Figure 10.44a. You summarize the overall total on a separate sheet, which references the first sheet. Notice in the formula the "!" after the worksheet named "data" and before the cell reference you include in the calculation (Figure 10.44b).



	A	B	C	D	E	F	G
1	Date	Port	Item Description	Quantity	Unique Quantity Code	Client A FOB $	Client B FOB $
2	1/22/2021	Portland, ME	HDTV Antennas	10	PCS	$ 280.00	$ 868.00
3	1/17/2021	Portland, ME	HDTV Antennas	76	PCS	$2,128.00	$ 952.00
4	1/15/2021	Portland, ME	HDTV Antennas	102	PCS	$2,856.00	$1,036.00
5	1/13/2021	Portland, ME	HDTV Antennas	97	PCS	$2,716.00	$ 980.00
6	1/8/2021	Portland, ME	HDTV Antennas	20	PCS	$ 560.00	$ 700.00
7	1/5/2021	Portland, ME	HDTV Antennas	14	PCS	$ 392.00	$ 756.00
8	1/3/2021	Portland, ME	HDTV Antennas	14	PCS	$ 392.00	$ 980.00
9	12/28/2020	Portland, ME	HDTV Antennas	53	PCS	$1,484.00	$ 896.00
10	12/20/2020	Portland, ME	HDTV Antennas	43	PCS	$1,204.00	$ 840.00
11							

(a)



	A	B	C	D	E
1	Date	TOTAL			
2	1/22/2021	$ 1,148.00			
3	1/17/2021	$ 3,080.00			
4	1/15/2021	$ 3,892.00			
5	1/13/2021	$ 3,696.00			
6	1/8/2021	$ 1,260.00			
7	1/5/2021	$ 1,148.00			
8	1/3/2021	$ 1,372.00			
9	12/28/2020	$ 2,380.00			
10	12/20/2020	$ 2,044.00			

can use the data on one worksheet in a formula on another worksheet. (b) Excel will include the name of the worksheet followed by "!" in the formula. (Used with permission from Microsoft)

Additionally, several errors have specific code assignations that should automatically appear in your cell if you have an error. These code errors are preceded by "#" to indicate that they are errors. Some of the common code errors are described in Table 10.5.

Table 10.5: Common Code Errors These are many of the most common code errors, and how to fix them.

# Code	Explanation	How to Fix It
####	This common error is a formatting error rather than a formula error. It occurs when the column is not wide enough for the numbers to be displayed.	Make the column wider.
#NAME?	This error is displayed if the function is not well-written, such as if there is a typo in the name of the function, or the designated function name is not complete or is written incorrectly.	Find the correct wording of the function by clicking on the Insert Function tool.
#DIV/0!	This error happens when you divide by zero. This can also be caused if a linked cell reference has no value.	Enter a value in the cell, or add the correct constant in the denominator.
#NULL!	This happens when the Excel notation syntax rules are not obeyed, such as if an operator is incorrect or missing.	Follow the pop-up menu that appears when writing a function. It tells where commas should be, what value should be referenced, and so on. If the error was made in the past, you can consult the roster of functions on the Formulas tab in the ribbon and selecting the Insert Function icon.
#NUM!	This happens when a cell reference contains contradictory or unsound numbers that stop the function from calculating the result.	Check the referenced cells, and retype the numbers that are unsound.
#REF!	This means that the cell references in a formula are not there anymore, or the cell reference was entered incorrectly in the formula.	Find the correct cell reference and fix the formula.
#VALUE!	This happens when a cell reference has a different data type, for example, when you use a function that requires two numerical values but you insert text for one of them.	Use the same data types.
#N/A	This happens when a function searches for a certain value and the function cannot find it.	Change the criterion on the search operators (e.g., LOOKUP function).
#GETTING_DATA	This is a temporary error. While waiting for Excel to calculate a complicated query, Excel will process the answer in a few seconds and display this error.	Wait for Excel to calculate the answer.

(b)

Figure 10.44: (a) You

Identifying the Cells Involved in a Formula

Excel makes it easy to find cells that meet certain criteria. For example, Excel can highlight all cells in a worksheet that contain formulas. To do this, select a cell (Figure 10.45) and go to the Find and Select icon on the Home tab, then choose Go To Special (Figure 10.46a). Next, select Formulas, then click OK (Figure 10.46b). All the cells that contain formulas will be selected (highlighted) in that worksheet.

Excel also has a built-in feature, called the Watch Window, that allows users to see where each constant, reference, and operators are correct. Select the Watch Window icon (on the Formulas tab in the ribbon). The Watch Window will be blank, so choose Add Watch, and select the cell or cells you want to analyze, as shown in Figure 10.47. Putting a cell or a range in the Watch Window allows you to monitor the cells you choose to ensure they remain error-free as you continue to work in a worksheet. You can add multiple cells to the Watch Window by following the same process. The Watch Window tells you the value and the function, the sheet, the workbook, the cell, and the defined name to help you identify any errors.

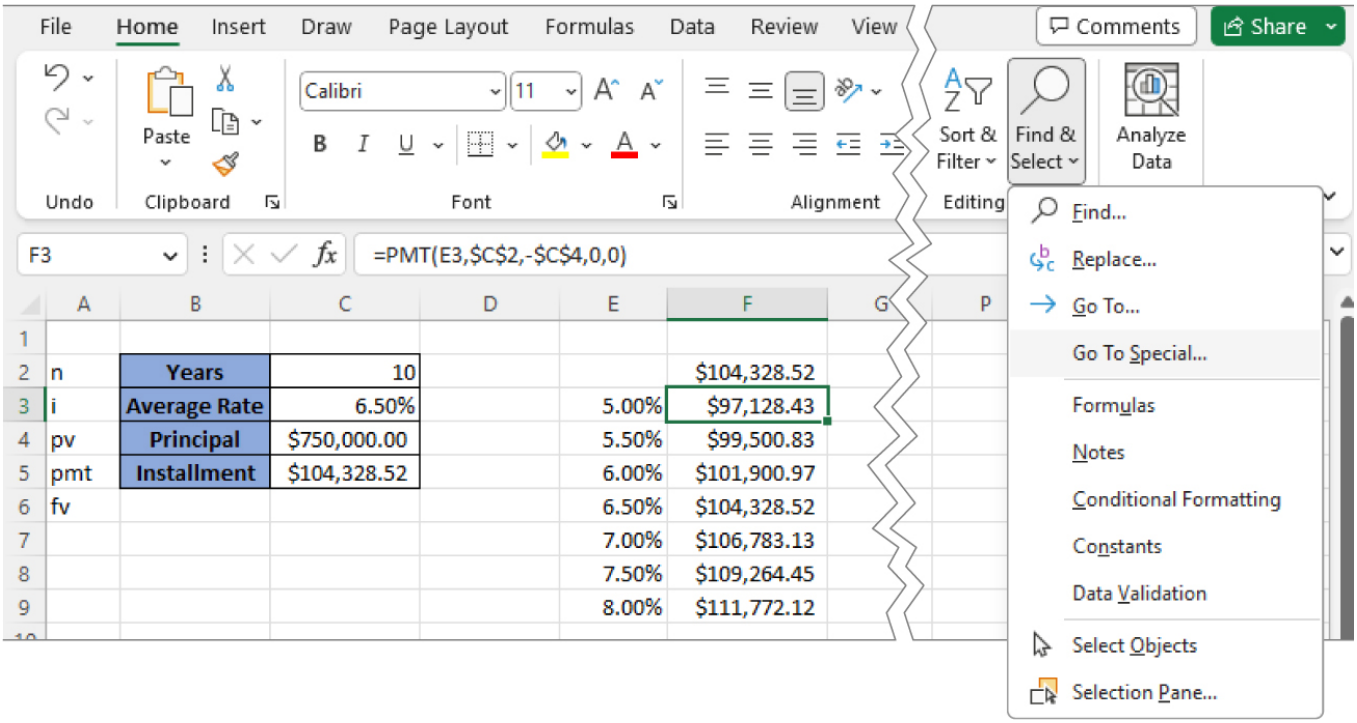


Figure 10.45: The Watch Window can tell you the relationships of the cell to other cells. You can use Find and Select to highlight cells that contain items such as Notes or Formulas. (Used with permission from Microsoft)

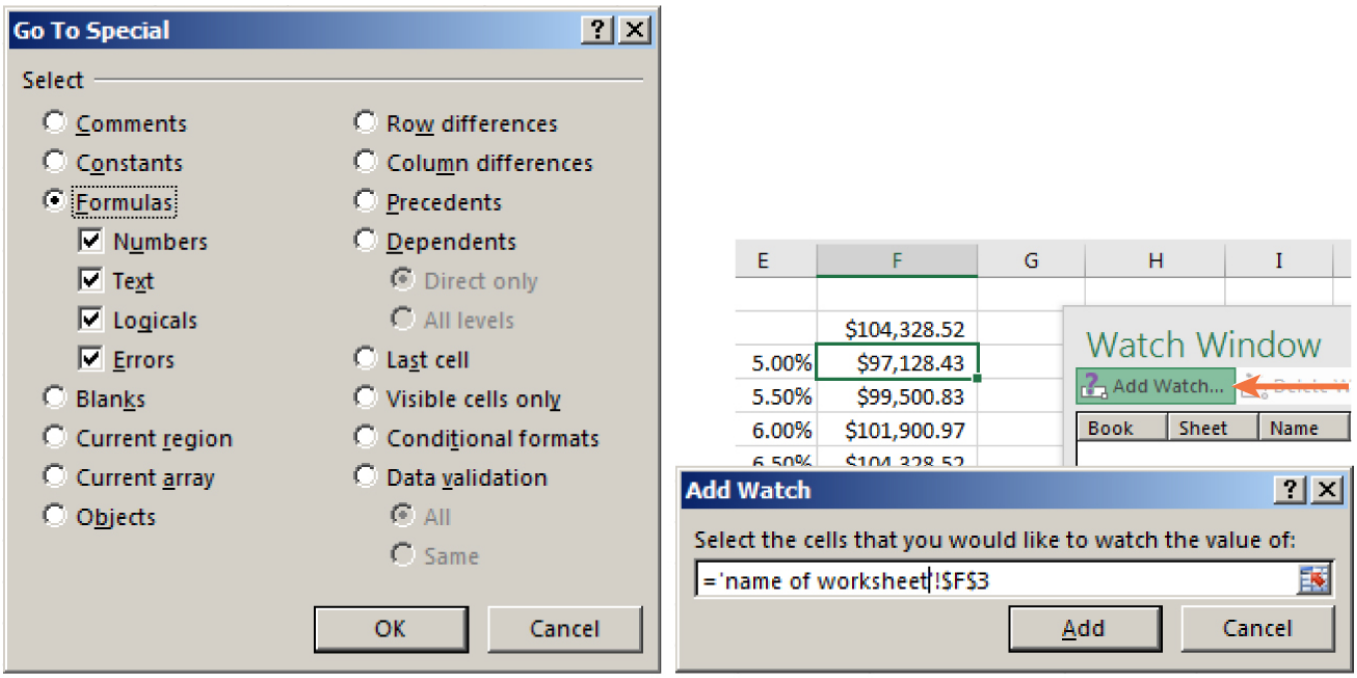


Figure 10.46: (a) Use Go To Special to define what elements you want Excel to search for in the cells on the worksheet. (b) Watch Window is an alternative to see the formulas in cells on a worksheet. (Used with permission from Microsoft)

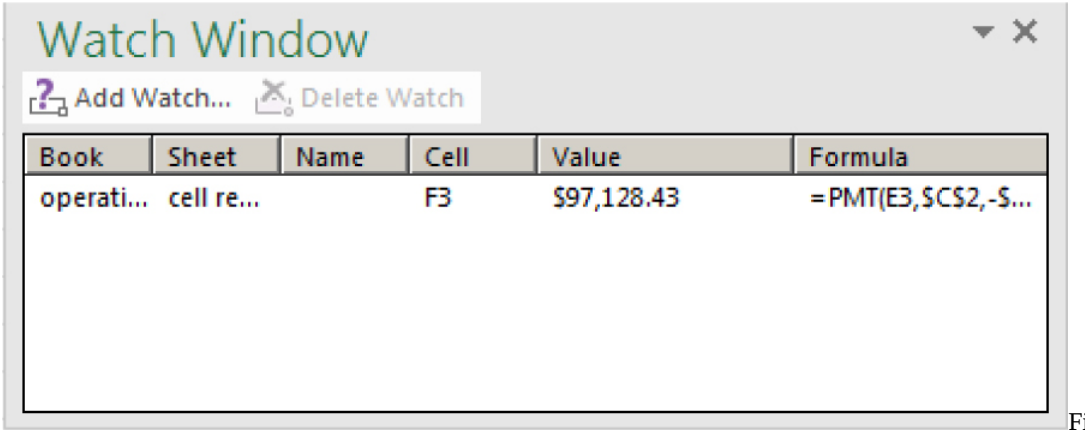


Figure 10.47: Click Add Watch to list the cells and the formulas. (Used with permission from Microsoft)

Another way to dissect a formula is by selecting the cell and choosing Evaluate Formula (on the Formulas tab). This command solves the formula piece by piece to ensure that the formula is built correctly. First, the formula displays as shown in Figure 10.48. Then, select Evaluate, which will solve the first argument of the function, then click on Evaluate again and the second argument gets resolved. Continue to click Evaluate to solve the formula one argument at a time, until you reach the last argument, where the final step is the calculation result. This lets you confirm that the cell is calculating correctly.

Figure 10.48 shows the Evaluate window when it first opens, and Figure 10.49 shows the last step before the final answer is shown in the window. If clicking the Evaluate button does not provide clarity on the formula, you can use Step In, which shows a more detailed view of all of the components of the formula. You are essentially going into the formula to see all the cell references that contribute to the data in that cell. If you use Step In, you will need to click Step Out to go back to the macro view of the formula and to proceed to the next argument, as shown in Figure 10.50. You can use this method to break down complex formulas that might include cell references in other worksheets.

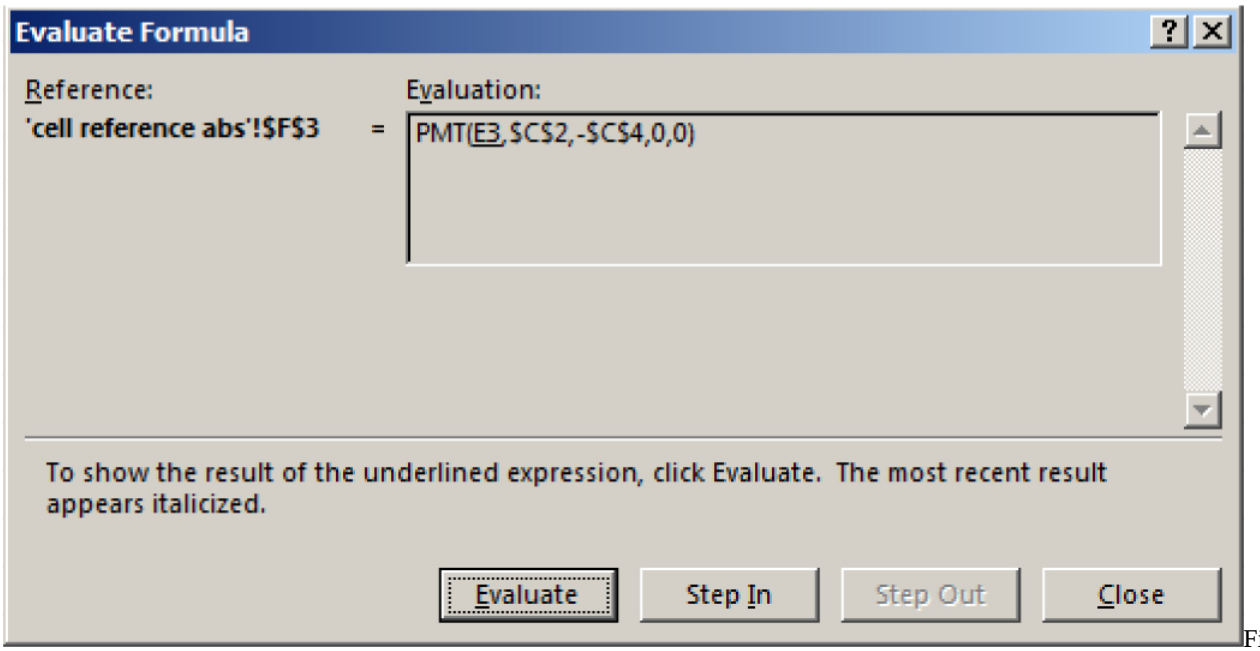


Figure 10.48: The Evaluate Formula tool can easily show where the error is by solving for each argument. Choose Evaluate to go step-by-step through the formula. (Used with permission from Microsoft)

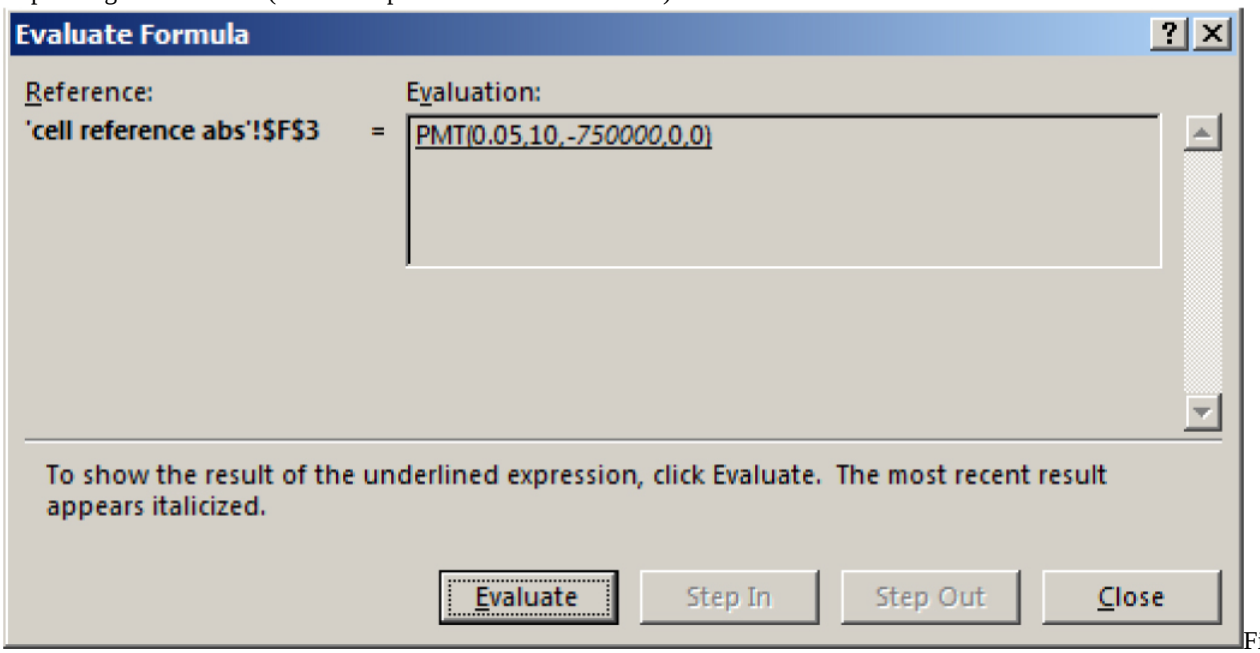


Figure 10.49: To see the result, choose Evaluate. (Used with permission from Microsoft)

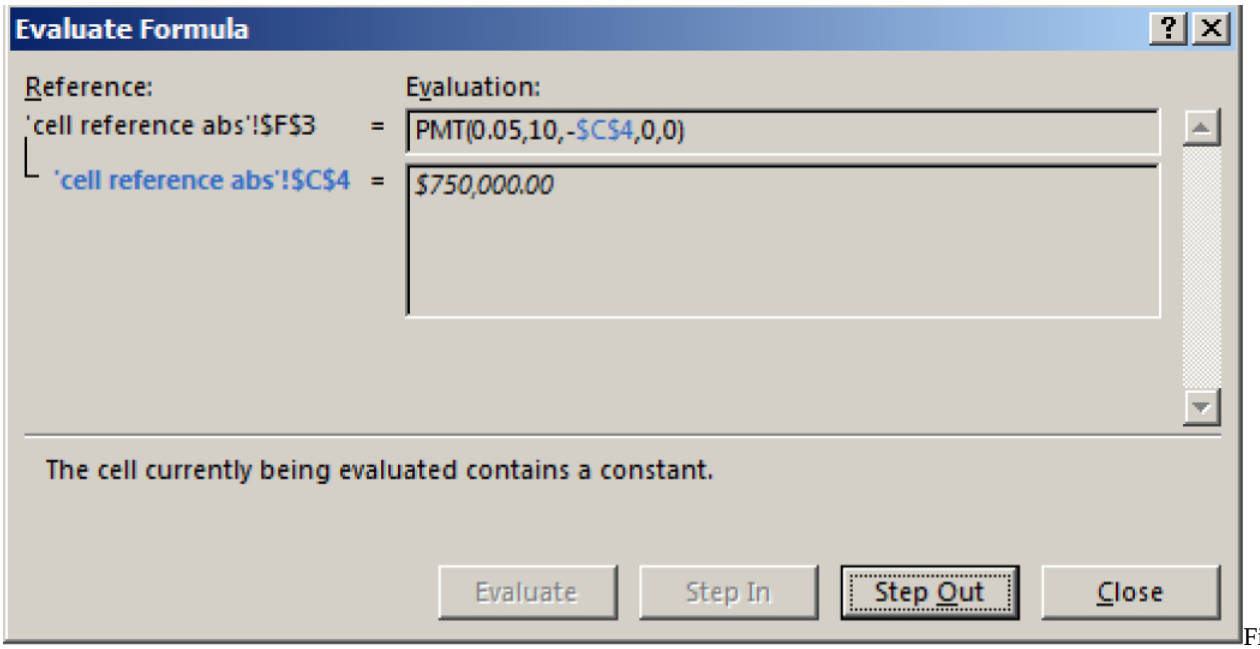
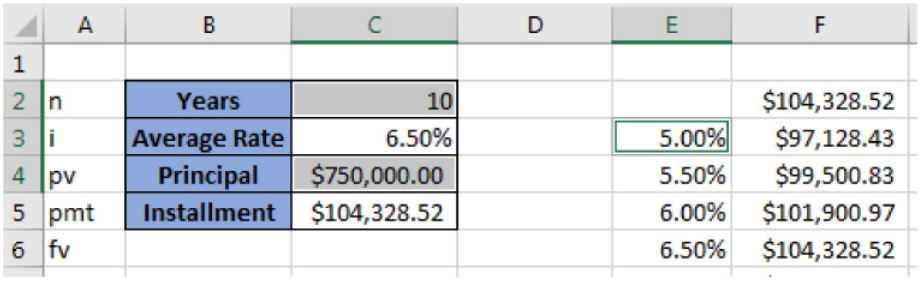


Figure 10.50: Step In takes you into the formula for a more detailed view, and Step Out goes back to the original full formula instead of the individual components. (Used with permission from Microsoft)

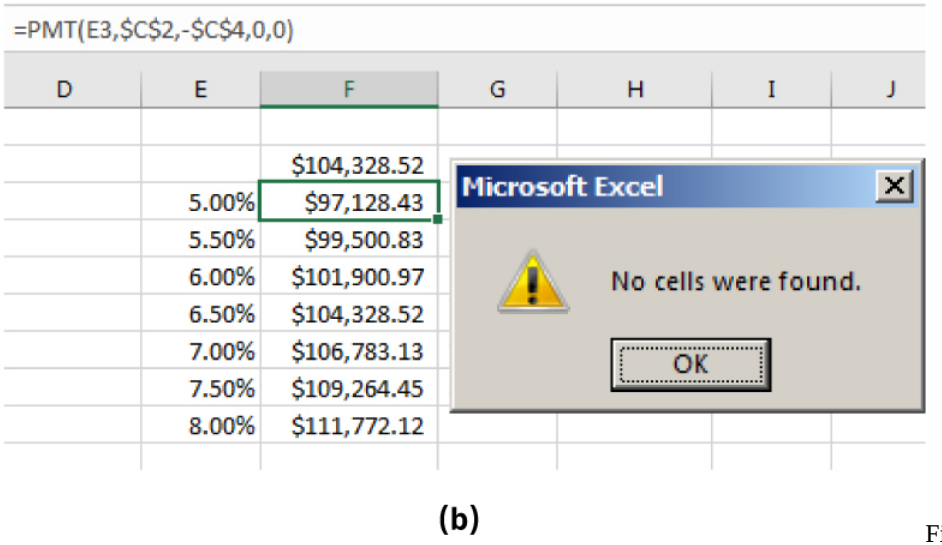
Another way to see the references of a formula is by simply selecting the cell in question, and then pressing Ctrl+[(Control and open bracket) to see dependent references, or Ctrl+] (Control and close bracket) to see precedents. This simple method selects all the cell references of the formula in question, as shown in Figure 10.51a. You can see that cells C2, C4, and E3 are selected and shaded in. These commands serve a similar function as the Trace Dependents and Trace Precedents tools; they show the dependent cells or precedents, but they do not draw a line like the Trace Dependents and Trace Precedents tools do.

If a cell has no dependent cells—cells that are depending on this data from other worksheets, or workbooks, or from another table in the same worksheet—then you cannot perform the Ctrl+[command, as shown in Figure 10.51b. In this example, there were no dependent cells.



	A	B	C	D	E	F
1						
2	n	Years	10			$104,328.52
3	i	Average Rate	6.50%		5.00%	$97,128.43
4	pv	Principal	$750,000.00		5.50%	$99,500.83
5	pmt	Installment	$104,328.52		6.00%	$101,900.97
6	fv				6.50%	$104,328.52

(a)



(b)

Figure 10.51: The Ctrl+[command is a simple way to see dependent cells. (a) Excel highlights the dependent cells. (b) If there are no dependent cells, Excel will let you know that there are none. (Used with permission from Microsoft)

The most comprehensive way to see your cell relationships is by installing the Inquire add-in. First, go to the Add-ins menu (File > Options > Add-ins) (Figure 10.52). Look for Manage drop-down at the bottom of the window and select COM Add-ins, from the drop-down menu. Then, select Go. Then, check Inquire and click OK, as shown in Figure 10.53a. Excel adds a new tab to the ribbon. From that ribbon tab, select Workbook Analysis (Figure 10.53b). The workbook will be displayed with all its formulas and connections between cells, and all formulas will be categorized by the type of function used (Figure 10.54). This new ribbon tab also offers the features Workbook Relationship, Worksheet Relationship, and Cell Relationship, all of which give a graph of the relationship between the sheet and the precedents and dependents in the worksheet.

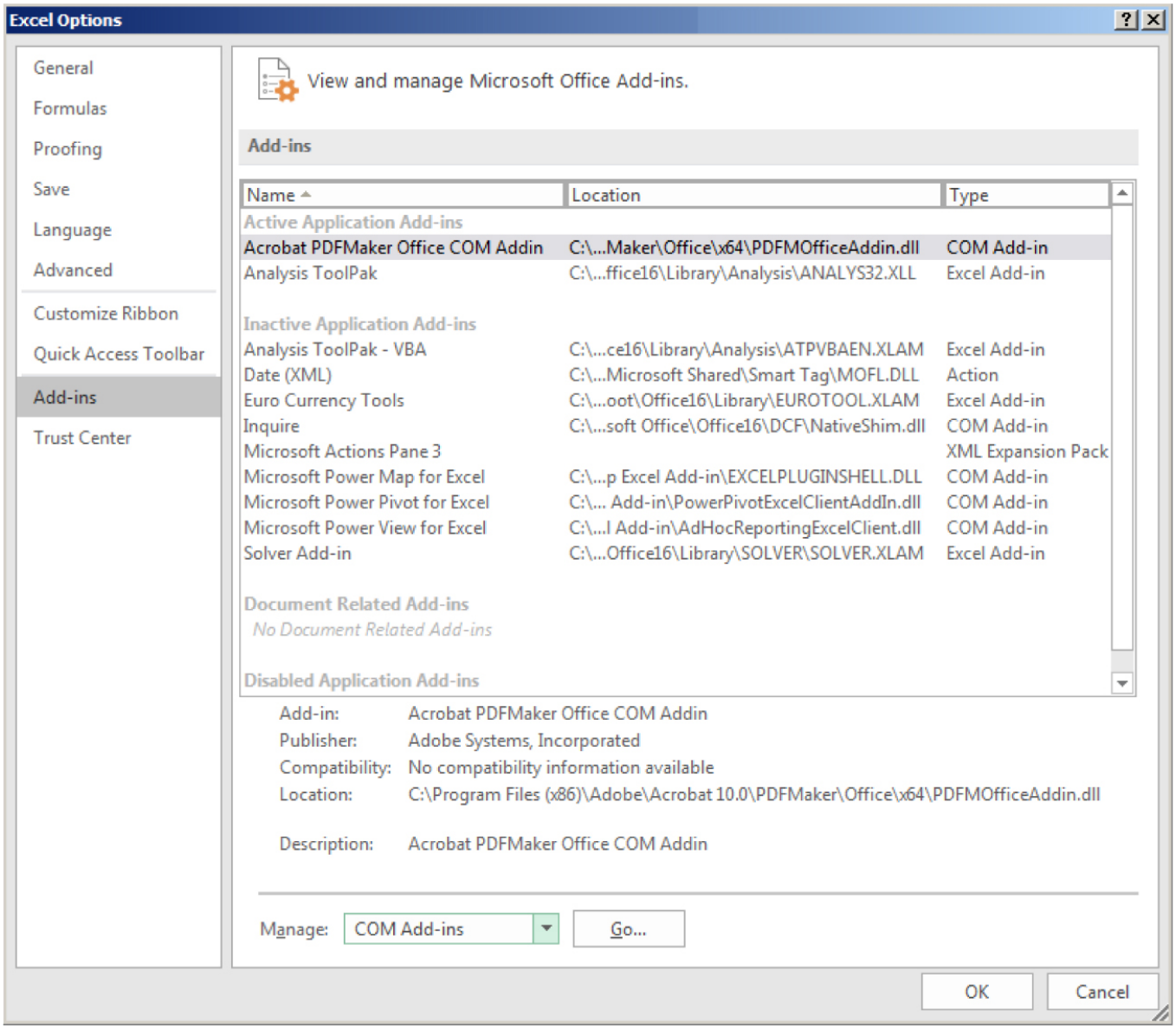
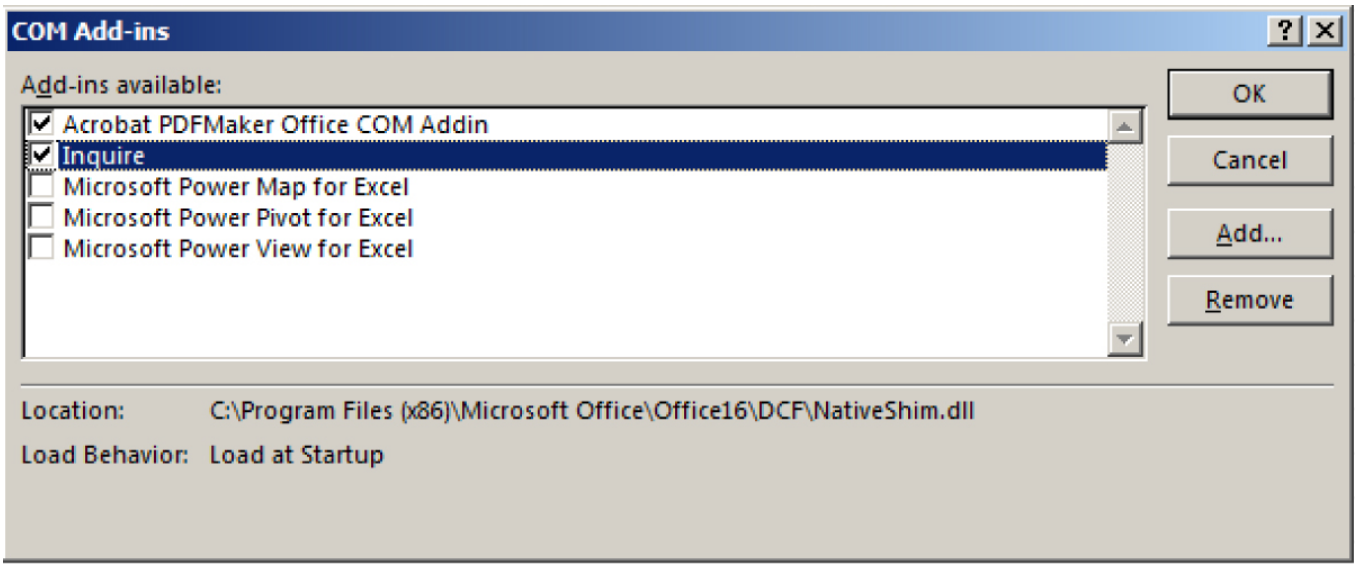
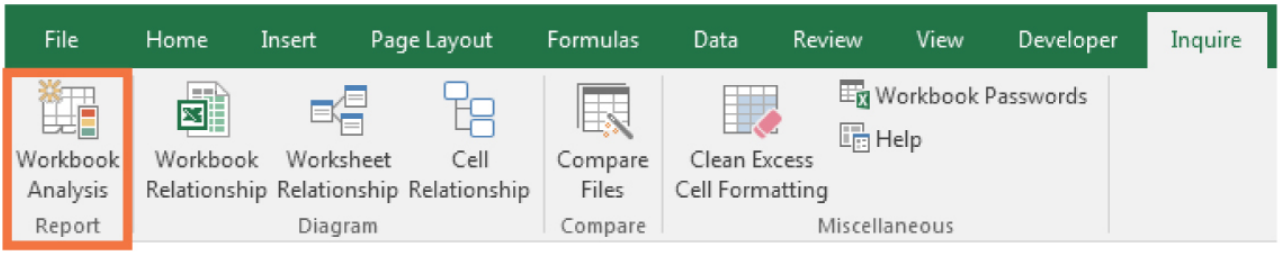


Figure 10.52: Access Excel Options from the File tab to find Add-Ins. (Used with permission from Microsoft)



(a)



(b)

Figure 10.53: (a) Inquire is a formula-auditing tool that does what the Watch Window does but also gives the found errors and organizes the formulas by categories. (b) Inquire will be added as a tab giving you several options to choose from. (Used with permission from Microsoft)

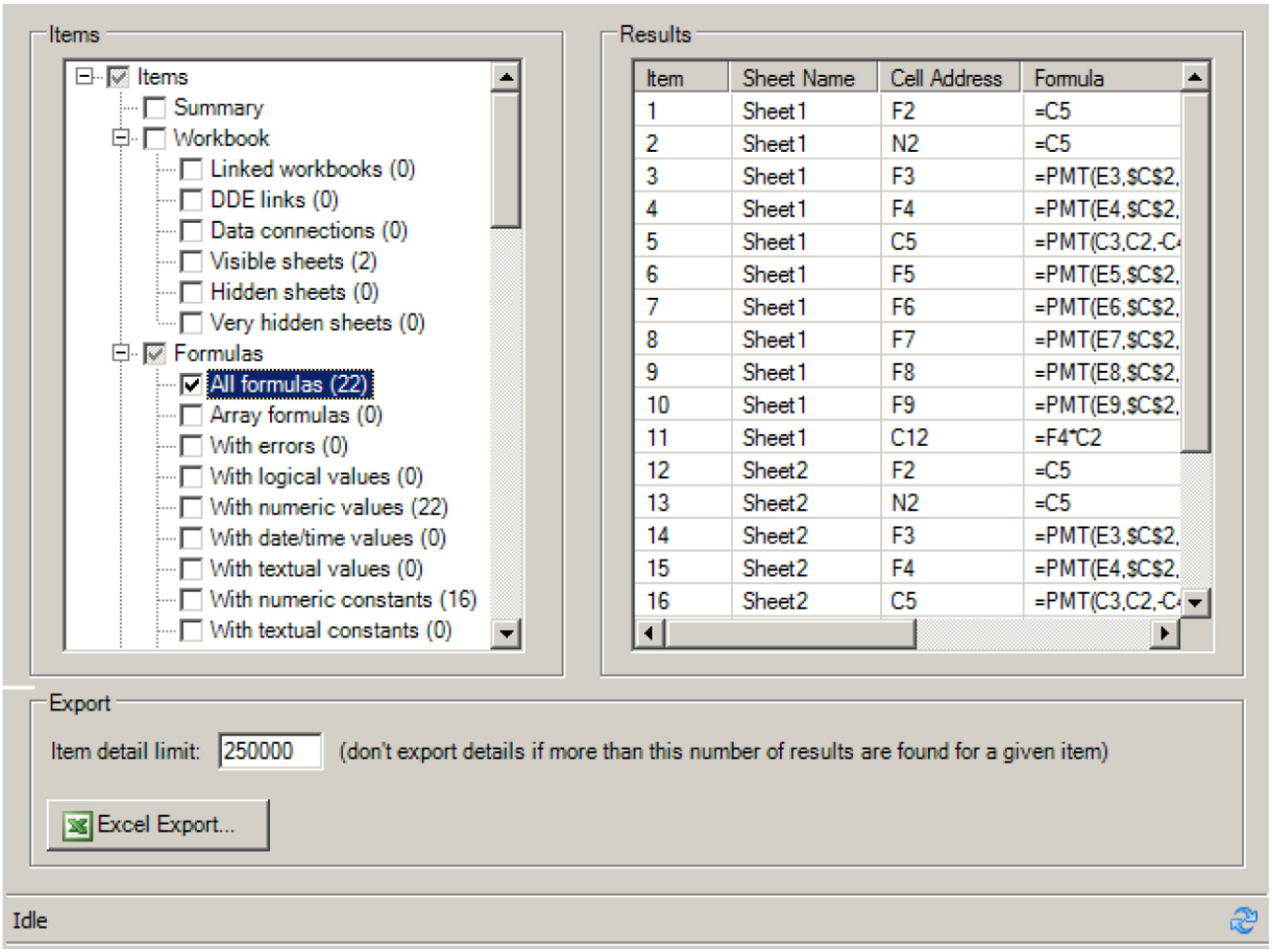


Figure 10.54: You will be able to see all formulas in the spreadsheet with their location identified by the cell reference. (Used with permission from Microsoft)

Mac Tip

In the Mac version, all add-ins are located in the Tools menu.

Choosing and Implementing Formula Auditing Options

Let's look at an example to practice identifying errors and choosing and implementing the correct ways to fix those errors. Using the WorldCorp loan installment example, suppose that the loan the company settled on has a 5.5 percent interest rate, resulting in a payment of $99,500.83 per year in interest and principal. Therefore, the total cost of the increase in capacity for the manufacturing plant will be $995,008.27. Cell F4 now has precedents and dependents, as shown in the arrows in Figure 10.55.

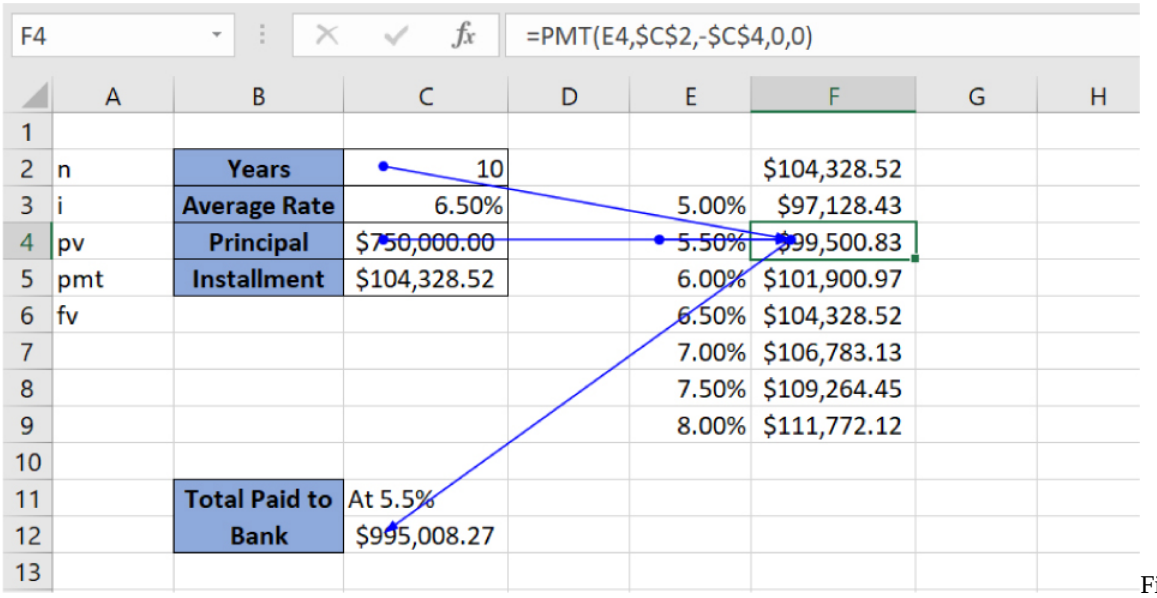


Figure 10.55: The cell pulls data from many other cells. By using Trace Precedents and Dependents, we can visually see the cells that are connected by formulas. (Used with permission from Microsoft)

The data in Figure 10.55 looks good, but suppose you get a #NUM! error in cell F4 (Figure 10.56). Recall that this type of error means that the formula contains contradictory or unsound numbers that stop the formula from calculating the correct result. First, try the Error Checking tool. Change the location of the N variable to a blank cell, C1. This gives the error shown in the figure. The formula cannot be calculated based on a blank cell. Choose the Error Checking tool from the Formulas tab in the Formula Auditing command group.

Mac Tip

In the Mac version, the Error Checking tool is located in the Formulas menu.

When the window appears, choose Show Calculation Steps (Figure 10.56). This opens the Evaluate Formula command, which shows the formula already solved (Figure 10.57a). When examining the formula, you can see the values of 0.065 for the rate and 750,000 for the principal. Because the PMT function requires you to input N, or the number of payment periods, you would also expect to see 10 in the formula, but there is a 0 instead of a 10 in the N variable location in the formula. Thus, you can see where the problem in the formula is, so you can fix it. If you then close the Evaluate Formula window, you are taken back to the Error Checking tool from where you can choose Edit in Formula Bar. When selected, the cells used in the formula are highlighted. At this point, you should see that the formula uses cell C1, not C2 as was intended. Revise the formula to replace C1 with C2 (Figure 10.57b), and run the Error Checking tool again. Now the worksheet doesn't have any errors (Figure 10.58c).

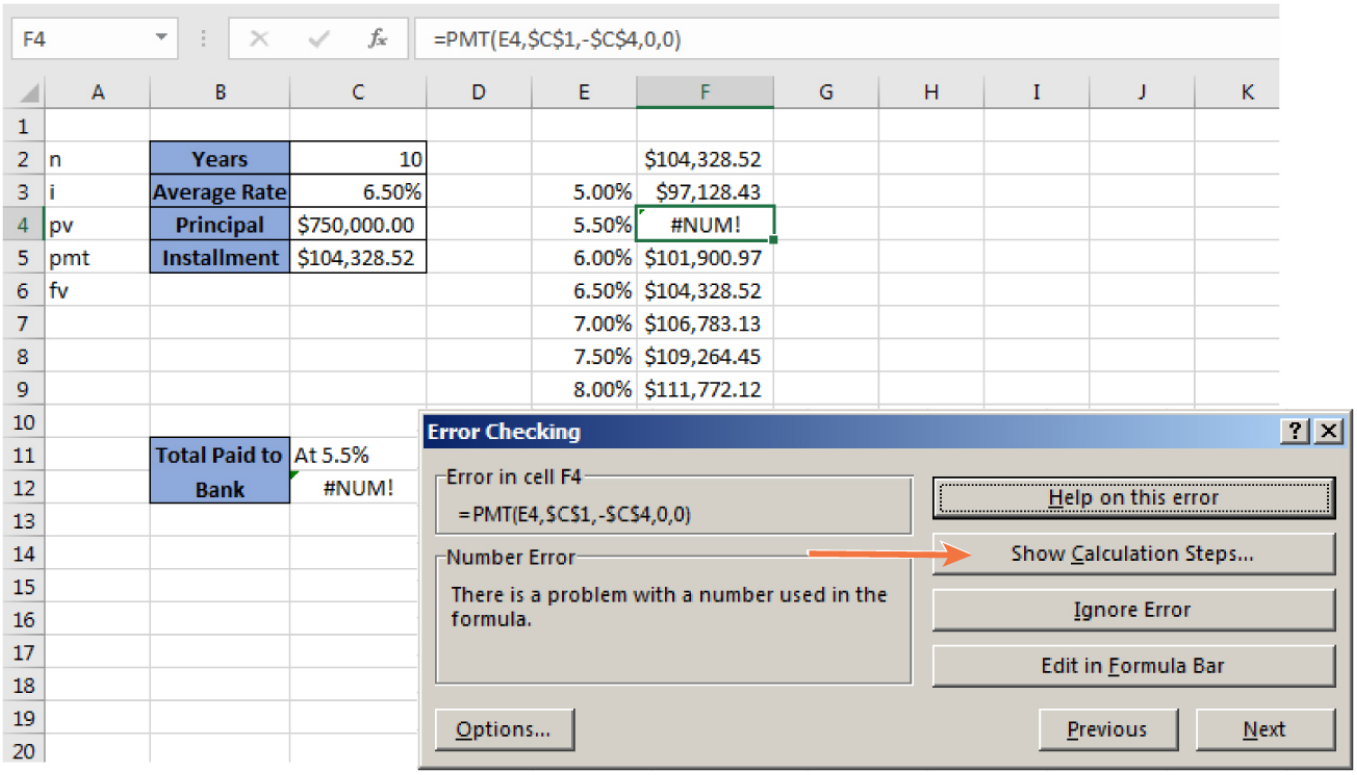
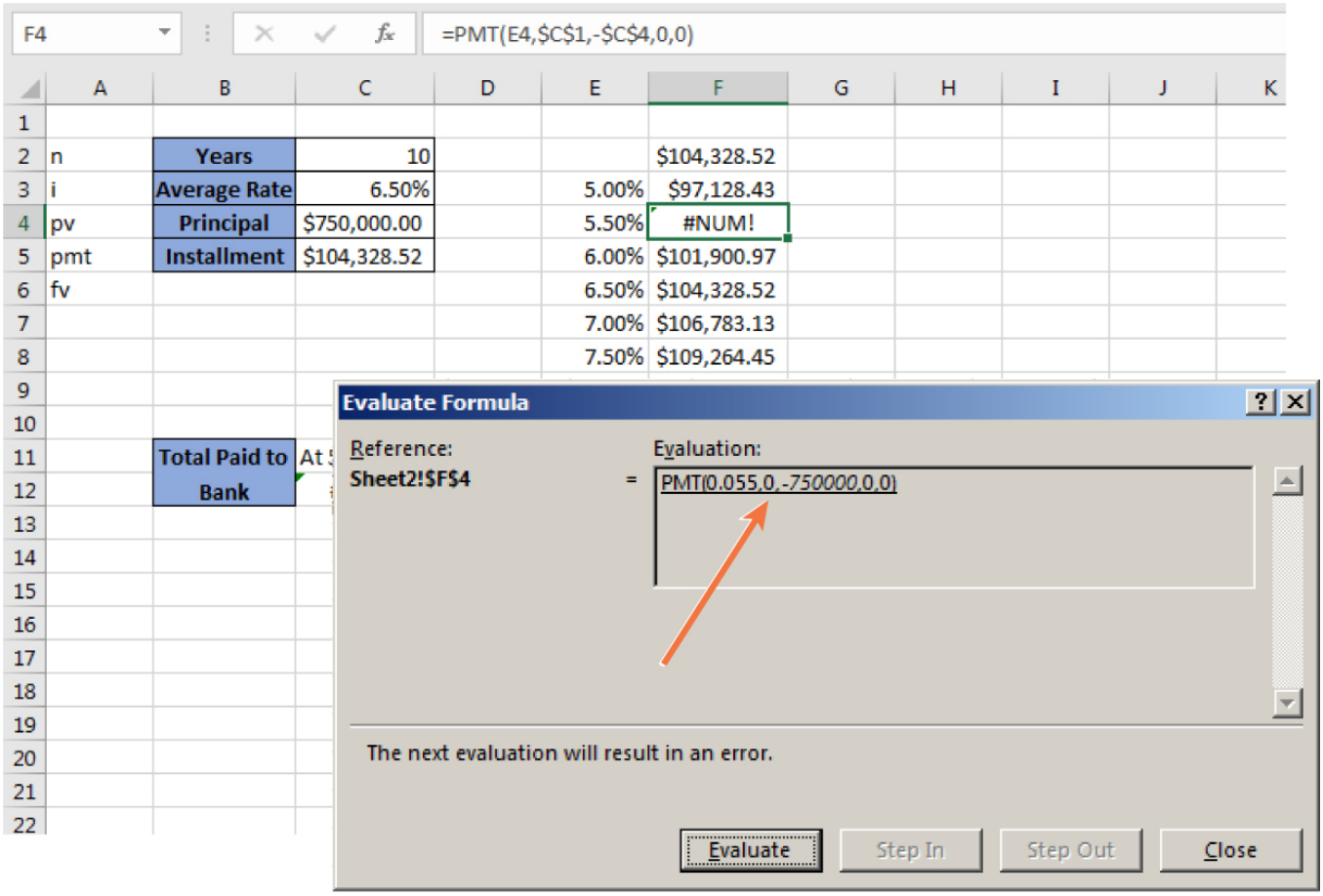
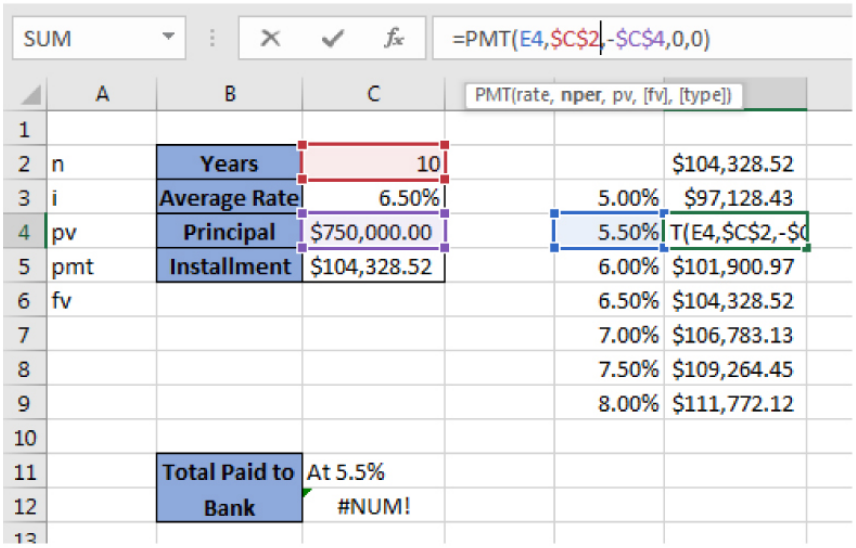


Figure 10.56: The formula cannot calculate an answer because of an error on the worksheet. The Error Checking tool is similar to the Evaluate Formula tool, except that it checks the whole worksheet at once. (Used with permission from Microsoft)



(a)



(b)

Figure 10.57: (a) Show Calculation steps will show you where the error is located. (b) You can adjust the formula to address the error on the spreadsheet. (Used with permission from Microsoft)

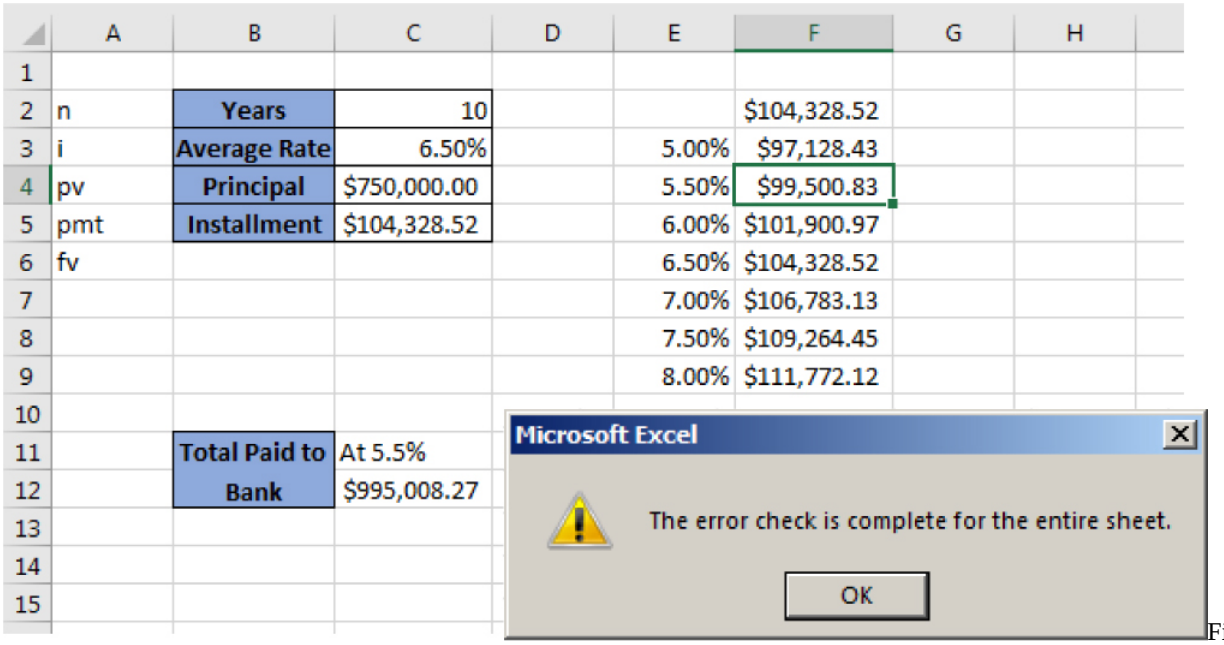


Figure 10.58: Running Error Check again indicates that the spreadsheet is now error-free. (Used with permission from Microsoft)

Spotlight on Ethics - The Tick and Tie Method

All businesses should have multiple ways of checking and auditing their financial statements. Often this is referred to as "checks and balances." One example for banking purposes would be to require two signatures on all checks that are written on the account. That then ensures that two different people have approved the check. The concept of auditing in accounting is checking and double-checking that the financial statements are accurate and follow the appropriate accounting standards. This not only protects the company from the consequences of errors, but it can also ensure that the company employees are not committing any wrongdoing.

One method to accomplish this is the "tick and tie" internal auditing method, which involves verifying the numbers on one financial statement with those on another. Managers can use this method internally to monitor transactions for irregularities (payments to unknown vendors, for example) or verify that company financial statements balance before the external auditors do a yearly review. It is better to monitor constantly and consistently than to wait for the external auditor to find the errors. Also, by having a regular internal audit of the finances of the company, you can create a culture that expects honesty and integrity. If you happen to find a deliberate error by an employee, you can address it quickly. By using the tools available in Excel, you can set up an internal audit system to use regularly, thus creating the culture in the organization and identifying misconduct quickly.

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7.5: Conditional Formatting

This page is a draft and is under active development.

Learning Objectives

- Use Conditional Formatting techniques to provide flexible highlighting, applying specified formatting only when certain conditions are met. Techniques include:
  - Data bars — to make it easy to visualize values in a range of cells.
  - Cells Rules — to highlight values that match the requirements you specify.

You now have all the calculations you need in your CAS 170 Grades spreadsheet. There is a lot of data here. To make it easier to pick out the most important pieces of data, Excel provides **Conditional Formatting**. The best thing about Conditional Formatting is that it is flexible, applying specified formatting only when certain conditions are met.

1. Select the values in the Total Points column (**O5:O24**).
2. At the bottom of your selection, click on the Quick Analysis Tool. On the Formatting tab, select Data Bars (see **Figure 3.18**).

Mac Users: as stated previously, there is no Quick Analysis Tool for Excel for Mac. Use the alternate steps as shown below.

Excel places blue bars on top of your values; long blue bars for larger numbers, shorter ones for smaller numbers. This makes it easier to see how well each student did in the class – without having to look at the specific numbers.

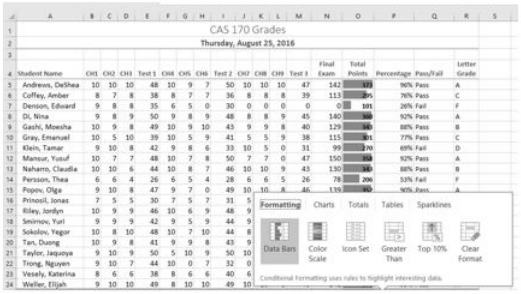


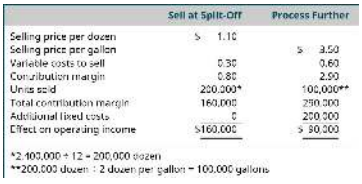
Figure 3.18 Data Bars on the Quick Analysis tool

Another way to apply Data Bars is to:

- Select the range that needs data bars
- On the Home tab, in the Styles group, select Data Bars from the Conditional Formatting tool.
- From there you can select data bars of different colors and opacities (see **Figure 3.19**).

Mac Users: Alternate Steps:

- On the Home tab select Data Bars from the Conditional Formatting tool  .
- From there you can select data bars of different colors and opacities (see **Figure 3.19**).



	Sell at Split-Off	Process Further
Selling price per dozen	$ 1.10	
Selling price per gallon		$ 3.50
Variable costs to sell	0.30	0.60
Contribution margin	0.80	2.90
Units sold	200,000*	100,000**
Total contribution margin	160,000	290,000
Additional fixed costs	0	200,000
Effect on operating income	$160,000	$ 90,000

*2,400,000 ÷ 12 = 200,000 dozen
**200,000 dozen ÷ 2 dozen per gallon = 100,000 gallons

Figure 3.19 Data Bars on the Conditional Formatting tool

It is even more important to highlight the students who are failing in the class. To practice further with Conditional Formatting we will do that in two places, in the Percentages column and on the Letter Grade column. To start with, we want any **F** letter grades to be formatted with a light red fill color and dark red text.

1. Select the Letter Grades (**R5:R24**).

2. On the Home tab, in the Styles group, select **Highlight Cell Rules** from the Conditional Formatting tool (see **Figure 3.20**).
3. Select **Equal To**
4. Fill out the Equal to dialog box so that cells that are equal to: **F** have **Light Red Fill with Dark Red Text** (see **Figure 3.21**).

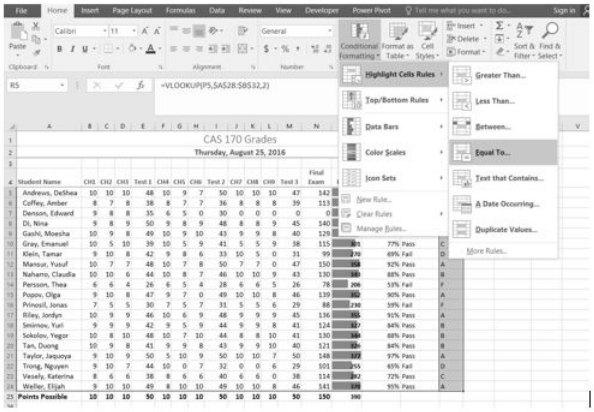


Figure 3.20 Conditional Formatting Equal To

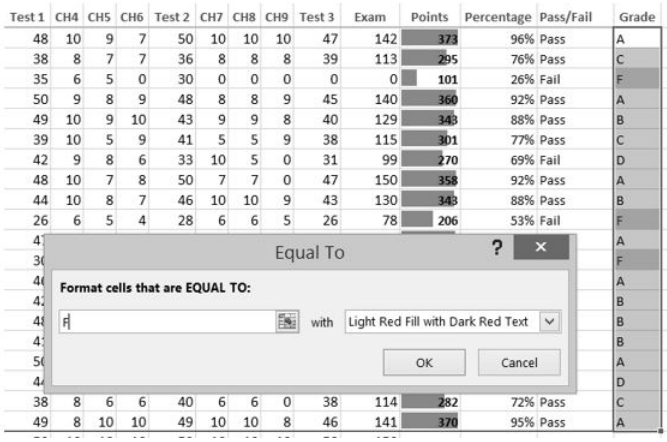


Figure 3.21 Conditional Formatting Equal To Dialog Box

Let's try that one more time – to highlight those students who are passing the class. This time we will use the Pass/Fail text in the Pass/Fail column. If the text for a student is Pass we want the cell to be formatted with a yellow fill with dark yellow text.

1. Select the Pass/Fail grades (**Q5:Q24**).
2. On the Home tab, in the Styles group, select **Highlight Cell Rules** from the Conditional Formatting tool (see **Figure 3.20**).
3. Select **Equal To**
4. Fill out the Equal to dialog box so that cells that are equal to: **Pass** have **Yellow Fill with Dark Yellow Text**. (To find the Yellow Fill with Dark Yellow text option, click the the down arrow at the end of the last (with) box).

You do not have to use the default styles to make your data stand out. You can set any formatting you want. When you do, it is probably a good idea to include other styling in addition to color. Your spreadsheet might be printed in black and white. You would hate to lose your Conditional formatting. Now we are going to use conditional formatting to display any Percentages that are less than 60% with red text formatted in bold and italic.

1. Select the Percentage grades (**P5:P24**).
2. On the Home tab, in the Styles group, select Highlight Cell Rules from the Conditional Formatting tool (see **Figure 3.20**).
3. Select **Less Than**
4. Fill out the Less Than dialog box so that cells that are less than **.6** will be have conditional formatting. But, instead of using the default red text on a light red fill, press the down arrow at the end of that box and select **Custom Format**.
5. On the **Font** tab of the Format Cells dialog box, in the Font style box, select **Bold Italic**. In the Color box, select **Red** (see **Figure 3.22**).
6. Press OK. Then press OK again.

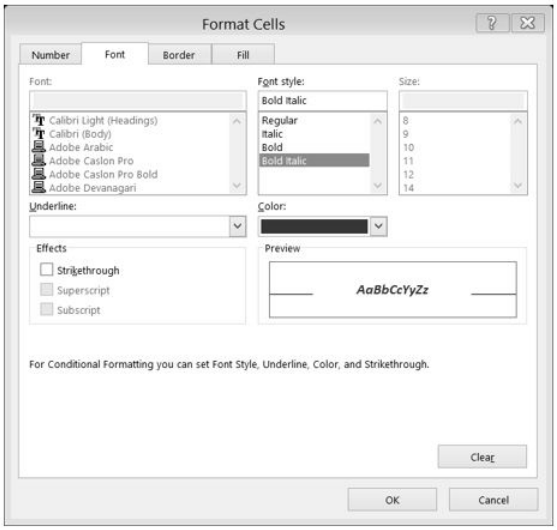


Figure 3.22 Conditional Formatting Custom Format Cells Dialog box

Conditional Formatting is valuable in that it reflects the current data. It changes to reflect changes in the data. To test this, delete DeShea's final exam score. (Select N5. Press Delete on your keyboard.) Suddenly, DeShae is failing the course and the Conditional Formatting reflects that. This is a little unfair to DeShae – who has worked so hard this quarter. Let's give him back his grade. Press CTRL Z (Undo). His test score reappears and the Conditional formatting reflects that as well.

Making Changes

What if you have made a mistake with your Conditional Formatting? Or, you want to delete it altogether? You can use the **Conditional Formatting Manage Rules** tool. In our example, we want to remove the conditional formatting rule that formats the **Pass** text with yellow. We are also going to modify the minimum passing percentage for the conditional formatting rule that is applied to the percentages.

1. On the Home Tab, in the Styles Group, select **Manage Rules** at the very bottom of the Conditional Formatting drop-down list.
2. Show formatting rules for: **This Worksheet** (see **Figure 3.23**).
3. We don't really need to highlight the students who are passing the class, so select that rule in the Rules Manager and press the **Delete Rule** button. Mac Users should click the minus symbol – at bottom left corner to delete the rule.

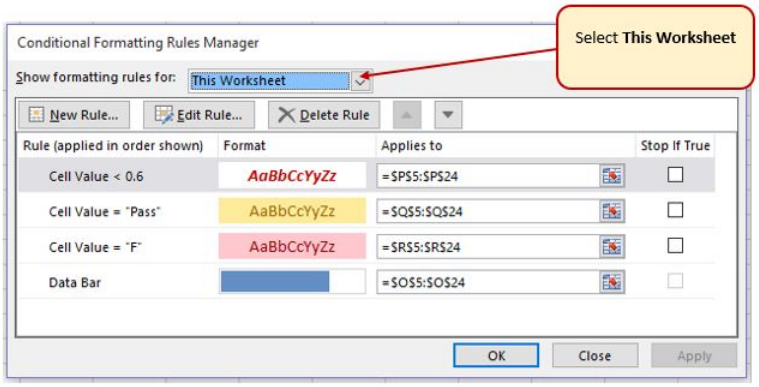


Figure 3.23 Conditional Formatting Manage Rules

In a previous exercise (the IF function), we decided that students were failing if they got a percentage score of less than 70%, so the Conditional Formatting rule in the Percentage column needs repair.

4. Select the rule that reads Cell Value <0.6.
5. Select the Edit Rule button, and change the .6 to .7 (see **Figure 3.24**).
6. Click OK (or Apply) twice. Double check that your completed workbook matches **Figure 3.25**.

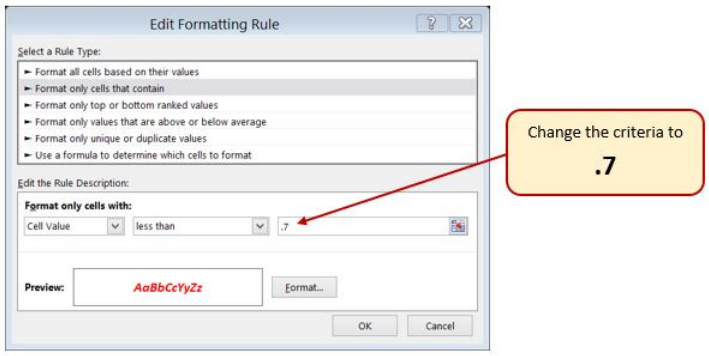


Figure 3.24 Conditional Formatting Edit Formatting Rule Dialog box

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	CAS 170 Grades																		
2	Wednesday, September 28, 2016																		
3																			
4	**Student Name**	**CH1**	**CH2**	**CH3**	**Test 1**	**CH4**	**CH5**	**CH6**	**Test 2**	**CH7**	**CH8**	**CH9**	**Test 3**	**Final Exam**	**Total Points**	**Percentage**	**Pass/Fail**	**Letter Grade**	
5	Andrews, DeShea	10	10	10	48	10	9	7	50	10	10	10	47	142	373	96%	Pass	A	
6	Coffey, Amber	8	7	8	38	8	7	7	36	8	8	8	39	113	295	76%	Pass	C	
7	Denson, Edward	9	8	8	35	6	5	0	30	0	0	0	0	0	101	*26%*	Fail	F	
8	Di, Nina	9	8	9	50	9	8	9	48	8	8	9	45	140	360	92%	Pass	A	
9	Gashi, Moesha	10	9	8	49	10	9	10	43	9	9	8	40	129	343	88%	Pass	B	
10	Gray, Emanuel	10	5	10	39	10	5	9	41	5	5	9	38	115	301	77%	Pass	C	
11	Klein, Tamar	9	10	8	42	9	8	6	33	10	5	0	31	99	270	*69%*	Fail	D	
12	Mansur, Yusuf	10	7	7	48	10	7	8	50	7	7	0	47	150	358	92%	Pass	A	
13	Naharro, Claudia	10	10	6	44	10	8	7	46	10	10	9	43	130	343	88%	Pass	B	
14	Persson, Thea	6	6	4	26	6	5	4	28	6	6	5	26	78	206	*53%*	Fail	F	
15	Popov, Olga	9	10	8	47	9	7	0	49	10	10	8	46	139	352	90%	Pass	A	
16	Prinosil, Jonas	7	5	5	30	7	5	7	31	5	5	6	29	88	230	*59%*	Fail	F	
17	Riley, Jordyn	10	9	9	46	10	6	9	48	9	9	9	45	136	355	91%	Pass	A	
18	Smirnov, Yuri	9	9	9	42	9	5	9	44	9	9	8	41	124	327	84%	Pass	B	
19	Sokolov, Yegor	10	8	10	48	10	7	10	44	8	8	10	41	130	344	88%	Pass	B	
20	Tan, Duong	10	9	8	41	9	9	8	43	9	9	10	40	121	326	84%	Pass	B	
21	Taylor, Jaquoya	9	10	9	50	5	10	9	50	10	10	7	50	148	377	97%	Pass	A	
22	Trong, Nguyen	9	10	7	44	10	0	7	32	0	0	6	29	101	255	*65%*	Fail	D	
23	Vesely, Katerina	8	6	6	38	8	6	6	40	6	6	0	38	114	282	72%	Pass	C	
24	Weller, Elijah	9	10	10	49	8	10	10	49	10	10	8	46	141	370	95%	Pass	A	
25	**Points Possible**	**10**	**10**	**10**	**50**	**10**	**10**	**10**	**50**	**10**	**10**	**10**	**50**	**150**	390				
26																			
27	Letter Grades																		
28	0%	F																	
29	60%	D																	
30	70%	C																	
31	80%	B																	
32	90%	A																	
33																			
34																			

Grades

Figure 3.25 Completed Ch3 Gradebook

Setting the Print Area

Before you consider this workbook finished, you need to prepare it for printing. The first thing you will do is set the Print Area so that the table of Letter Grades in A27:B32 does not print.

1. Select A1:R25. This is the only part of the worksheet that you want to have print.
2. On the **Page Layout** ribbon, click the **Print Area** button. Choose **Set Print Area** from the menu.

Next you will preview the worksheet in Print Preview to check that the print area setting worked, as well as make sure it is printing on one page.

1. View the workbook in Print Preview.
   Mac Users should choose **Print** from the **File** menu to view Print Preview.
2. Set the page orientation to **Landscape**.
3. Change the page scaling if needed so that the entire worksheet prints on one page.
4. Save the **CH3 Gradebook and Parks** workbook.

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7.6: Preparing to Print

This page is a draft and is under active development.

Learning Objectives

- Locate and fix formatting consistency errors.
- Apply new formatting techniques.
- Use Print Titles to repeat rows and columns on each page of a multiple page worksheet.
- Control where page breaks occur in a multiple page worksheet.

In this section, we will review a worksheet for formatting consistency, as well as learn two new formatting techniques. This worksheet currently prints on four pages, so we will learn new page setup options to control how these pages print. A new data file will be used for this section.

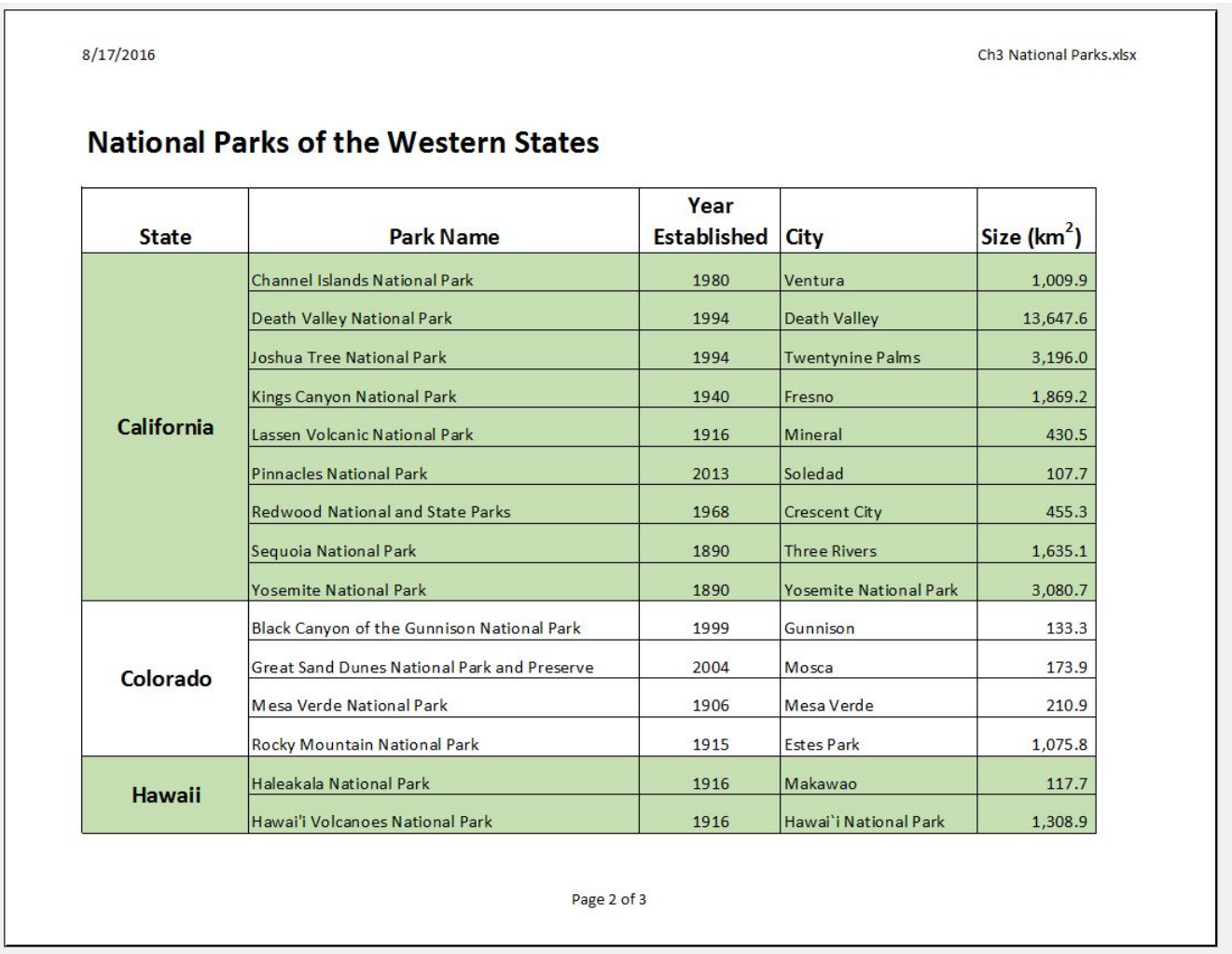
Reviewing Formatting for Consistency

Open the **"CH3-Gradebook and Parks"** workbook if it isn't already open.

*Click on the **"Park Size"** sheet tab within your **"CH3-Gradebook and Parks"** workbook* 

.

You have been given a spreadsheet with data about the national parks in the western United States. Your coworker formatted the workbook and has asked you to review it for consistency. You also need to prepare it for printing. **Figure 3.26** shows how the second page of the finished worksheet will appear in Print Preview.



National Parks of the Western States

State	Park Name	Year Established	City	Size (km^2)
California	Channel Islands National Park	1980	Ventura	1,009.9
	Death Valley National Park	1994	Death Valley	13,647.6
	Joshua Tree National Park	1994	Twentynine Palms	3,196.0
	Kings Canyon National Park	1940	Fresno	1,869.2
	Lassen Volcanic National Park	1916	Mineral	430.5
	Pinnacles National Park	2013	Soledad	107.7
	Redwood National and State Parks	1968	Crescent City	455.3
	Sequoia National Park	1890	Three Rivers	1,635.1
	Yosemite National Park	1890	Yosemite National Park	3,080.7
Colorado	Black Canyon of the Gunnison National Park	1999	Gunnison	133.3
	Great Sand Dunes National Park and Preserve	2004	Mosca	173.9
	Mesa Verde National Park	1906	Mesa Verde	210.9
	Rocky Mountain National Park	1915	Estes Park	1,075.8
Hawaii	Haleakala National Park	1916	Makawao	117.7
	Hawai'i Volcanoes National Park	1916	Hawai`i National Park	1,308.9

Figure 3.26 Completed National Parks worksheet

Reviewing Formatting for Inconsistencies

The first thing you are going to do is review the worksheet for formatting inconsistencies.

1. Scroll through the worksheet and locate the following formatting errors:
   - The formatting of the Utah label does not match the other states.
   - The Year Established values for Hawaii are not center aligned like the other years.
   - The cells for the Nevada data should have the same green fill color as the other alternating states.
   - The number of digits after the decimal place for the Size values is inconsistent. Also, these values should be formatted with Comma style to make them easier to read.
2. To fix these errors, complete the following steps:
   - Merge & Center A34:A38. Change the font size to 16 and apply Bold format.
   - Center align C28:C29.
   - Apply the green fill color to A31:E31 (be sure to match the green fill color of the other states).
   - Select E4:E43 and apply Comma Style. Use Increase Decimal and/or Decrease Decimal until one digit appears after the decimal place for all values.
3. While you're fixing errors, proofread the sheet and correct any typos.
4. Finally, let's add color to the two sheet tabs. The use of colored tabs assists in navigating between sheet tabs.
   - Right-click the **"Park Size"** sheet tab (**Mac users** hold down **Ctrl key and click the sheet tab)**
   - Point to **Tab Color** and choose a "**blue**" color.

- Now right-click the "**Grades"** sheet tab, point to **Tab Color** and choose an "**orange**" color. That's it!

Fine-tuning Formatting

Now that you have fixed the inconsistencies in the formatting, you decide to apply some formatting techniques to make the worksheet look even better. You are going to start by **vertically aligning** the names of the states within the cells.

1. Select A4:A43 (the cells with the state labels).
2. Click the Home tab on the ribbon.
3. In the Alignment group, click the **Middle Align** button (see **Figure 3.26**). Notice that the names of the states are now centered between the top and bottom borders of the cells.

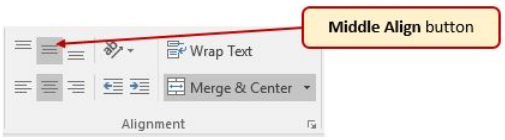


Figure 3.26 Alignment Group

The next new formatting skill is to change the label in E3 from Size (km2) to Size (km^2) with the 2 after km formatted with **superscript**.

1. Double-click on cell E3 to enter Edit mode
2. Select just the **2** (be careful not to select anything else).
3. On the ribbon (Home tab) click the dialog box launcher arrow in the Font group.

   Mac Users: there is no dialog box launcher for Excel for Mac. Instead, choose **Format** from the Menu Bar, click **Cells**:  then continue with Steps 4 and 5
4. In the Effects section of the Format Cells dialog box, check the box for **Superscript** (see **Figure 3-27**). Click OK.
5. Save the **CH3 Gradebook and Parks** file.

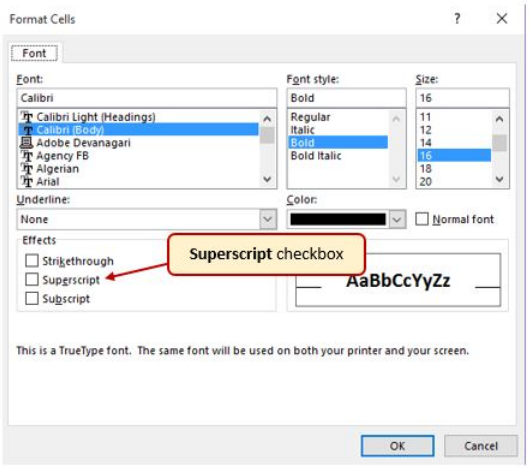


Figure 3.27 Font Tab in Format Cells Dialog Box

Repeating Column (and Row) Labels

Now that you have fixed the cell and text formatting, you are ready to review the worksheet in Print Preview. You will notice that the worksheet is printing on multiple pages, and you cannot tell what each column of data represents on some of the pages.

1. With the ***CH3-Gradebook and Parks*** file still open, and the Parks tab selected, go to Backstage View by clicking the File tab on the ribbon. Select Print from the menu.

   Mac Users: choose **File** from the Menu Bar, and then choose **Print**
2. Click through each of the pages. The worksheet is currently printing on four pages (Mac users may only see three pages but that is ok), with the City and Sizes columns printing on separate pages from the rest of the data.

3. Change the Orientation from Portrait to Landscape. This fits all of the columns on one page. All of the columns are now on the same page, but the second and third pages have no column labels to identify what information is in each column. You are going to use **Print Titles** to repeat the first three rows of the worksheet on each of the printed pages. To set **Print Titles** you need to exit Print Preview.
4. Exit Backstage View then click the Page Layout tab on the ribbon.
5. Click the Print Titles button in the Page Setup group on the ribbon. The dialog box shown in **Figure 3.28** should appear.
6. Click the Sheet tab if necessary.

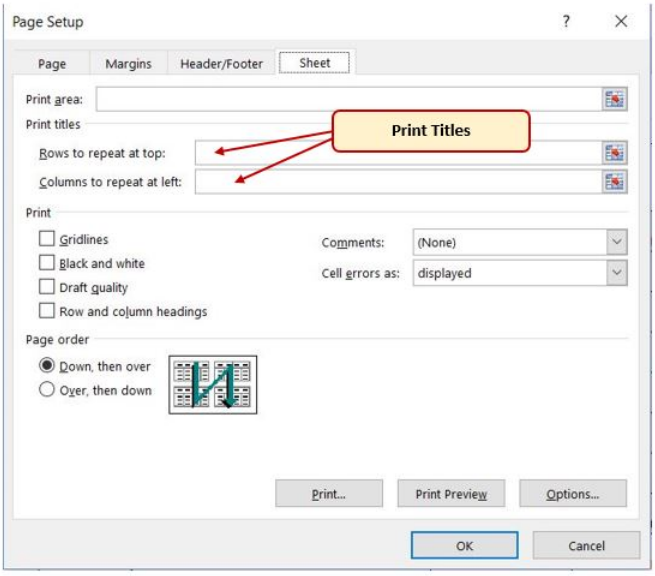


Figure 3.28 Print Titles dialog box

7. Click in the **Rows to repeat at top:** box. *Be sure your insertion point is blinking in that box before moving on to the next step.*
8. In the worksheet, select Rows 1 through 3. The text **$1:$3** should now appear in the **Rows to repeat at top:** box.
9. Click OK.

You will not see a change to the worksheet in Normal view, so you will need to return to Print Preview. While looking in Print Preview, you will notice that the pages are breaking in inconvenient places.

1. Go to Print Preview and look at each of the pages. Notice that the first three rows are now repeated at the top of each page.
2. Exit Backstage View.

Skill Refresher

Creating Print Titles

1. Open the Page Setup dialog box and click the Sheet tab.
2. Click in the Rows to repeat at top: box or the Columns to repeat at left: box.
3. Click in the worksheet and select the row(s) or column(s) that you want to repeat on each page.

Inserting Page Breaks

Notice that the data for California is split between the first and second pages. You want all of the data for each state to be together on the same page, so you need to control the page breaks. You are going to start by inserting a page break before the California data to force it to start on the second page, then you will move the page break for the third page if needed. To make these changes you are going to work in **Page Break Preview**.

1. Click the View tab on the ribbon then click **Page Break Preview** in the Workbook Views Group. Your screen should look similar to **Figure 3.29**.

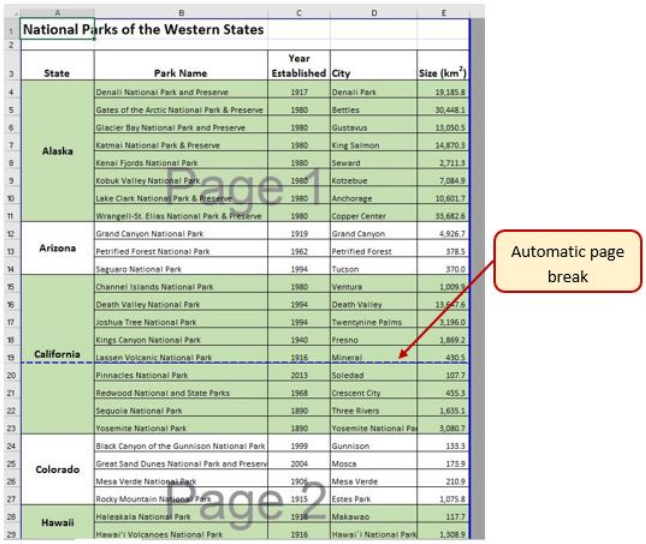


Figure 3.29 Page Break Preview

Mac Users: in the next paragraph below, the location of the automatic page breaks may be in different locations. That's ok.

In Page Break Preview, automatic page breaks are displayed as dotted blue lines. Notice the dotted blue lines after rows 13 and 28. These lines indicate where Excel will start a new page. For this worksheet, you want the first page to break before the California data, so you are going to insert a **manual page break**.

1. Select cell A15. When inserting a page break, you select the cell below where you want the page break to appear.
2. Click the Page Layout tab on the ribbon.
3. Click the Breaks button in the Page Setup group (see **Figure 3.30**).
4. Select **Insert Page Break** from the menu. There is now a solid blue line after row 14, which indicates a manual page break that was inserted.
5. Go to Print Preview. Notice that the California data now starts on the second page.

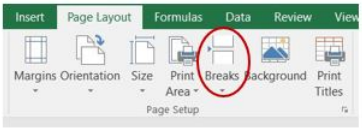


Figure 3.30 Breaks Button on Page Layout tab

While looking at each page in Print Preview you decide that the third page should start with Montana. To make this change you are going to move the automatic page break that appears after Nevada.

1. Exit Backstage View. Switch back to Page Break Preview if needed.
2. Locate the next dotted blue line (automatic page break).
3. Put your pointer over the dotted blue line and it will switch to a vertical double-headed arrow. Click on the dotted blue line and drag it **above** Montana.
4. Release the mouse button when the line is above row 30 (above Montana). The line will now be a solid blue line, indicating a manual page break.
5. Go to Print Preview. The Montana data now appears at the top of the third page.

While evaluating the pages in Print Preview you decide that there is too much white space at the bottom of the pages. To fix this, you are going to center the contents vertically on the pages.

1. Click the Page Setup link at the bottom of the Settings section of Backstage View to open the Page Setup dialog box.

Mac Users: there is no "Page Setup link" in Print Preview for Excel for Mac. Click

the Margins list arrow instead, and choose “Manage Custom Margins” then continue with the steps below. 

2. Click on the Margins tab.
3. In the Center on page section, check the box for Vertically then click OK.
4. Review each page in Print Preview to see the changes. Exit Backstage View.

Creating a Header and Footer using Page Layout View

Now that the worksheet is printing on three pages, with page breaks in appropriate places, you are ready to add a header with the current date and filename. You will also add a footer with the page number and the total number of pages that will appear as **Page 1 of 3**. You are going to edit the header and footer in Page Layout View.

1. Click the View tab on the ribbon and click the Page Layout button in the Workbook Views group.
2. The white space at the top of the worksheet should say Add header. Place the mouse pointer over the left section of the Header and click to activate that section.

   Mac Users should make sure the mouse pointer turns into a small page icon  then click in the left section of the Header
3. Click the Header & Footer Tools Design tab on the ribbon.
4. Click the **Current Date** button in the Header & Footer Elements group (see **Figure 3.31**). Inserting the date this way will insert a field that will update every time the workbook is opened.
5. Click in the right section of the Header. Click the **Filename** button in the Header & Footer Elements group (see **Figure 3.31**). Inserting the filename this way will insert a field that will update if the filename is changed.
6. Click the **Go to Footer** button in the Navigation group of commands.
7. In the center section of the footer, type the word *Page* with a space after it.
8. Click the **Page Number** button in the Header & Footer Elements group (see **Figure 3.31**), then type a space after the **&[Page]** code that appears.
9. Type the word *of* with a space after it, then click the **Number of Pages** button in the Header & Footer Elements group (see **Figure 3.31**). The footer should match **Figure 3.32**.
10. Click anywhere on the worksheet to close the Footer editing.
11. Review the worksheet again in Print Preview. Pay careful attention to the page numbers in the footer to ensure they will print correctly, then exit Backstage View.
12. View the correct print preview screenshot below in Figure 3.33
13. Check the spelling on all of the worksheets and make any necessary changes. Save and submit the ***CH3-Gradebook and Parks*** workbook.

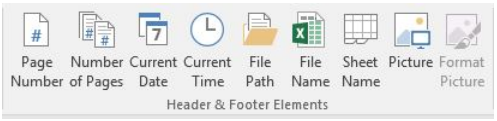


Figure 3.31 Header & Footer Elements buttons

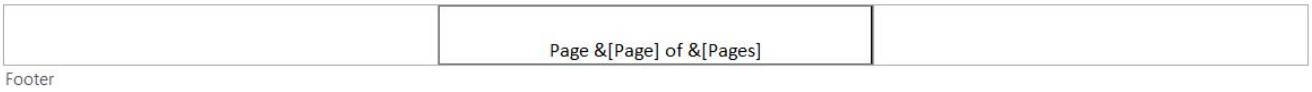


Figure 3.32 Completed Footer



National Parks of the Western States

State	Park Name	Year Established	City	Size (km²)
Alaska	Denali National Park and Preserve	1917	Denali Park	19,185.8
	Gates of the Arctic National Park & Preserve	1980	Bettles	30,448.1
	Glacier Bay National Park and Preserve	1980	Gustavus	13,050.5
	Katmai National Park & Preserve	1980	King Salmon	14,870.3
	Kenai Fjords National Park	1980	Seward	2,711.3
	Kobuk Valley National Park	1980	Kotzebue	7,084.9
	Lake Clark National Park & Preserve	1980	Anchorage	10,601.7
	Wrangell-St. Elias National Park & Preserve	1980	Copper Center	33,682.6
Arizona	Grand Canyon National Park	1919	Grand Canyon	4,926.7
	Petrified Forest National Park	1962	Petrified Forest	378.5
	Saguaro National Park	1994	Tucson	370.0
California	Channel Islands National Park	1980	Ventura	1,009.9
	Death Valley National Park	1994	Death Valley	13,647.6
	Joshua Tree National Park	1994	Twentynine Palms	3,196.0
	Kings Canyon National Park	1940	Fresno	1,869.2
	Lassen Volcanic National Park	1916	Mineral	430.5
	Pinnacles National Park	2013	Soledad	107.7
	Redwood National and State Parks	1968	Crescent City	455.3
	Sequoia National Park	1890	Three Rivers	1,635.1
	Yosemite National Park	1890	Yosemite National Park	3,080.7
Colorado	Black Canyon of the Gunnison National Park	1999	Gunnison	133.3
	Great Sand Dunes National Park and Preserve	2004	Mosca	173.9
	Mesa Verde National Park	1906	Mesa Verde	210.9
	Rocky Mountain National Park	1915	Estes Park	1,075.8
Hawaii	Haleakala National Park	1916	Makawao	117.7
	Hawai'i Volcanoes National Park	1916	Hawai'i National Park	1,308.9
Montana	Glacier National Park	1910	West Glacier	4,101.8
Nevada	Great Basin National Park	1986	Baker	312.3
New Mexico	Carlsbad Caverns National Park	1930	Carlsbad	189.3
Oregon	Crater Lake National Park	1902	Crater Lake	741.5
Utah	Arches National Park	1971	Moab	309.7
	Bryce Canyon National Park	1928	Bryce	145.0
	Canyonlands National Park	1964	Moab	1,366.2
	Capitol Reef National Park	1971	Torrey	979.0
	Zion National Park	1919	Springdale	593.3
Washington	Mount Rainier National Park	1899	Ashford	953.5
	Olympic National Park	1938	Port Angeles	3,733.8
	North Cascades National Park Service Complex	1968	Sedro-Woolley	2,042.8
Wyoming	Grand Teton National Park	1929	Moose	1,254.5
	Yellowstone National Park	1872	Yellowstone	8,983.2

Page 1
Page 2
Page 3

Grades | Park Size | +

Figure 3.3 – Print Preview of Parks sheet

Skill Refresher

Inserting Page Numbers

1. In Page Layout View, click in the section of the header or footer where you want the page number to appear.
2. Type the word Page, followed by a space, and then click the Page Number button in the Header & Footer Elements group on the Header & Footer Tools Design ribbon. This will create Page 1.
3. If desired, type a space after the &[Page] code then type the word of followed by a space. Then click the Number of Pages button. This will create Page 1 of 4.

Note

- Always check the formatting of your worksheets for consistency.
- If a worksheet is printing on multiple pages, use Print Titles to repeat rows at the top and/or columns at the left of every page to make it easier to interpret the data.
- Insert manual page breaks as needed in Page Break Preview to control where a new page begins.
- Multiple page worksheets should include the page number in either the header or footer. Be sure to insert the Page Number element so that the correct page number will display on each page of the worksheet.

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7.7: Chapter Practice

> This page is a draft and is under active development.

Scenario

You are supporting an instructor who needs a clean, print-ready gradebook snapshot for a midterm progress update. Your job is to calculate results, assign outcomes, highlight performance patterns, and format the worksheet to print professionally.

Data File: CH 7 Practice

Instructions

A) Calculate totals and percentages

1. Open the Chapter 7 gradebook file and **Save As**: `CH7_Gradebook_Practice_Lastname` .
2. Add a **Total Points** column and calculate each student's total score (use **Quick Analysis** or **AutoSum**).
3. Create a single **Points Possible** value (one cell) for the total points available.
4. Add a **Percent** column and calculate each student's percentage:
   Percent = Total Points / Points Possible
5. Make the **Points Possible** cell reference **absolute** so you can fill the percent formula down.

B) Determine Pass/Fail and Letter Grade

6. Add a **Pass/Fail** column using an **IF** function:
   - **Pass** if the percent is **70% or higher**
   - **Fail** if the percent is below **70%**
7. Add a **Letter Grade** column using **VLOOKUP** and the grade scale table provided in the workbook.

C) Add date and highlight results

8. Insert today's date using **TODAY()** and format it as a readable date.
9. Apply **Data Bars** to the **Total Points** column.
10. Apply **Conditional Formatting** to:

- Highlight low vs. high scores in the **Percent** column
- Make **Pass/Fail** easy to identify at a glance

D) Clean up common errors

11. Check for errors such as **#DIV/0!** or **#VALUE!** and correct the cause (missing values, incorrect data types, or blank cells).

E) Prepare the worksheet to print

12. Set the worksheet to **Landscape**.
13. Set scaling to **Fit all columns on one page** (or fit the sheet on one page if required).
14. Set a **Print Area** so only the gradebook table prints.
15. Add a header or footer with **page numbers** if the report prints on more than one page.

Deliverable

Submit one Excel file: `CH7_Gradebook_Practice_Lastname.xlsx`

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CHAPTER OVERVIEW

8: Data Visualization

> This page is a draft and is under active development.

One of the most important things to consider when using charts in Excel is that they are intended to be used for communicating an idea to an audience. Your audience can be reading your charts in a written document or listening to you in a live presentation. In fact, Excel charts are often imported or pasted into Word documents or PowerPoint slides, which serve this very purpose of communicating ideas to an audience. Although there are no rules set in stone for using specific charts for certain data types, some chart types are designed to communicate certain messages better than others. This chapter explores numerous charts that can be used for a variety of purposes. In addition, we will examine formatting charts and using those charts in Word and PowerPoint documents.

8.1: Choosing a Chart Type
8.2: Formatting Charts
8.3: Using Charts with Microsoft Word and Microsoft PowerPoint
8.4: Data Analysis Charts
8.5: Preparing to Print
8.6: Chapter Practice

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8.1: Choosing a Chart Type

This page is a draft and is under active development.

Learning Objectives

- Construct a line chart to show timeline and comparison trends.
- Learn how to use a column chart to show one and two frequency distributions.
- Create and format a map chart.
- Insert a funnel chart.
- Learn how to use a pie chart to show the percentage of the total for a data set.
- Compare the difference between a column chart and a bar chart.
- Construct column charts to show how a percentage of the total changes over time.

This section reviews the most commonly used Excel chart types. To demonstrate the variety of chart types available in Excel, it is necessary to use a variety of data sets. This is necessary not only to demonstrate the construction of charts but also to explain how to choose the right type of chart given your data and the idea you intend to communicate.

Choosing a Chart Type

Before we begin, let's review a few key points you need to consider before creating any chart in Excel.

1. **The first is identifying your idea or message**. It is important to keep in mind that the primary purpose of a chart is to present quantitative information to an audience. Therefore, you must first decide what message or idea you wish to present. This is critical in helping you select specific data from a worksheet that will be used in a chart. Throughout this chapter, we will reinforce the intended message first before creating each chart.
2. **The second key point is selecting the right chart type**. The chart type you select will depend on the data you have and the message you intend to communicate.
3. **The third key point is identifying the values that should appear on the X and Y axes**. One of the ways to identify which values belong on the X and Y axes is to sketch the chart on paper first. If you can visualize what your chart is supposed to look like, you will have an easier time selecting information correctly and using Excel to construct an effective chart that accurately communicates your message. **Table 4.1** "Key Steps Before Constructing an Excel Chart" provides a brief summary of these points.

Integrity Check

Carefully Select Data When Creating a Chart

Just because you have data in a worksheet does not mean it must all be placed onto a chart. When creating a chart, it is common for only specific data points to be used. To determine what data should be used when creating a chart, you must first identify the message or idea that you want to communicate to an audience.

Table 4.1 Key Steps before Constructing an Excel Chart

Step	Description
Define your message.	Identify the main idea you are trying to communicate to an audience. If there is no main point or important message that can be revealed by a chart, you might want to question the necessity of creating a chart.
Identify the data you need.	Once you have a clear message, identify the data on a worksheet that you will need to construct a chart. In some cases, you may need to create formulas or consolidate items into broader categories.
Select a chart type.	The type of chart you select will depend on the message you are communicating and the data you are using.
Identify the values for the X and Y axes.	After you have selected a chart type, you may find that drawing a sketch is helpful in identifying which values should be on the X and Y axes. In Excel, the axes are: The "category" axis. Usually, the horizontal axis is where the labels are found. The "value" axis. Usually, the vertical axis is where the numbers are found.

Time Series Trend: Line Chart 1

The first chart we will demonstrate is a line chart. Figure 4.1 shows part of the data that will be used to create two line charts. This chart will show the trend of the NASDAQ stock index.

Read more: http://www.investopedia.com/terms/n/nasdaq.asp

This chart will be used to communicate a simple message: to show how the index has performed over two years. We can use this chart in a presentation to show whether stock prices have been increasing, decreasing, or remaining constant over the designated period of time.

Before we create the line chart, it is important to identify why it is an appropriate chart type given the message we wish to communicate and the data we have. When presenting the trend for any data over a designated period of time, the most commonly used chart types are the line chart and the column chart. With the column chart, you are limited to a certain number of bars or data points. As shown below in **Figure 4.1**, as the number of bars increases on a column chart, it becomes increasingly difficult to read. In our first example, there are 24 points of data used to construct the chart. This is generally too many data points to put on a column chart, which is why we are using a line chart.

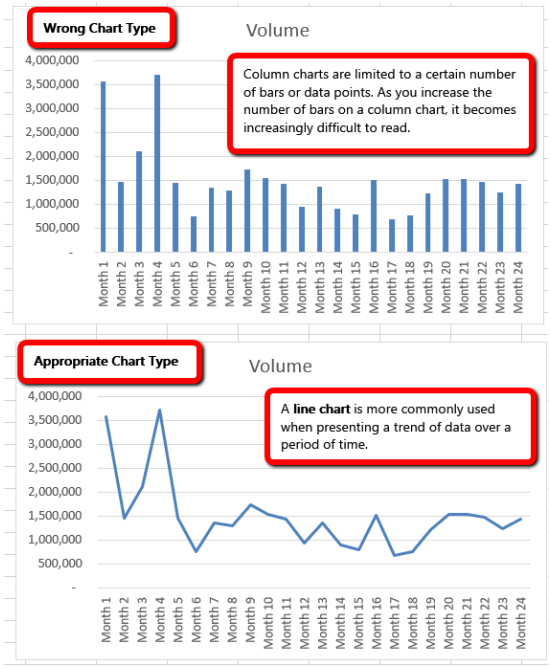


Figure 4.1 Chart Types

Our line chart will show the **Volume** of sales for the NASDAQ on the Y-axis and the **Month** number on the X-axis. Notice that when we select the information, we are including the column headings/labels. Excel will use the column headings/labels to identify each axis. Excel named the horizontal axis labels Month and the Vertical axis series Volume.

The following steps explain how to construct this chart:

Download Data file: CH4 Data

1. Open the data file CH4 Data and save a file to your computer as CH4 Charting.
2. Navigate to the Stock Trend worksheet.
3. Highlight the range B4:C28 on the Stock Trend worksheet. (Note – you have selected a label in the first row and more labels in column B. Watch where they show up in your completed chart.)
4. Click the Insert tab of the ribbon.
5. Click the Line button in the Charts group of commands. Click the first option from the list, which is a basic 2D Line Chart (see Figure 4.2). Notice Excel adds, or embeds, the line chart into the worksheet.

Figure 4.2 Selecting the Basic Line Chart

Why?

Line Chart vs. Column Chart

We can use both a line chart and a column chart to illustrate a trend over time. However, a line chart is far more effective when there are many periods of time being measured. For example, if we are measuring fifty-two weeks, a column chart would require fifty-two bars. A general rule of thumb is to use a column chart when twenty bars or fewer are required. A column chart becomes difficult to read as the number of bars exceeds twenty.

Figure 4.3 shows the embedded line chart in the Stock Trend worksheet. Do you see where your labels showed up on the chart?

Notice that additional tabs, or contextual tabs, are added to the ribbon. We will demonstrate the commands in these tabs throughout this chapter. These tabs appear only when the chart is activated.

Note

Excel 2010 uses three contextual tabs for charts. Later versions use only two. Each has all the same tools. They are just organized a little differently.

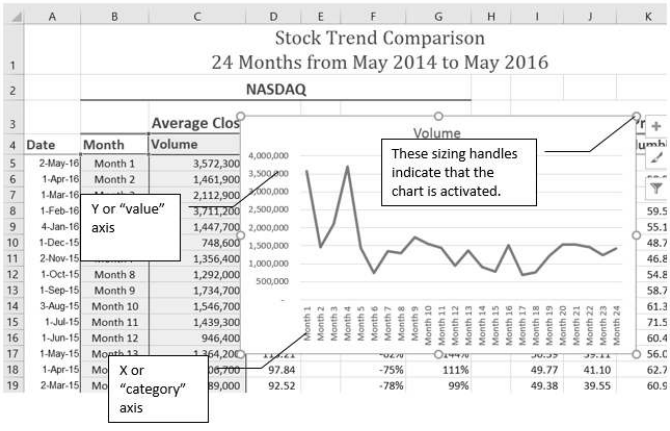


Figure 4.3 Embedded Line Chart in the Stock Trend Worksheet

https://biz.libretexts.org/@go/page/150616

As shown in **Figure 4.3**, the embedded chart is not placed in an ideal location on the worksheet since it is covering several cell locations that contain data. The following steps demonstrate common adjustments that are made when working with embedded charts:

1. **Moving a chart**: Click and drag the upper left corner of the chart to the corner of cell B30.

Note

Keep an eye on your pointer. It will change into  when you are in the right place to move your chart.

2. **Resizing a chart**: Place the mouse pointer over the bottom lower corner sizing handle, drag and drop to approximately the end of Column I, and Row 45.

Note

Keep an eye on your pointer. It will change into  when you are in the right place to resize your chart

3. **Adjusting the chart title**: Click the chart title once. Then click in front of the first letter. You should see a blinking cursor in front of the letter. This allows you to modify the title of the chart.
4. Type the following in front of the first letter in the chart title: **May 2014-2016 Trend for NASDAQ Sales**.
5. Click anywhere outside of the chart to deactivate it.
6. Save your work.

Figure 4.4 shows the line chart after it is moved and resized. Notice that the sizing handles do not appear around the perimeter of the chart. This is because the chart has been deactivated. To activate the chart, click anywhere inside the chart perimeter.

Figure 4.4 Line Chart Moved and Resized

Integrity Check

When using line charts in Excel, keep in mind that anything placed on the X-axis is considered a descriptive label, not a numeric value. This is an example of a category axis. This is important because there will never be a change in the spacing of any items placed on the X-axis of a line chart. If you need to create a chart using numeric data on the category axis, you will have to modify the chart. We will do that later in the chapter.

Skill Refresher

Inserting a Line Chart

1. Highlight a range of cells that contain data that will be used to create the chart. Be sure to include labels in your selection.
2. Click the Insert tab of the ribbon.

3. Click the Line button in the Charts group.
4. Select a format option from the Line Chart drop-down menu.

Adjusting the Y-Axis Scale

After creating an Excel chart, you may find it necessary to adjust the scale of the Y-axis. Excel automatically sets the maximum value for the Y-axis based on the data used to create the chart. The minimum value is usually set to zero. That is usually a good thing. However, depending on the data you are using to create the chart, setting the minimum value to zero can substantially minimize the graphical presentation of a trend. For example, the trend shown in Figure 4.4 appears to be increasing slightly in recent months. The presentation of this trend can be improved if the minimum value starts at 500,000. The following steps explain how to make this adjustment to the Y-axis:

1. Click anywhere on the Y (value or vertical) axis on the May 2014-2016 Trend for NASDAQ Sales Volume line chart (Stock Trend worksheet).
2. Right-click and select Format Axis. The Format Axis Pane should appear, as shown in Figure 4.5.

Mac Users: Hold down the Control key and click the Y axis. Then choose Format Axis.

Note

If you do not see "Format Axis . . . on your menu, you have not right-clicked in the correct spot. Press "Escape" to turn the menu off and try again

3. In the Format Axis Pane, click the input box for the "**Minimum**" axis option and **delete** the zero. Then type the number **500000** and hit Enter. As soon as you make this change, the Y axis on the chart adjusts.

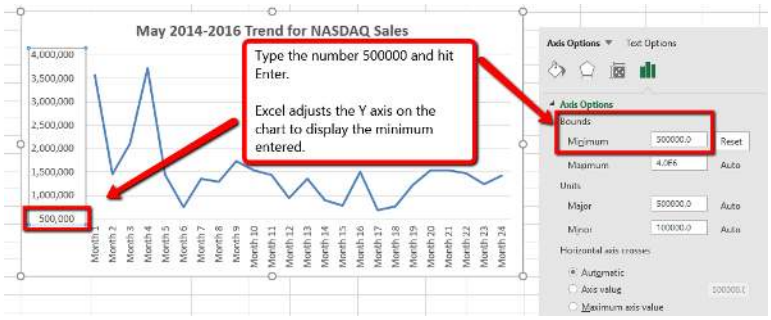


Figure 4.5 Format Axis Pane

4. Click the X in the upper-right corner of the Format Axis pane to close it.
5. Save your work.

Figure 4.6 shows the change in the presentation of the trend line. Notice that with the Y axis starting at 500,000, the trend for the NASDAQ is more pronounced. This adjustment makes it easier for the audience to see the magnitude of the trend.

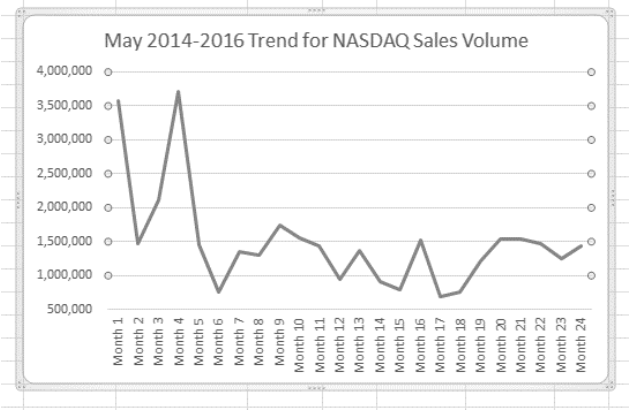


Figure 4.6 Adjusted Y-Axis for the S&P 500 Chart

Skill Refresher

Adjusting the Y-Axis Scale

1. Click anywhere along the **Y-axis** to activate it.
2. Right Click. (Note, you can also select the Format tab in the Chart Tools section of the ribbon.)
3. Select **Format Axis** . . .
4. In the **Format Axis pane**, make your changes to the **Axis Options**.
5. Click in the input box next to the desired axis option and then type the new scale value.
6. Click the **Close** button at the top right of the Format Axis pane to close it.

Trend Comparisons: Line Chart 2

We will now create a second line chart using the data in the Stock Trend worksheet. The purpose of this chart is to compare two trends: the change in volume for the NASDAQ and the change in the Closing price.

Before creating the chart to compare the NASDAQ volume and sales price, it is important to review the data in the range B4:D28 on the Stock Trend worksheet. We cannot use the volume of sales and the closing price because the values are not comparable. That is, the closing price is in a range of $45.00 to $115.00, but the data for the volume of Sales is in a range of 684,000 to 3,711,000. If we used these values – without making changes to the chart — we would not be able to see the closing price at all.

The construction of this second line chart will be similar to the first line chart. The X axis will be the months in the range B4:D28.

1. Highlight the range **B4:D28** on the Stock Trend worksheet.
2. Click the **Insert** tab of the ribbon.
3. Click the **Line** button in the **Charts** group of commands.
4. Click the first option from the list, which is a basic line chart.

Figure 4.6.5 shows the appearance of the line chart comparing both the volume and the closing price before it is moved and resized. Notice that the line for the closing price (Close) appears as a straight line at the bottom of the chart.



Figure 4.6.5 Trend Comparison Line Chart

The line representing the closing values is flat along the bottom of the chart. This is hard to see and not very useful as is. Fear not. We will fix that.

1. Move the chart so the upper left corner is in the middle of cell M1.
2. Resize the chart, using the resizing handle so the graph is approximately in the area of M1:U13.
3. Click in the text box that says "**Chart Title.**" Delete the text and replace it with the following: **24 Month Trend Comparison**.
4. Adjust the Closing Price axis, by double-clicking the red line across the bottom of the chart that represents the Closing Price.
5. The Format Data Series dialogue box opens. In the Series Options, select Secondary Axis.

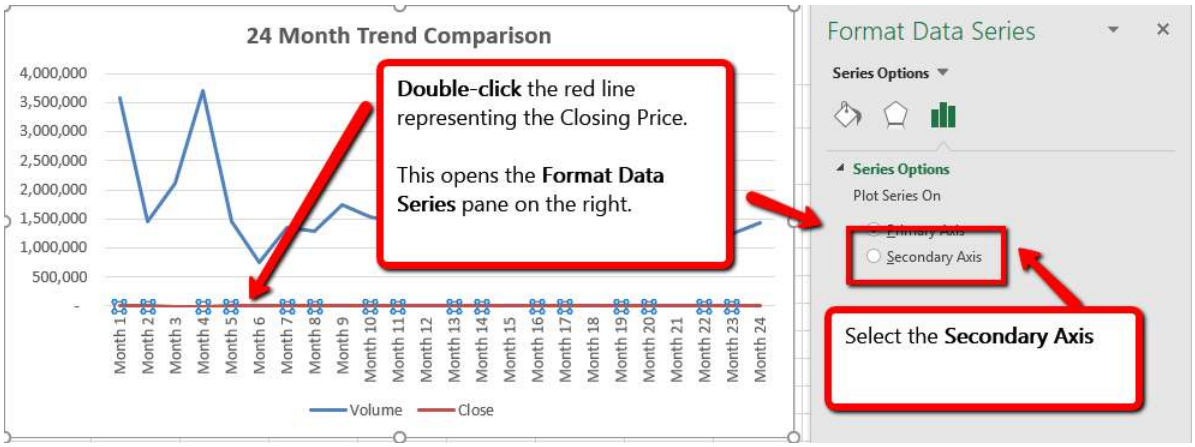
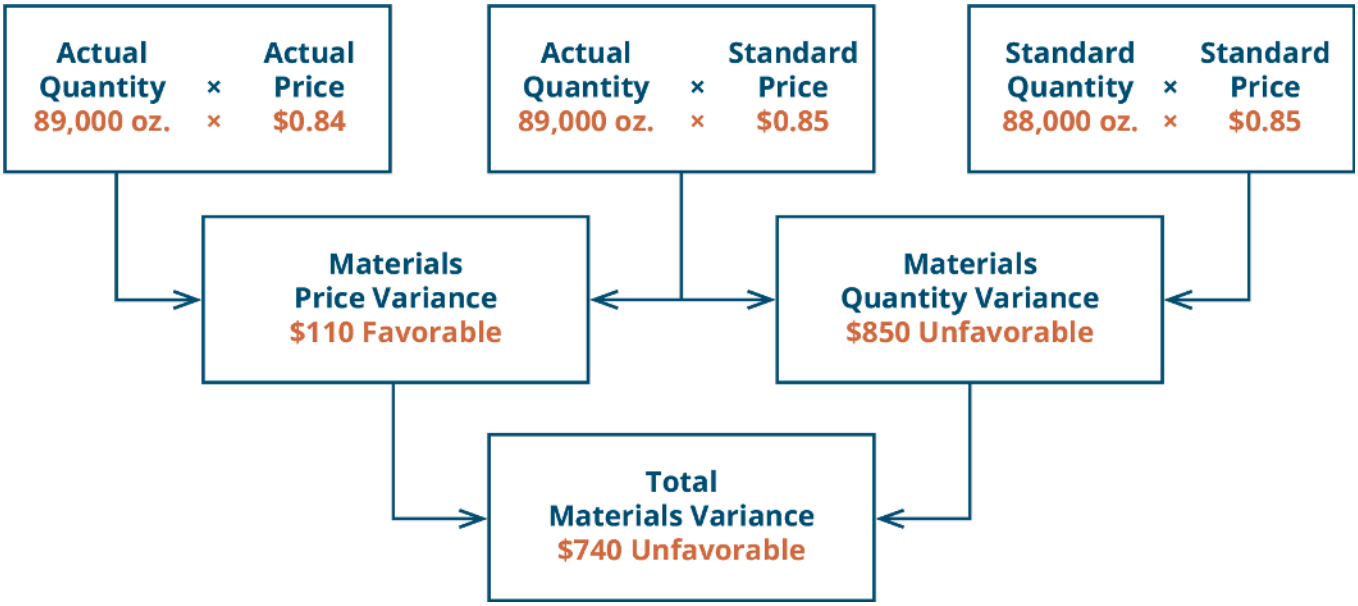


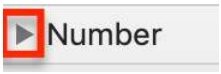
Figure 4.7 Adding a Secondary Axis

Excel adds the secondary axis. Format the values on the secondary axis to represent prices.

1. Double-click the Secondary Vertical Axis. (The vertical axis on the right goes from 0 to 140.)
2. In axis options, scroll down to the Number section.



Mac Users: If needed, click the Number "expand arrow."



3. Use the Symbol list box to add the $.
4. Press the Close button to close the Format Axis pane.
5. Save your work.

Figure 4.8 Modifying the Secondary Axis

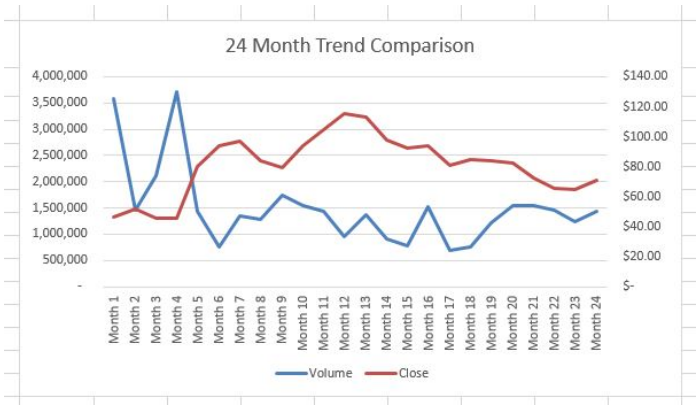


Figure 4.9 Final Comparison Line Chart

Skill Refresher

X and Y-Axis Number Formats

1. Double-click anywhere along the X or Y axis to activate it.
2. Click Number from the list of options on the left side of the Format Axis dialog box.
3. Select a number format and set decimal places on the right side of the Format Axis dialog box.
4. Click the Close button in the Format Axis pane.

Frequency Distribution: Column Chart 1

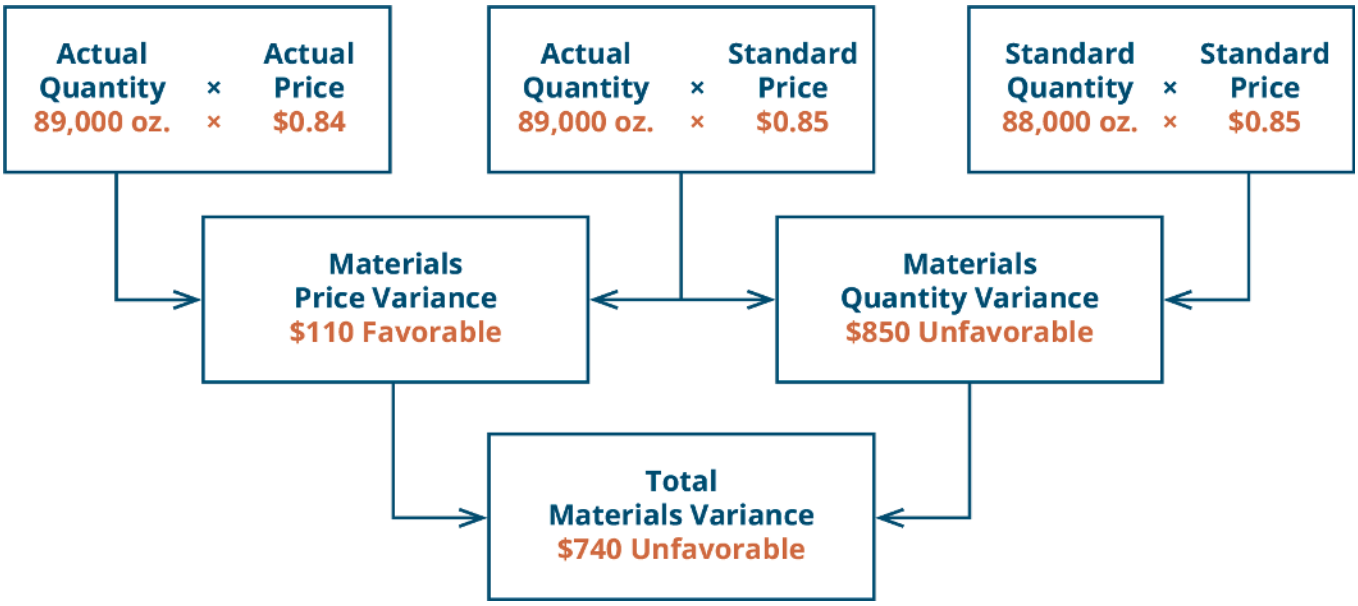
A column chart is commonly used to show trends over time, as long as the data are limited to approximately twenty points or fewer. A common use for column charts is frequency distributions. A frequency distribution shows the number of occurrences by established categories.

For example, a common frequency distribution used in most academic institutions is a grade distribution. A grade distribution shows the number of students who achieve each level of a typical grading scale (A, A−, B+, B, etc.). The Grade Distribution worksheet contains final grades for some hypothetical Excel classes.

To show the grade frequency distribution for all the Excel classes in that year, the **Numbers of Students** appear on the Y-axis and the **Grade Categories** appear on the X-axis. In this situation, notice we do not select the **Total** row. The totals are a representation of all data and would skew the graph. Essentially, you would be graphing the information twice. If you want to display the totals in a chart, the best approach is to create a separate chart that only displays the total values.

The following steps are to create the column chart:

1. Select the Grade Distribution worksheet.
2. In Row3, replace the red text with [**Insert Current Year**] and replace it with the actual current academic term and year.
3. Select two non-adjacent columns by selecting **A3:A8**.
4. Press, and hold down the **Crtl key**.



Mac Users: Hold down the **Command key** instead.

5. Without letting go of the **Ctrl key**, select **C3:C8**
6. From the ribbon, click the Insert tab. Choose the Column button.
7. Select the Clustered Column format. (First option listed.)
8. Click and drag the chart so the upper left corner is in the middle of cell **H2**. Resize the graph to fit in the area of **H2: O13**.
9. Click any cell location on the **Grade Distribution** worksheet to deactivate the chart.
10. Save your work.

Figure 4.10 shows the completed grade frequency distribution chart. By looking at the chart, you can immediately see that the greatest number of students earned a final grade in the B+ to B− range.

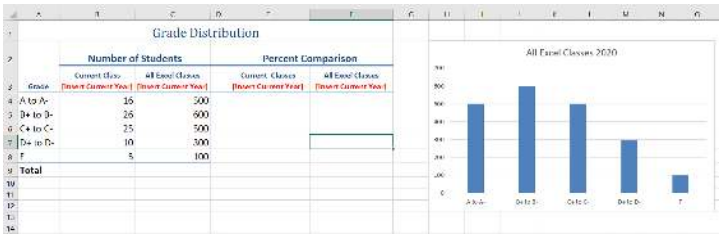


Figure 4.10 Grade Frequency Distribution Chart

Why?

Column Chart vs. Bar Chart

When using charts to show frequency distributions, the difference between a column chart and a bar chart is really a matter of preference. Both are very effective in showing frequency distributions. However, if you are showing a trend over a period of time, a column chart is preferred over a bar chart. This is because a period of time is typically shown horizontally, with the oldest date on the far left and the newest date on the far right. Therefore, the descriptive categories for the chart would have to fall on the horizontal – or category axis, which is the configuration of a column chart. On a bar chart, the descriptive categories are displayed on the vertical axis.

Creating a Chart Sheet

The charts we have created up to this point have been added to or embedded in an existing worksheet. Charts can also be placed in a dedicated worksheet called a chart sheet. It is called a chart sheet because it can only contain an Excel chart. Chart sheets are

useful if you need to create several charts using the data in a single worksheet. If you embed several charts in one worksheet, it can be cumbersome to navigate and browse through the charts. It is easier to browse through charts when they are moved to a chart sheet because a separate sheet tab is added to the workbook for each chart. The following steps explain how to move the grade frequency distribution chart to a dedicated chart sheet:

1. Click anywhere on the **Final Grades for All Excel Classes** chart on the Grade Distribution worksheet.
2. From the Chart Tools Design tab. Select **Move Chart .** This opens the Move Chart Dialog box.
3. Click the **New sheet** option on the Move Chart dialog box.
4. The entry in the input box for assigning a name to the chart sheet tab should automatically be highlighted once you click the New sheet option. Type **All Excel Classes.** This replaces the generic name in the input box (see **Figure 4.11**).
5. Click the **OK** button at the bottom of the Move Chart dialog box. This adds a new chart sheet to the workbook with the name **All Excel Classes**.
6. Save your work.

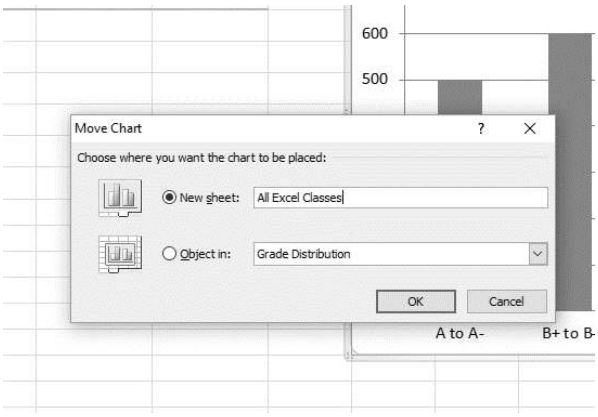


Figure 4.11 Move Chart

Figure 4.12 shows the Final Grades for all the Excel Classes column chart is in a separate chart sheet. Notice the new worksheet tab added to the workbook matches the New sheet name entered into the Move Chart dialog box. Since the chart is moved to a separate chart sheet, it no longer is displayed in the Grade Distribution worksheet.

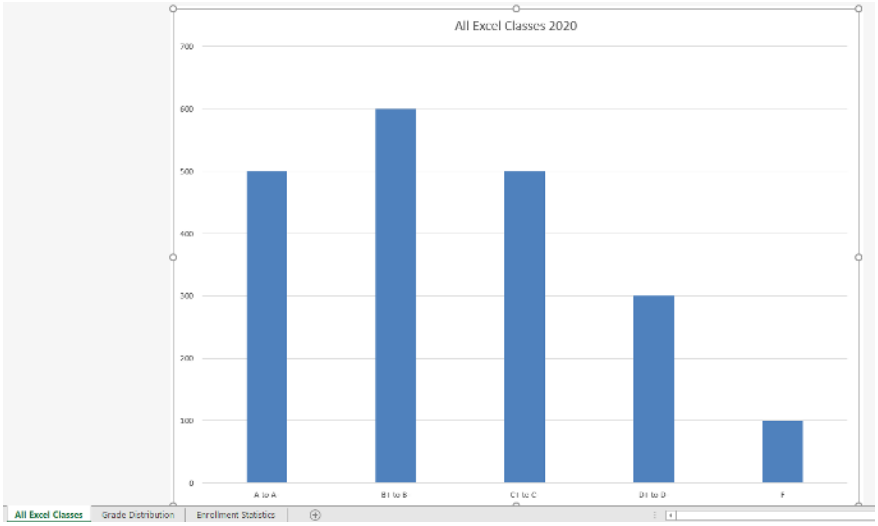


Figure 4.12 Chart Sheet Added to the Workbook

Frequency Comparison: Column Chart 2

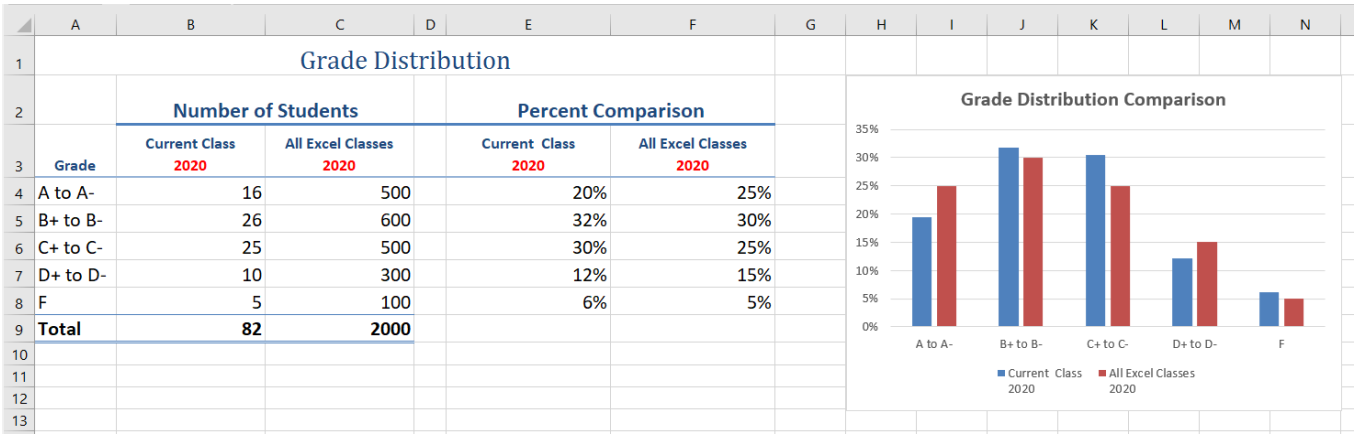
We will create a second column chart to show a comparison between two frequency distributions. Column B on the Grade Distribution worksheet contains data showing the number of students who received grades within each category for the Current

Excel Class Class. We will use a column chart to compare the grade distribution for the current class (Column B) with the overall grade distribution for Excel courses for the whole year (Column C).

However, since the number of students in the term is significantly different from the total number of students in the year, we must calculate percentages in order to make an effective comparison. The following steps explain how to calculate the percentages:

1. Highlight the range **B4:C9** on the **Grade Distribution** worksheet.
2. Click the **AutoSum** button in the Editing group of commands on the Home tab of the ribbon. This automatically sums the values in the selected range.
3. Select cell **E4**. Enter a formula that divides the value in cell **B4** by the total in cell **B9**. Add an absolute reference to cell **B9** in the formula **=B4/$B$9**. Autofill the formula down to cell **E8.**
4. Select cell **F4** . Enter a formula that divides the value in cell **C4** by the total in cell **C9**. Add an absolute reference to cell **C9** in the formula **=C4/$C$9**.
5. Autofill the down to **F8**.
6. Select **A3:A8,** press and hold down the **Ctrl** key and select **E3:F8.**

   Mac Users: Hold down the **Command key**
7. Click the **Insert** tab of the ribbon.
8. Select the **Column** button. Select the first option from the drop-down list of chart formats, which is the **Clustered Column**.
9. Click and drag the chart so the upper left corner is in the middle of cell **H2**.
10. Resize the chart to the approximate area of H2:N12.
11. Change the chart title to **Grade Distribution Comparison**. If you do not have a chart title, you can add one. On the **Design** tab, select **Add Chart Element**. Find the **Chart Title**. Select the **Above Chart** option from the drop-down list.
12. Save your work.



Grade Distribution

Grade	Number of Students: Current Class 2020	Number of Students: All Excel Classes 2020	Percent Comparison: Current Class 2020	Percent Comparison: All Excel Classes 2020
A to A-	16	500	20%	25%
B+ to B-	26	600	32%	30%
C+ to C-	25	500	30%	25%
D+ to D-	10	300	12%	15%
F	5	100	6%	5%
Total	**82**	**2000**		

Figure 4.13 Completed Data Series for the Class Grade Distribution

Figure 4.13 shows the final appearance of the column chart. The column chart is an appropriate type for this data as there are fewer than twenty data points and we can easily see the comparison for each category. An audience can quickly see that the class issued fewer As compared to the college. However, the class had more Bs and Cs compared with the college population.

Integrity Check

Too Many Bars on a Column Chart?

Although there is no specific limit for the number of bars you should use on a column chart, a general rule of thumb is twenty bars or less.

Map Charts

Data visualization brings more depth in how information, in this case geographically, connects. You can use a map chart to compare values and show categories across geographical regions like countries/regions, states, counties or postal codes. Excel will

automatically convert data to geographical locations and will display values on a map. As shown below, in **Figure 4.14,** in the next steps, we will compare West Coast Community College enrollments for Fall of 2019 using a map chart.

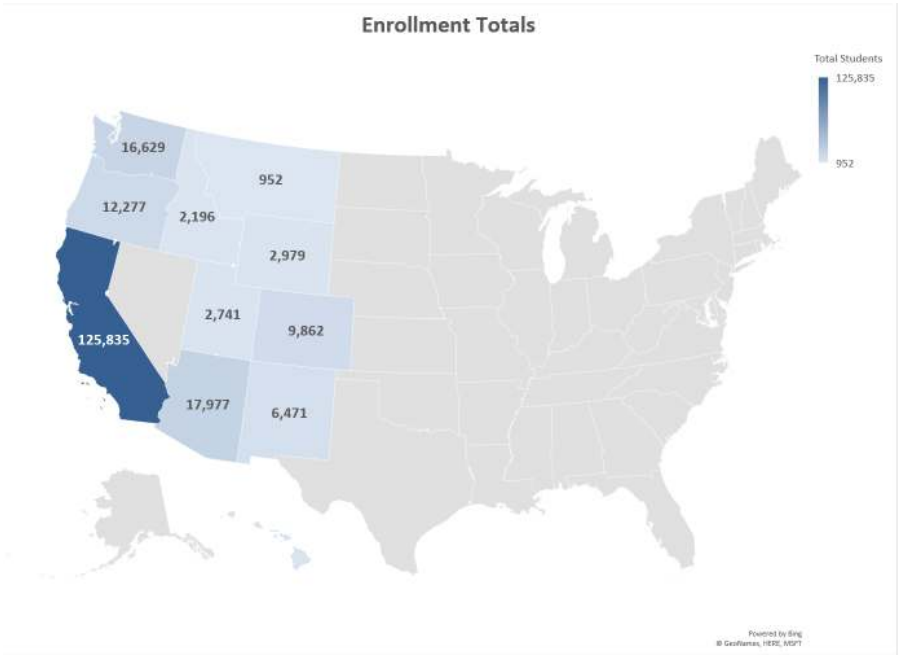


Figure 4.14 Map Chart Solution

1. From the **Enrollment Statistics** worksheet, select **A3:A13.** Next, press and hold the **CTRL** key and select **C3:C13**.
2. Click the Insert tab on the Ribbon.
3. Click **Maps**, and choose the **Filled Map** option.
4. From the Charts Design Tab, choose **Move Chart**, and select the **New Sheet** option. In the name box type **Map**. Click **Ok**.
5. To make sure the map and data are vibrant and will stand out in a presentation make the following changes:
   a. Select the **Title.** Type **Enrollment Totals.** Change the font to **bold**, **size 18**.
   b. From the top right corner of the Chart area, choose the Charts Elements plus sign.
   c. Select the Data Labels checkbox. Notice the values appear on each State.

Mac Users: There is no “Charts Element plus sign”. Follow the alternate steps below.

Click the **“Chart Design”** tab on the Ribbon

Click the **“Add Chart Element”** button on the Ribbon

Point to **“Data Labels”** option and click **“Show”**

d. Save your work.

FUNNEL CHARTS

Another graph to visualize data is a Funnel chart. Funnel charts provide a visual snapshot of a process. From our data, we will create a Funnel Chart to show how many students we have in the admissions process. You can quickly review the funnel chart to see admissions predict to have 932 new enrolled students for Winter Term 2020.

Insert a Funnel chart by following the steps.

1. From the **Admissions** sheet, select **A3:B7**.
2. From the Insert tab, choose **Recommended Charts**.
3. Scroll down the list and select the **Funnel Chart**. Click **OK**.
4. Move and resize the graph to approximately fit in the range of **D1:K15.**
5. From the Design Tab, click the **6th style option** provided in the styles gallery. (The background is black.) It is okay if your text color is different than the figure below.

6. Change the Chart Title to **Admissions Pipeline Winter 2020.**
7. From the Charts Elements, turn off the **Legend**.
   - Mac Users: Click the "**Add Chart Element**" button and change the "**Legend**" option to "**None**"
8. Save your work.

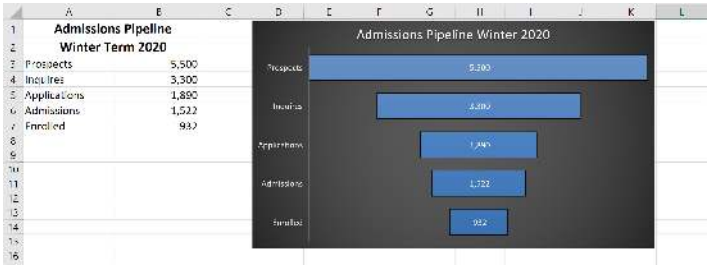


Figure 4.15 Funnel Chart

PERCENT OF TOTAL: DOUGHNUT PIE CHART

The next chart we will demonstrate is a pie chart. A pie chart is used to show a percent of the total for a data set at a specific point in time. Using the Doughnut Pie Chart, show the percentage of students enrolled at a full-time status. As in the last example, the data is located on the Enrollment Statistics sheet.

1. From the **Enrollment Statistics** worksheet, select **A3:A13.** Next, press and hold the **CTRL** key and select **D3:D13**.
2. Click the **Insert** tab on the ribbon.
3. Click the **Pie** button in the **Charts** group of commands.
4. Select the "**Doughnut**" option from the drop-down list of options.
5. From the Charts Design Tab, choose Move Chart, and select the New Sheet option. In the name box type **Full-Time Students**. Click **Ok**.
6. From the Chart Tools Design Tab, click the Chart Styles gallery and apply **Style 7**.
7. On the Chart, expand the Chart Elements tools. Select the **Legend.** Choose to display the legend on the **Right**.
   - Mac Users: Click the "Add Chart Element" button, point to **Legend,** and choose **"Right."**
8. From the Charts Elements, select the Data Labels checkbox. Then, drop down the Data Labels menu. Choose **More Options**.
   - Mac Users: Click the "Add Chart Element" button, point to **Data Labels,** and choose **"More Data Label Options."**

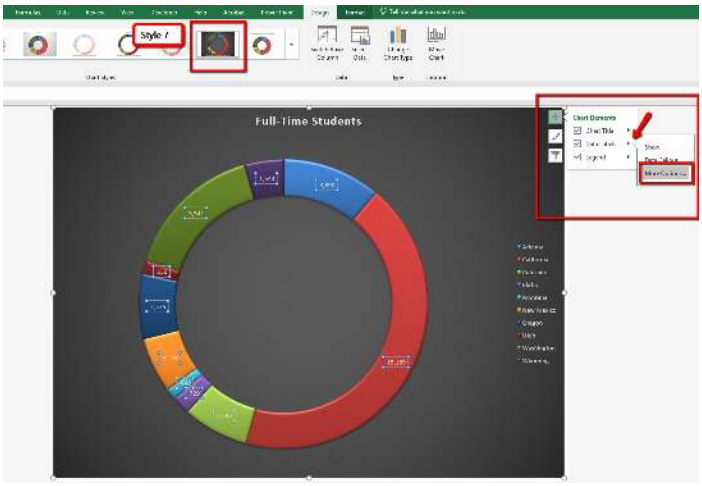


Figure 4.15 Doughnut Pie Chart Elements

9. From the Format Data Label Options menu, select **Percentages**, and **Deselect Values** to show the percent of total students who are enrolled at a full-time status.
10. Close the Format Data Labels menu.

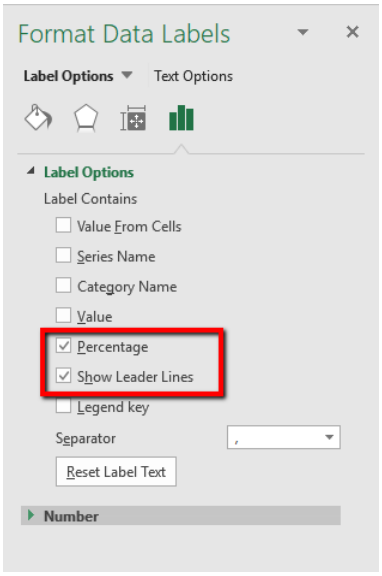


Figure 4.16 Doughnut Pie Format Data Labels

Notice the font is small compared to the graph size. Adjust the font size of the Title, Legend, and Data Label by following the below steps:

1. Select the Title. Change the font to **bold**, **size 18**.
2. Select the Legend. Change the font to **bold, size 14.**
3. Select one of the data labels in a doughnut wedge. Notice now all labels are selected. Change the font **bold, size 12.**

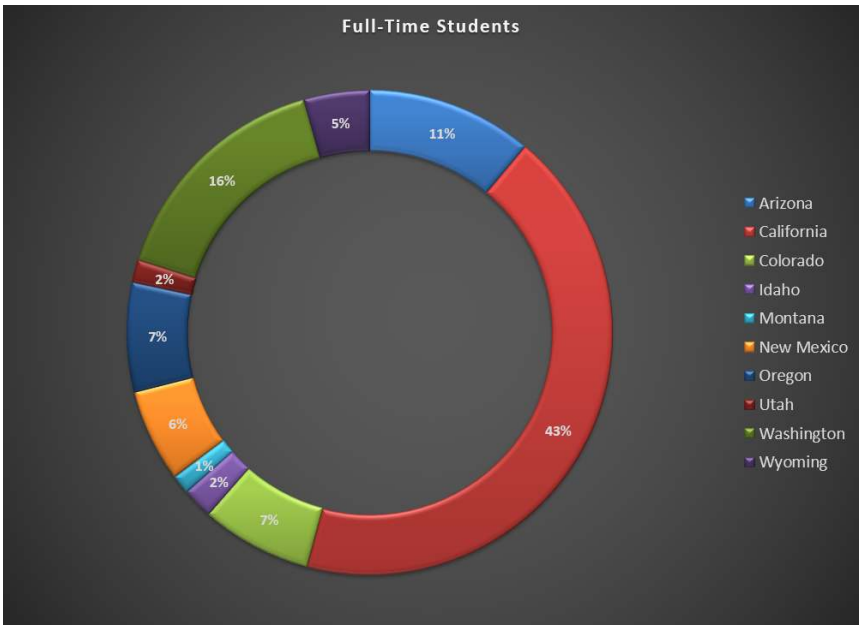


Figure 4.18 Doughnut Pie Solution

Skill Refresher

Inserting a Pie Chart

1. Highlight a range of cells that contain the data you will use to create the chart.
2. Click the Insert tab of the ribbon.
3. Click the Pie button in the Charts group.
4. Select a format option from the Pie Chart drop-down menu.

Bar chart vs Column chart

We will use statistical data to compare a bar and column chart. Both the Bar and the Column chart display data using rectangular bars where the length of the bar is proportional to the data value. Both charts are used to compare two or more values. However, the difference lies in their orientation. A bar chart is oriented horizontally, whereas a column chart is oriented vertically. Although alike, they cannot always be used interchangeably. The difference in their orientation, meaning typically the more data values, the harder it is to read in a column format. This is where, visually, a bar chart would be a better choice. Complete the steps to insert both a bar and column chart comparing not only the gender and age differences of enrolled students, but also the type of graphs you are viewing the data in.

1. From the Enrollment Statistics sheet, select **A3:A13**. Press and hold the CTRL key and select **G3:H13**.
2. From the Insert tab, choose **Recommended Charts**. Scroll down and select the **Stacked Bar** chart option. Click **Ok**.
3. Move and resize the graph so it fits approximately in **L1:U13**.
4. Add a chart title. Type **Age Comparison**.
5. Notice the age difference. Currently, per State, the majority of students are under 20 years old. **Save your work**.

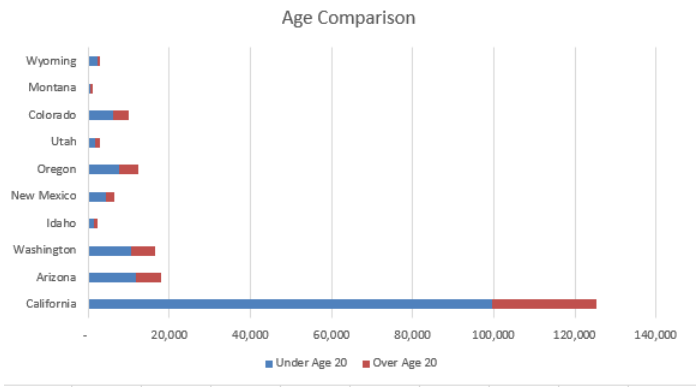


Figure 4.19 Stacked Bar chart solutions

Next, insert a column chart comparing gender.

1. From the Enrollment Statistics sheet, select **A3:A13**. Press and hold the CTRL key and select I**3:J13**.
2. From the Insert tab, choose **Recommended Charts**. Choose the first option, Clustered Column chart.
3. Move and resize the graph so it fits approximately in **L15:U32**.
4. Add a chart title. Type **Gender Comparison**.
5. Notice the ratio of women and men enrolled are pretty equal per State. **Save your work**.

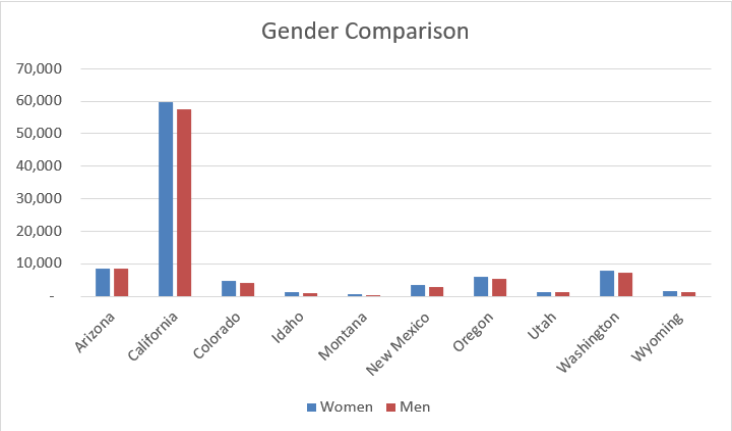


Figure 4.20 Column Chart Age Comparison

Stacked Column Chart

The last chart types we will demonstrate are the stacked column chart and a bar chart. You will use a stacked column chart to show differences in budgeted expense accounts for the admissions department and a bar chart for age comparisons of enrolled students at the college.

Follow the steps to insert a stacked column chart.

1. Click the Expenses sheet. Select the range **A4:G9.**
2. Click the **Insert** tab of the ribbon.
3. Click the **Column** button in the **Charts** group of commands. Select the **3D– Stacked Column** format.
4. Change the Chart Title to **Expenses**.
5. Move the Chart to a New Sheet. In the name box, type Budget.
6. Save your work.

Figure 4.21 shows the final stacked column chart.

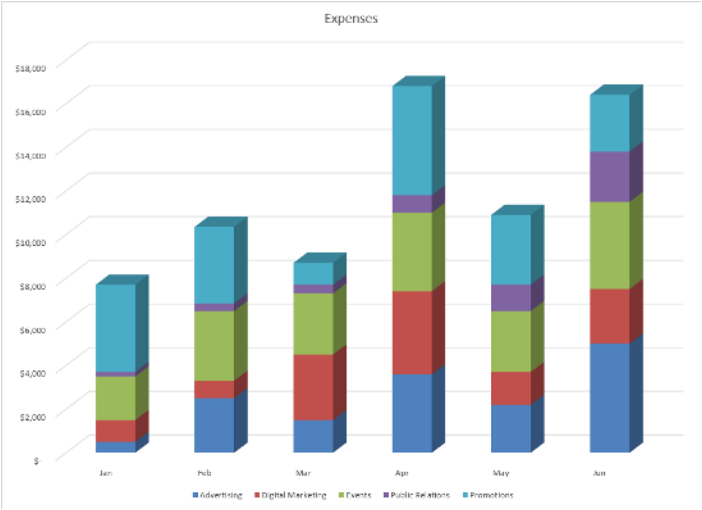


Figure 4.21 Stacked Column Chart

Skill Refresher

Inserting a Stacked Column Chart

1. Highlight a range of cells that contain data that will be used to create the chart.
2. Click the Insert tab of the ribbon.
3. Click the Column button in the Charts group.
4. Select the Stacked Column format option from the Column Chart drop-down menu to show the values of each category on the Y-axis. Select the Stacked Column option to show each category on the Y-axis.

Key Takeaways

- Identifying the message you wish to convey to an audience is a critical first step in creating an Excel chart.
- Both a column chart and a line chart can be used to present a trend over a period of time. However, a line chart is preferred over a column chart when presenting data over long periods of time.
- The number of bars on a column chart should be limited to approximately twenty bars or fewer.
- When creating a chart to compare trends, the values for each data series must be within a reasonable range. If there is a wide variance between the values in the two data series (two times or more), the percent change should be calculated with respect to the first data point for each series.
- When working with frequency distributions, the use of a column chart or a bar chart is a matter of preference. However, a column chart is preferred when working with a trend over a period of time.
- A pie chart is used to present the percentage of the total for a data set.
- A stacked column chart is used to show how a percent total changes over time.

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8.2: Formatting Charts

This page is a draft and is under active development.

Learning Objectives

- Apply formatting commands to the X and Y axes.
- Assign titles to the X and Y axes that clarify labels and numeric values for the reader.
- Apply labels and formatting techniques to the data series in the plot area of a chart.
- Apply formatting commands to the chart area and the plot area of a chart.

You can use a variety of formatting techniques to enhance the appearance of a chart once you have created it. Formatting commands are applied to a chart for the same reason they are applied to a worksheet: they make the chart easier to read. However, formatting techniques also help you qualify and explain the data in a chart. For example, you can add footnotes explaining the data source as well as notes that clarify the type of numbers being presented (i.e., if the numbers in a chart are truncated, you can state whether they are in thousands, millions, etc.). These notes are also helpful in answering questions if you are using charts in a live presentation.

X and Y-Axis Formats

There are numerous formatting commands we can apply to the X and Y axes of a chart. Although adjusting the font size, style, and color are common, many more options are available through the Format Axis pane. The following steps demonstrate a few of these formatting techniques on the **Grade Distribution Comparison** chart. Follow the steps to make some changes to the percentage numbers on the Y (vertical) axis.

1. In the **Grade Distribution** worksheet, click on the **Grade Distribution Comparison** chart. Double-click the vertical (value) axis. This opens the **Format Axis** pane.
2. Select **Axis Options**. Change the **Minimum Bound** to **.05** to make the differences in the columns more dramatic.
3. Click the **Close** button at the top of the Format Axis pane.
4. Save your work.

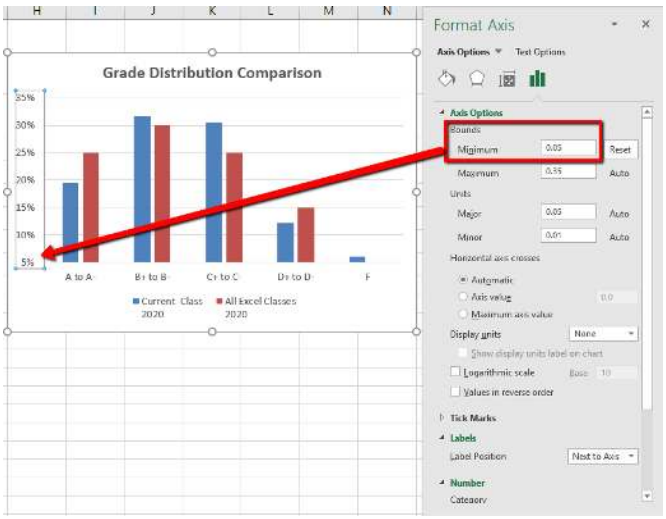


Figure 4.22 Format Axis Pane Changes

X and Y-Axis Titles

Titles for the X and Y axes are necessary for defining the numbers and categories presented on a chart. For example, by looking at the Grade Distribution Comparison chart, it is not clear what the percentages along the Y-axis represent. The following steps explain how to add titles to the X and Y axes to define these numbers and categories:

1. Click anywhere on the Grade Distribution Comparison chart in the Grade Distribution worksheet to activate it.
2. In the upper right corner of the graph, choose the Charts Element plus sign. Select the Axis Titles, then Primary Horizontal and Primary Vertical. This inserts the place holders that you will type text in.

   Mac Users click the “Add Chart Element” button in the Design tab, point to “Axis Titles” and click on “Primary Horizontal”. Do this one more time and click on “Primary Vertical”.
3. Click at the beginning of the Y-axis title and delete the generic title. Type **Percent of Enrolled Excel Students**.
4. Click at the beginning of the X-axis title and delete the generic title. Type **Final Course Grade**.

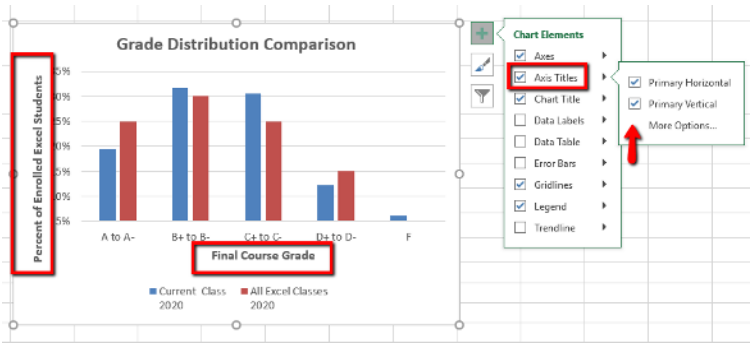


Figure 4.23 Selecting a Title for the X & Y-Axis

Skill Refresher

X and Y Axis Titles

1. Click anywhere on the chart to activate it. Choose to open the Charts Element menu.
2. Select one of the options from the second drop-down list.
3. Click in the axis title to remove the generic title and type a new title.

Data Series Labels and Formats

Adding labels to the data series of a chart is a key formatting feature. A data series is an item that is being displayed graphically on a chart. For example, the blue bars on the Grade Distribution Comparison chart represent one data series. We can add labels at the end of each bar to show the exact percentage the bar represents. In addition, we can add other formatting enhancements to the data series, such as changing the color of the bars or adding an effect. The following steps explain how to add these labels and formats to the chart:

1. Click on any of the **red columns** representing the **All Excel Classes** data series, then **Right-Click** to open the menu.

   Mac Users should hold down the **CTRL key** and click on any of the red columns.
2. From the menu, select **Format Data Series.**
3. From the **Format Data Series** pane, click the **Fill and Line** (paint bucket) button to bring up the Fill and Border group of commands.
4. Click the word **Fill** (if needed) to expand the list of Fill options.
5. Select **Pattern Fill**. Then select **40%** (last option in the top row). Change the Foreground to white, and the Background to Red.
6. Close the **Format Data Series** pane.

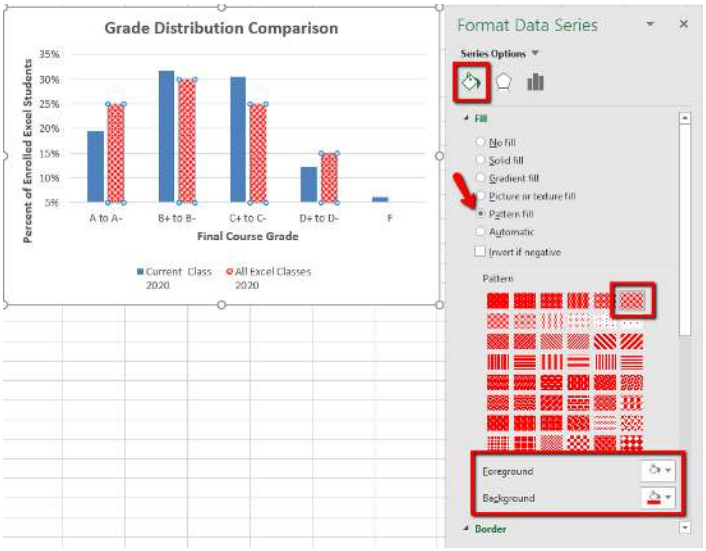


Figure 4.24 Changing the Fill of a Data Series

Now we are going to add the Data Labels at the end of the columns.

1. Be sure that your entire chart is selected, not just one of the data series. Click the **Design** tab in the **Chart Tools** section of the ribbon.
2. On the **Design** tab, select the **Add Chart Element** button, then **Data Labels**, then **Outside End** (see **Figure 4.25**.)
3. Click on one of the **Data Labels**. Note that all of the data labels for that data series are selected.
4. Check the spelling on all of the worksheets and make any necessary changes. Save your work.

Figure 4.25 shows the Grade Distribution Comparison chart with the completed formatting adjustments and labels added to the data series. Note that we can move each individual data label. This might be necessary if two data labels overlap or if a data label falls in the middle of a grid line. To move an individual data label, click it twice, then click and drag.

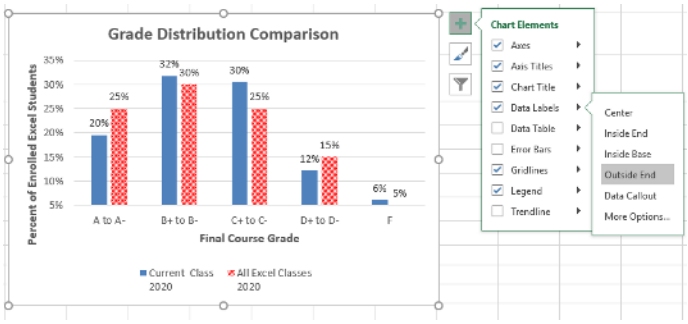


Figure 4.25 Data Labels Outside End

Skill Refresher

Adding Data Labels

1. Click anywhere on the chart to activate it.
2. Open the **Add Chart Element** group.
3. Then, select **Data Labels**
4. Select one of the preset positions from the drop-down list.

Key Takeaways

- Applying appropriate formatting techniques is critical for making a chart easier to read.
- Many formatting commands in the Home tab of the ribbon can be applied to a chart.

- To change the number format for an axis or data label, you must use the Number section in the Format Data Labels dialog box. You cannot use the Number format commands in the Home tab of the ribbon.
- Axis titles help the reader sees the most accurate representation of the information presented on a chart.

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8.3: Using Charts with Microsoft Word and Microsoft PowerPoint

This page is a draft and is under active development.

Learning Objectives

- Learn how to paste an image of an Excel chart into a Word document.
- Learn how to paste a link to an Excel chart into a PowerPoint slide.

Charts that are created in Excel are commonly used in Microsoft Word documents or for presentations that use Microsoft PowerPoint slides. Excel provides options for pasting an image of a chart into either a Word document or a PowerPoint slide. You can also establish a link to your Excel charts so that if you change the data in your Excel file, it is automatically reflected in your Word or PowerPoint files. We will demonstrate both methods in this section.

Pasting a Chart Image into Word

For this exercise, you will need **two** files:

- *The Excel spreadsheet you have been working on in this chapter — **CH4 Charting**.*
- *A Word document data file —* CH4 CC Enrollment

Excel charts can be valuable tools for explaining quantitative data in a written report. Reports that address business plans, public policies, budgets, and so. For this example, we will assume that the total enrollment per state from the Enrollment Statistics Map chart is being used in a student's written report. (see **Figure 4.26**). The following steps demonstrate how to paste an image, or picture, of this chart into a Word document:

1. Open ***CH4 CC Enrollment***. Save it as ***CH4 Enrollment Totals Per State.***
2. Move your cursor to the bottom of the document by clicking below the heading that reads: **Figure 1: Enrollment by State**. The image of the Map chart will be placed below this heading.
3. If needed, open the Excel file you have been working with (*CH4 Charting)*. Activate the **Map** chart.
4. On the **Home** tab of the ribbon. Click the **Copy button** dropdown arrow and select **Copy as Picture.**
5. Select **OK —** Accepting the Copy Pictures defaults:
    - As shown on Screen
    - Picture
6. Go back to the ***CH4 Enrollment Totals Per State*** Word document.
7. Confirm that the insertion point is below **Figure 1:Enrollment by State** heading, click the **Paste** button in the Home tab of the ribbon (or press **Crtl-V**).
8. Note the picture of the Map chart will need to be resized. Resize the image by slowly dragging one of the corner sizing handles so it's large enough to fill space below the text on the first page. Make sure the image does not spill over to the next page. This document should be one page only.
9. Save your work.

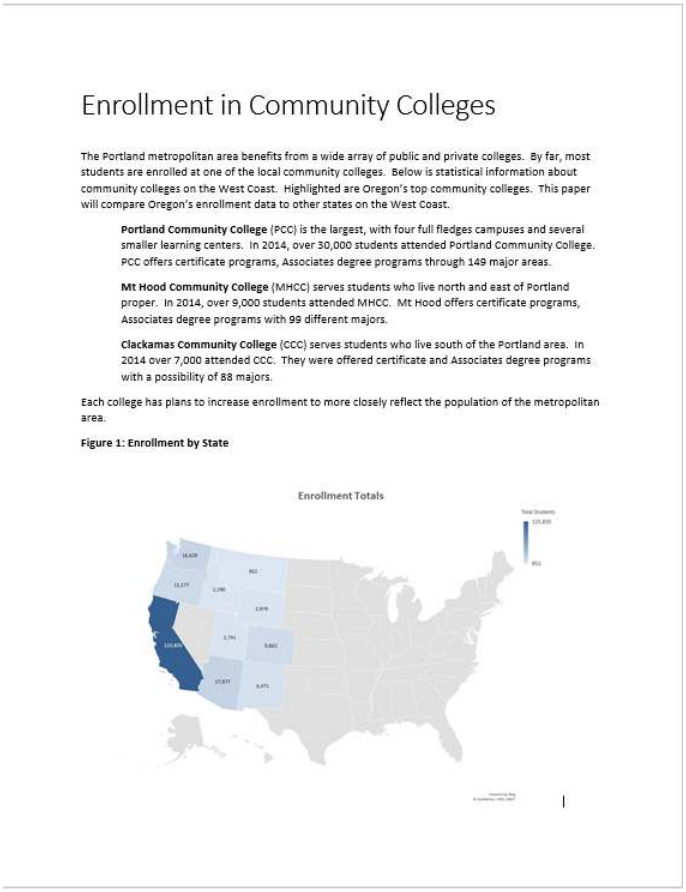


Figure 4.26 CH4 Enrollment Totals Per State

Skill Refresher

Pasting a Chart Image into Word

1. Activate an Excel chart and click the Copy button in the Home tab of the ribbon.
2. Click on the location in the Word document where the Excel chart will be pasted.
3. Click the down arrow of the Paste button in the Home tab of the ribbon.
4. Click the Picture option from the drop-down list.
5. Click the Format tab in the Picture Tools section of the ribbon.
6. Resize the picture by clicking the up or down arrow on the Shape Width or Shape Height buttons.

Pasting a Linked Chart Image into PowerPoint

For this exercise, you will need two files:

- *The Excel spreadsheet you have been working on in this chapter — **CH4 Charting**.*
- *A PowerPoint data file –* CH4 PowerPoint CC
- Microsoft PowerPoint is perhaps the most commonly used tool for delivering live presentations. The charts used in a live presentation are critical for efficiently delivering your ideas to an audience. Similar to written documents, a wide range of presentations may require an explanation of quantitative data. This demonstration includes a PowerPoint slide that could be used in a presentation. We will paste the linked Budget chart into the PowerPoint slide. As a result, if we change the chart in the Excel file, the change will be reflected in the PowerPoint file.

1. Open ***CH4 PowerPoint CC .pptx***. Save it as **CH4 PowerPoint CC Enrollment**.
2. Navigate to **Slide 6** – **Budget To Increase Enrollment**. This is the slide where you will place the linked chart.

3. If needed, open the Excel file you have been working with (*CH4 Charting)*. Activate the **Budget** chart. Click copy, (not Copy as Picture.)
4. Go back to the *CH4 PowerPoint CC Enrollment* presentation.
5. Make sure you are still on Slide 6. Click into the empty prompt box on the right.
6. Click the **Paste** button dropdown arrow in the **Home** tab of the ribbon in the PowerPoint file, choose the Paste Option **Use Destination Theme and Link Data (L).**

Mac Users should choose "**Use Destination Theme"**

This pastes an image of the Excel chart into the PowerPoint slide yet changing the appearance to match the current theme of the PowerPoint slide.

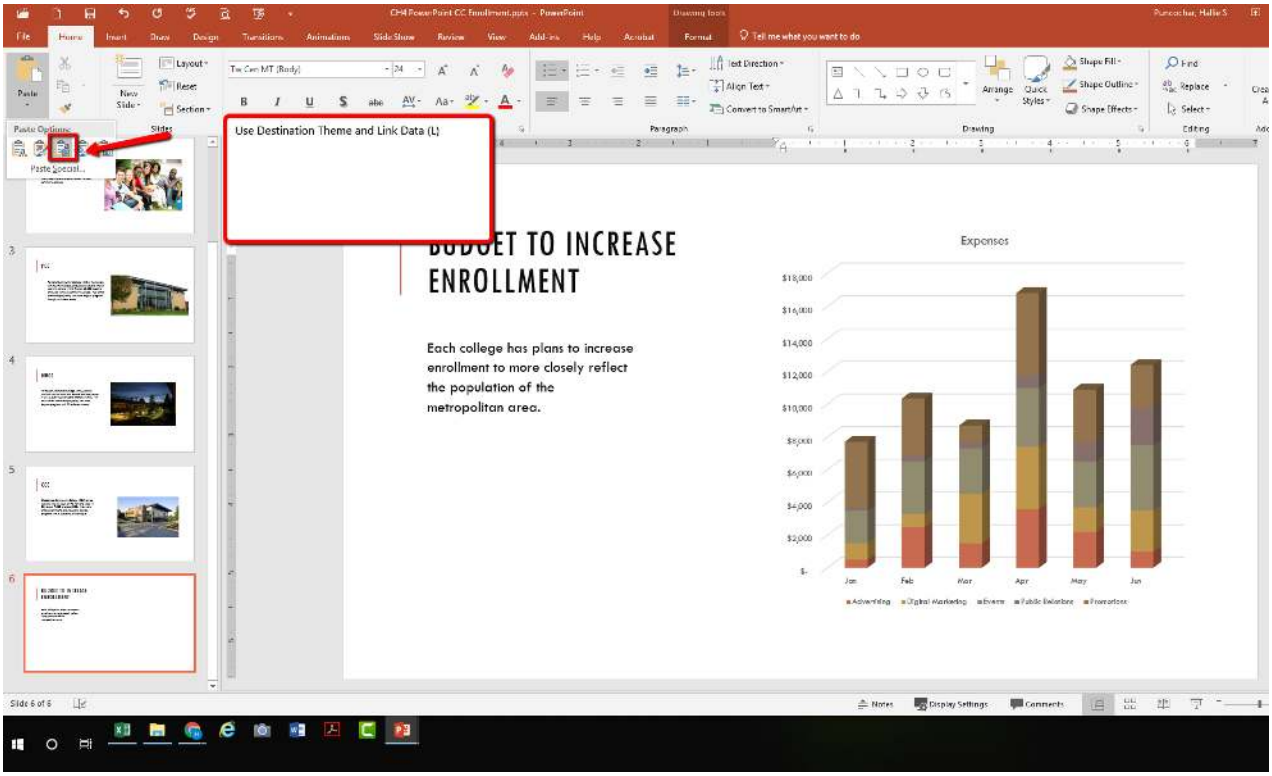


Figure 4.27 Use Destination Theme & Link_Data (L)

The benefit of adding this chart to the presentation as a link is that it will automatically update when you change the data in the linked spreadsheet file.

1. Return to your *CH4 Charting* Excel file.
2. Select the **Expenses** worksheet. The Advertising cost for June was cut. Update the spreadsheet to change. Change the value in cell G5 to **1000**.
3. Select the **Budget** worksheet. Notice how the chart has changed.
4. Return to the PowerPoint file. On Slide6, you should see the updated chart.
5. Save your work. You will submit both the **Word** and **PowerPoint** files, along with the **Excel** file, at the end of the next section.

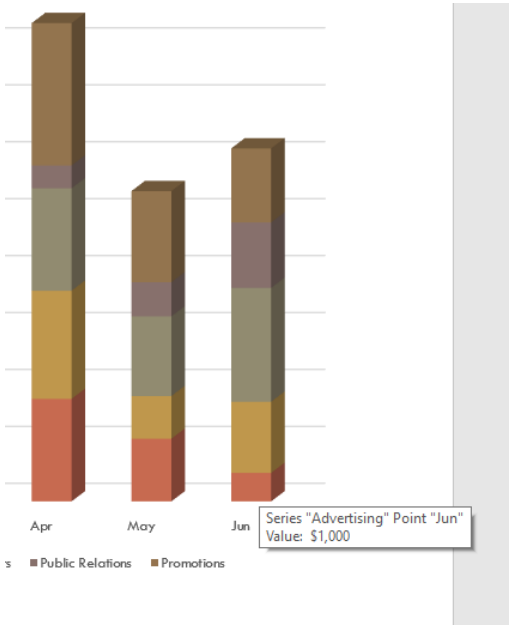


Figure 4.28 Updated June Advertising Cost

Integrity Check

Refreshing Linked Charts in PowerPoint and Word

When creating a link to a chart in Word or PowerPoint, you must refresh the data if you make any changes in the Excel workbook. This is especially true if you make changes in the Excel file prior to opening the Word or PowerPoint file that contains a link to a chart. To refresh the chart, make sure it is activated, then click the Refresh Data button in the Design tab of the ribbon. Forgetting this step can result in old or erroneous data being displayed on the chart.

Severed Link?

When creating a link to an Excel chart in Word or PowerPoint, you must keep the Excel workbook in its original location on your computer or network. If you move or delete the Excel workbook, you will get an error message when you try to update the link in your Word or PowerPoint file. You will also get an error if the Excel workbook is saved on a network drive that your computer cannot access. These errors occur because the link to the Excel workbook has been severed. Therefore, if you know in advance that you will be using a USB drive to pull up your documents or presentation, move the Excel workbook to your USB drive before you establish the link in your Word or PowerPoint file.

Skill Refresher

Pasting a Linked Chart Image into PowerPoint

1. Activate an Excel chart and click the Copy button in the Home tab of the ribbon.
2. Click in the PowerPoint slide where the Excel chart will be pasted.
3. Click the down arrow of the Paste button in the Home tab of the ribbon.
4. Click the Keep Source Formatting & Link Data option from the drop-down list.
5. Click the Refresh Data button in the Design tab of the ribbon to ensure any changes in the Excel file are reflected in the chart.

Key Takeaways

- When pasting an image of an Excel chart into a Word document or PowerPoint file, use the **Picture** option from the Paste drop-down list of options – if you want the image to act as an image. You will not be able to make any changes to the content of the picture.

- When creating a link to a chart in Word or PowerPoint, you may need to refresh the data if you make any changes in the originating spreadsheet. You should not use the **Picture** option.

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8.4: Data Analysis Charts

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Determine the most appropriate chart for a given dataset or analysis
- Create a chart template
- Use the Quick Analysis tool to add sparklines to a table

At some point in your career, you might need to present an analysis of data to an audience of peers or management. Your information must appear clear and professional and will likely include graphs and charts of your analysis. Recall that the theme and color choices of these elements can be critical to developing a professional presentation that will effectively and clearly communicate your intended message (see Preparing Presentations for a review of design strategies and tips).

You learned how to create graphs and charts in PivotTables. Some of those skills, such as using legends, adding gridlines, editing axis titles and labels, and including chart titles, will make for a professional presentation of the data. This section will discuss several types of charts and graphs and when they might be appropriate to use based on your dataset.

With data visuals, it is key that you select the type of chart or graph that works best for a particular dataset and makes the information easy to understand. You cannot simply select a graph or a chart based on its appearance. All types of graphs and charts are not appropriate for every dataset. As you decide which chart or graph to use, consider the type and level of data that you have (Table 11.3). You should also consider what kind of message you are trying to convey. Are you trying to inform, compare, show trends over time, or reveal relationships? Your purpose can dictate what type of chart you will use.

Table 11.3: Usage of Graphs and Charts

Purpose	Appropriate Charts/Graphs
Comparisons	Bar chart, pie chart, stacked bar chart, clustered column chart
Changes	Line graph, area chart, timeline
Relationships	Scatter plot, histogram, combo column/line chart

Link to Learning

Selecting the right type of chart to represent your data is not always easy. How you present your data is incredibly important. You need to always be mindful that you are accurately presenting your data visually in a way that tells the story objectively, with no apparent bias or intention. Visit this link to read strategies for choosing the correct chart to visualize your data.

Clustered Column Chart

A clustered column chart is simply a column chart that includes multiple variables to show the comparison between the groups. A column chart compares one variable against another variable. For example, you might put the sales region on the horizontal axis and the total sales on the vertical axis. A clustered column would have that, but it would include the same data for multiple years of data. The clustered column chart is great for showing comparisons (Figure 11.85). Using the WorldCorp data, you can create a clustered column chart to see the comparisons between the quantity sold for each product type over time. A drawback of the clustered column chart is that it is not appropriate for large amounts of data. If you have more than five sets of data, the chart can look too busy and overwhelm your audience. The clustered column chart also works better with a 2D display rather than a 3D display. The 3D display can look too busy and can make it difficult to interpret the information easily.



Figure 11.85: A clustered column chart can show data for multiple products at the same time.

Combination Chart

A combination chart combines two different chart types in one visual, allowing you to display data at different levels on the same chart. You can use combination charts to understand and examine comparisons between groups and the relationship between different variables. With this example, a combination chart can be created to show the FOB $ for each month based on the quantity sold for each of the two product types. With the combination chart, you determine which chart is appropriate for each data series you are including. Figure 11.86 uses a column chart for quantity sold and a line graph for FOB $. Combination charts are often easier to interpret as 2D than as 3D. Consider using contrasting colors to make the plotted series more visible.

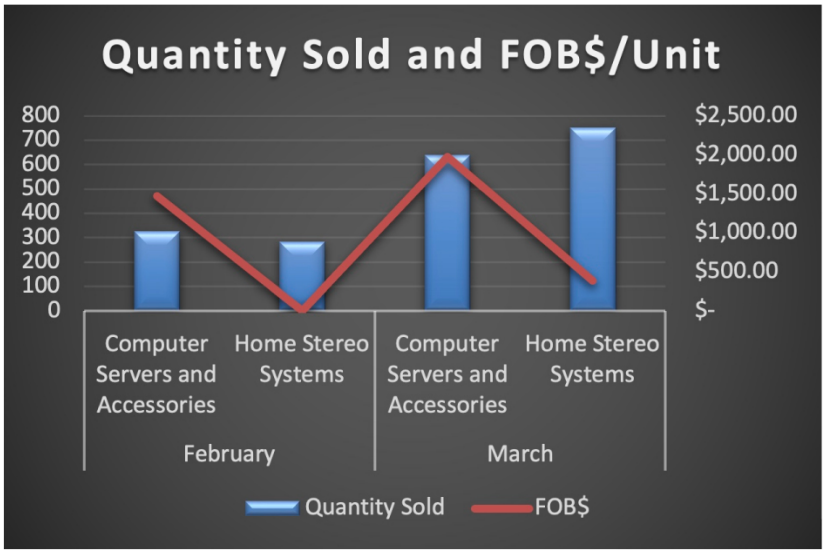


Figure 11.86: Combination charts can be used to show different types of data on the same chart.

Stacked Column Chart

The stacked column chart compares data like the clustered column chart but displays it in a different format. It shows the relationship between groups using the same scales. Instead of the columns being next to each other, the data is stacked, one series on top of the other, in a single column. A stacked column chart can be used to show part-to-whole relationships. Using contrasting colors will help make the distinction between the groups more visible. Using one of the 3D options for displaying a stacked column chart can give it a professional appearance that is easy to interpret (Figure 11.87). This stacked column chart shows WorldCorp's sales agents' FOB $ during a three-week period.

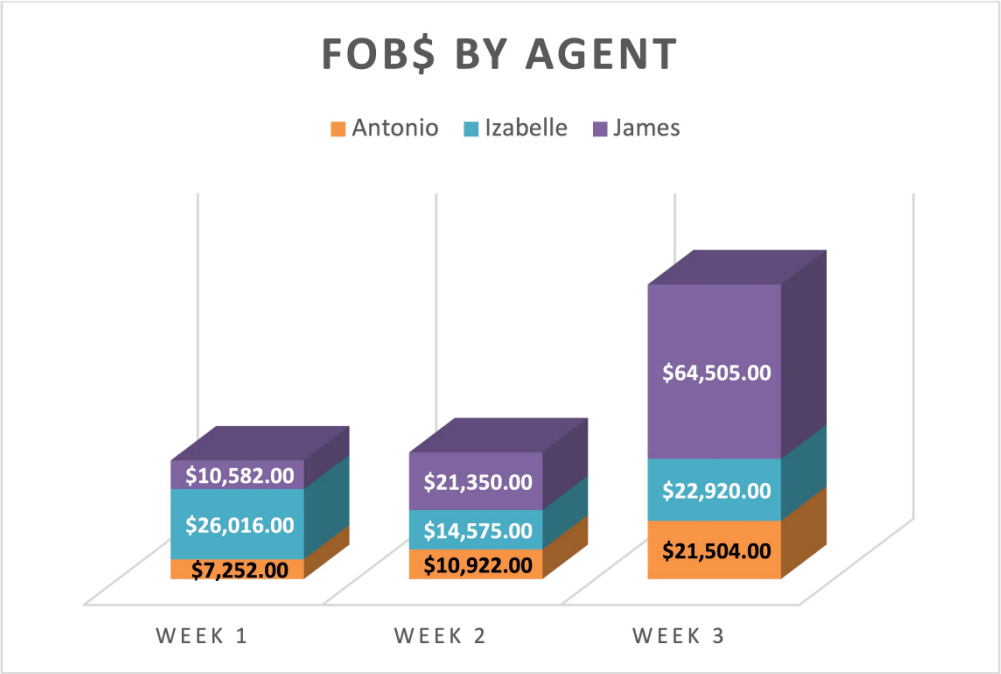


Figure 11.87: A stacked column chart is a different way to display multiple series of data.

Bar Chart

A bar chart is a horizontal column chart. It is sometimes used to communicate complex datasets and can be easier to interpret in certain situations. Bar charts are effective for displaying negative and positive numbers together. They also work well for charts with long text labels along the *y*-axis because the labels are more readable when placed horizontally (Figure 11.88). You can create clustered and stacked bar charts to display multiple series in a single chart. Use a simple layout and contrasting colors for the most professional look. Like a clustered column chart, bar charts work best with smaller datasets. Too many bars on the chart can make it unreadable. Use a bar chart when you have ten or fewer categories to display. You can use WorldCorp data to construct a bar chart of the volume sold for four different sizes of televisions.

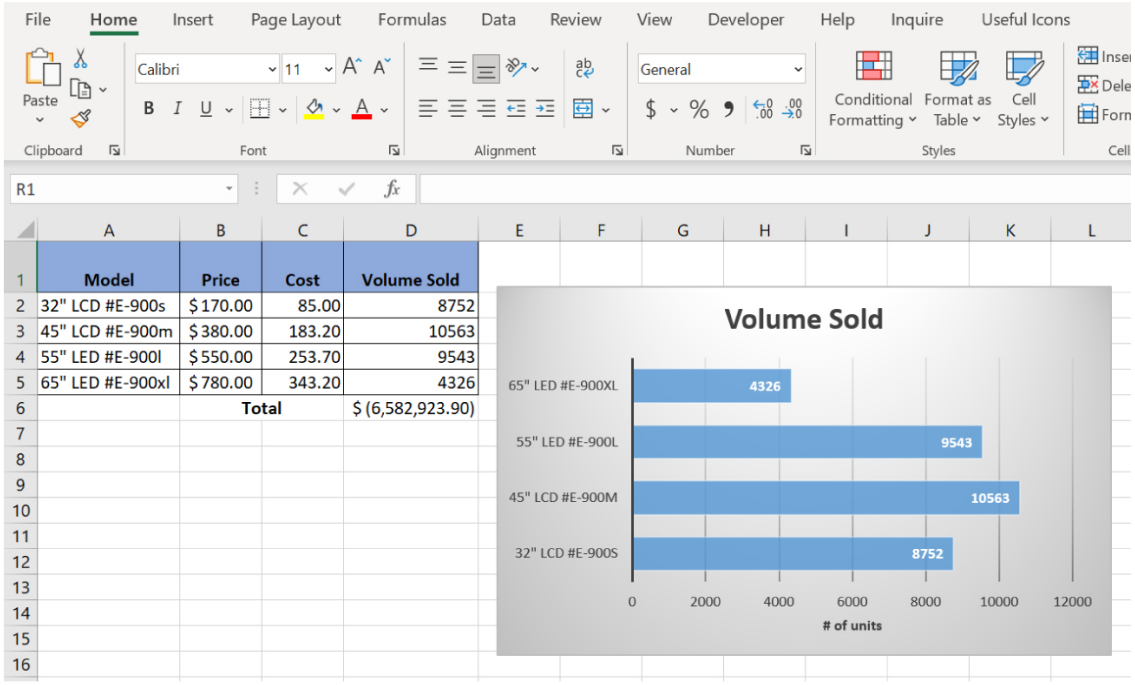


Figure 11.88: Bar charts can be good for displaying complex sets of data. (Used with permission from Microsoft)

Line Chart

A line chart is used to show changes over time. It is appropriate for trend analysis and graphing continuous datasets. Line charts are not appropriate for categorical data. Be careful of the scaling of the axis so as to not overemphasize or deemphasize the trend in either the vertical or horizontal directions. Keep the chart to four lines or fewer for the most effective presentation of the material, and use thicker, solid lines rather than thin lines or dotted/dashed lines. Be sure to include a legend if you are plotting more than one series of data (Figure 11.89). Also consider including data markers on the lines to make interpretation clearer. The 3D line chart is difficult to interpret even with a single line; the 2D line chart presents data more clearly. You can examine the changes in sales for Home Stereo Systems at WorldCorp for the month of March with a line chart. Adding gridlines or data labels can help your audience quickly see values at certain points in time.

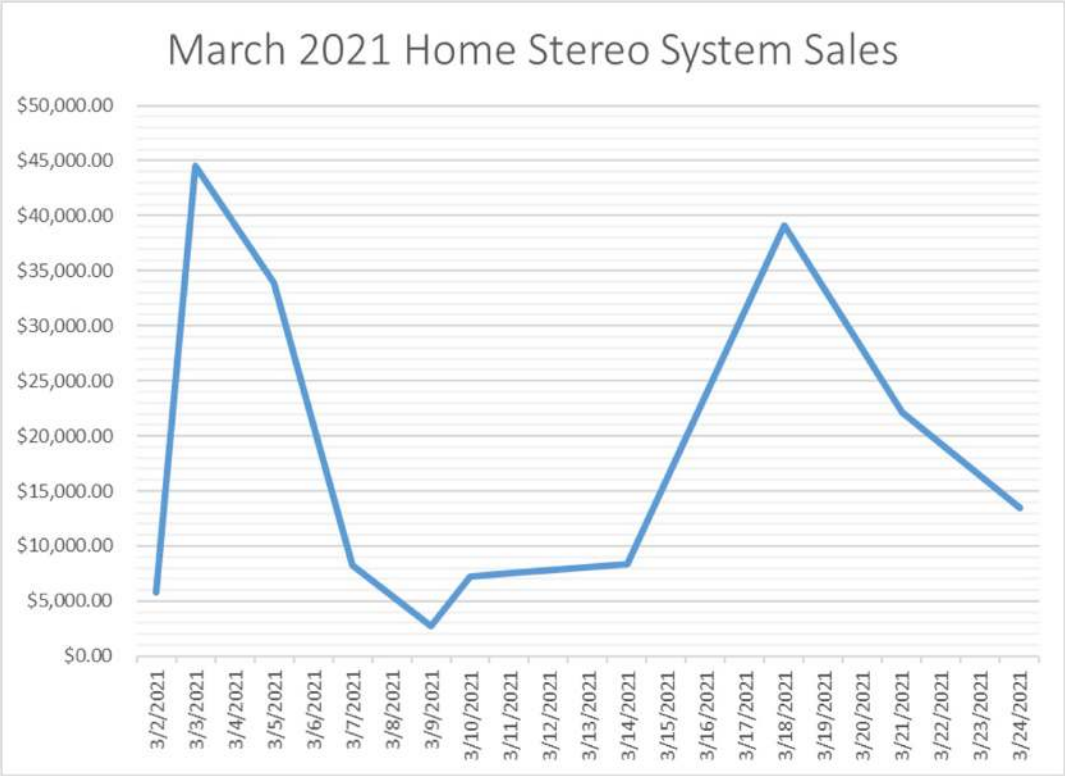


Figure 11.89: A line chart can be used to show changes over time.

Real-World Application - Misleading Graphs

Earlier, you learned the importance of accurately representing data in a chart to prevent misinterpretation of the information. When you are presenting charts and graphs as opposed to the actual data, special care should be taken to make sure the data representation is valid. By adjusting the scaling on either axis, you can drastically change the interpretation of the information presented in a chart. Take a look at this article on how mistakes have been made in representing data to learn more. Now select one chart represented in the preceding link and re-create the chart so that it is not misleading, and then answer the following questions:

- What was the major issue(s) with the selected chart?
- What are some of the incorrect conclusions drawn from the chart?
- What adjustments did you make? How does it more accurately reflect the information?

Scatter Chart

A scatter chart or scatter plot shows the relationship between two variables. It is often used as part of a regression analysis, and it easily shows the direction of the slope of the line (Figure 11.90). A positive slope indicates a positive correlation between the variables, and a negative slope indicates a negative correlation. A positive slope is when the two variables move in the same

direction. The chart of data will have a line that moves from the lower-left to the upper-right corner. A negative slope means the variables move in opposite directions. The chart of a negative slope will start in the upper-left corner and move down toward the lower-right corner of the chart. If the chart is relatively flat, meaning a near 0 slope, then there is little relationship between the two variables. The scatter plot for FOB $ versus Quantity Sold show a slight positive (upward) trend in the data.



Figure 11.90: A scatter chart is used in regression analysis.

A scatter chart can show if a relationship exists. It does not provide a quantitative measure of the relationship between the two variables; it simply shows the estimated relationship. In a scatter plot, the data points are not connected. Instead, it uses the data points only, and then, if desired, you can add in a best-fit regression line to examine the information more closely (Figure 11.91). If the data points are clustered around the best-fit regression line, the relationship is strong. If the data points are scattered and show little to no discernible pattern around the fitted regression line, the relationship is weak. When you add the trendline to the previous scatter plot, you can see that the data points are not clustered around that trendline. Instead, they are quite spread out. This is a visual indication that the variables (FOB $ and Quantity Sold) are not strongly connected to each other.

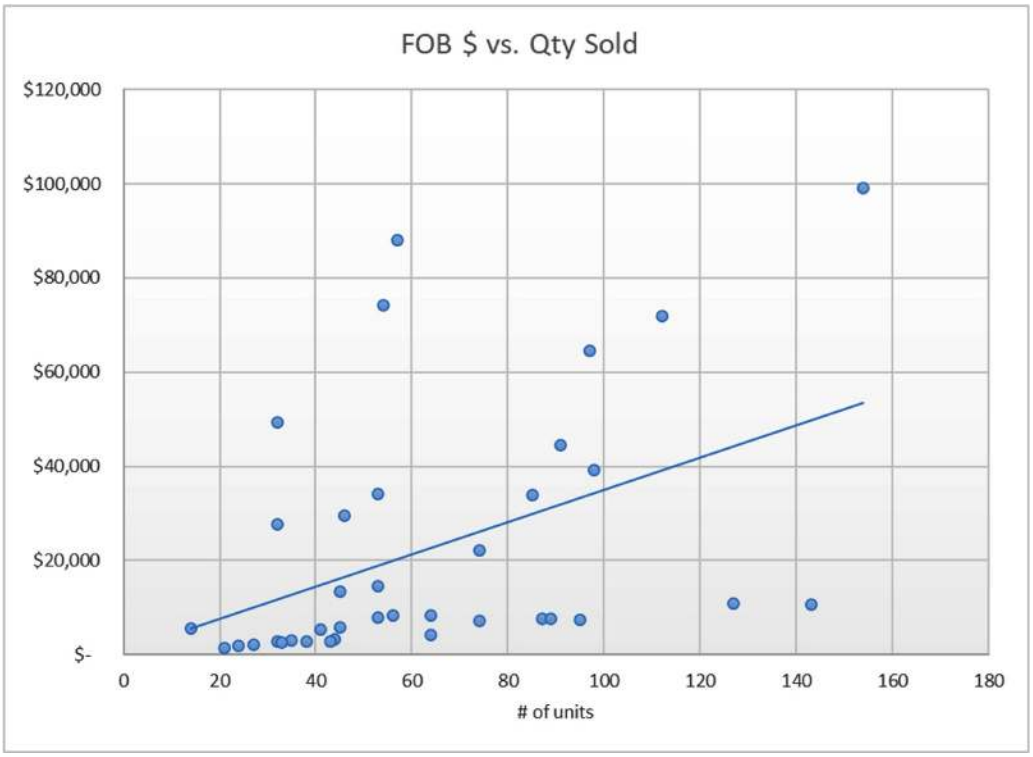


Figure 11.91: Adding a trendline gives a visual representation of the strength of the relationship between two variables.

Histogram

A histogram represents a single variable at various levels/ranges for that variable. With a histogram, a dataset is condensed into categories for a quick analysis of the distribution of the data (Figure 11.92). It is the visual representation of a histogram table. Histograms can represent discrete or continuous data, such as the distribution of customers. They are used frequently for a quick assessment of a dataset and to visually convey large datasets in an easy-to-understand format. They readily show outliers or gaps in information. The process of creating histograms was covered in more detail in Histograms.

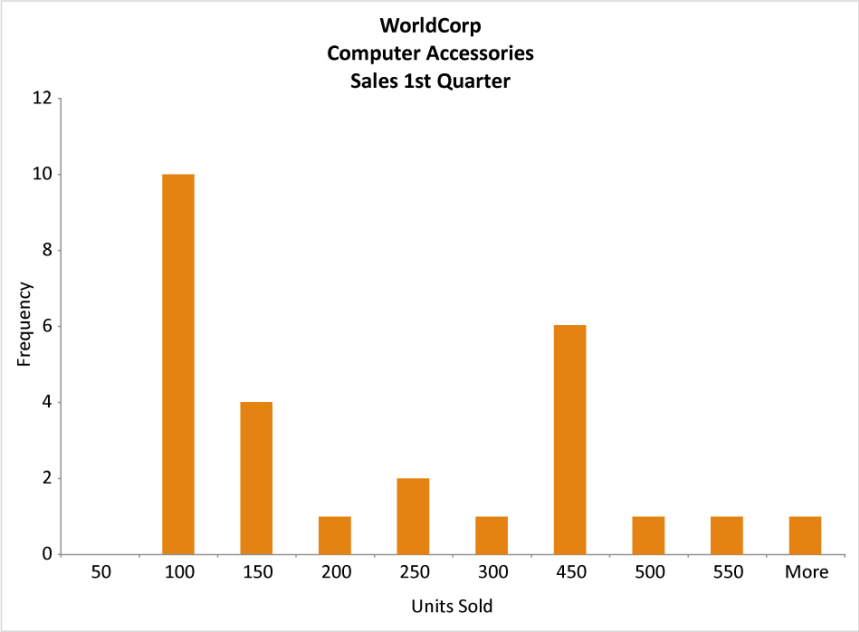


Figure 11.92: A histogram is a visual representation of a histogram table.

Stock Chart

Stock charts are used to represent market data to show the highs and lows for stocks. They can also be used in quality control to show the range of data on a certain day or shift for a production process. To create a stock chart, you will need a date or time reference and the high values and low values for that date or time. The horizontal axis will be the span of time and the vertical axis will be dollars, in the case of a stock market chart. It could be another measure if you are using the stock chart for quality control purposes (Figure 11.93).

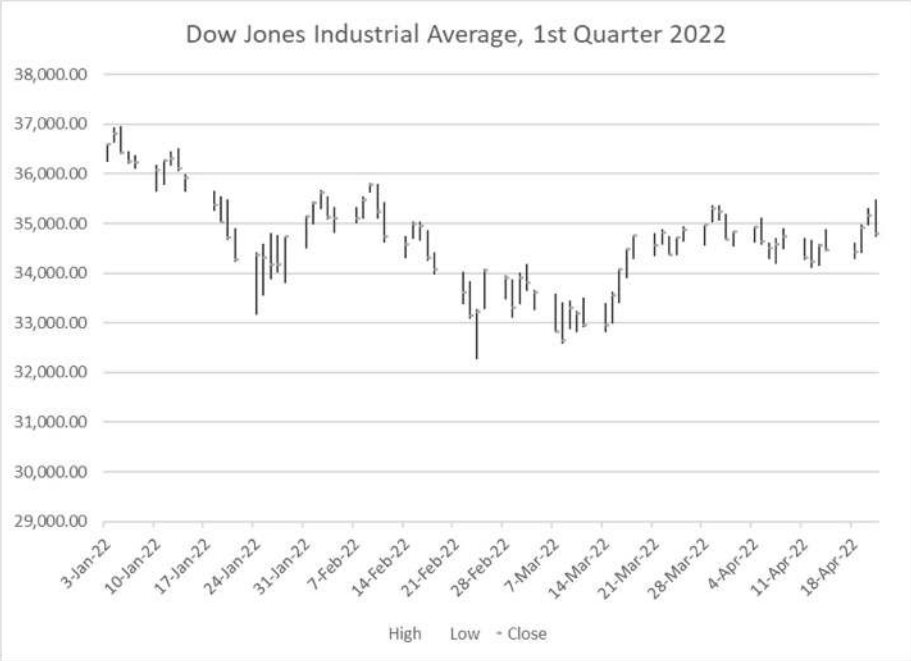


Figure 11.93: A stock chart shows the changes in stock prices over time.

Chart Template

If you are creating the same type of chart on a regular basis, creating a chart template will save time. You can save features, themes, colors, and formats as a template that you can use with other data files. To begin, create the chart as you would normally create it. Add the desired customization to the chart. This could include formatting the chart with company colors or including the company logo as a watermark in the chart. When you are finished, right-click on the chart you just created and formatted (Figure 11.94). Choose Save As Template. You will then be prompted to enter a name for the chart template you just created (Figure 11.95). Consider a name for the template that will help identify the template's use. Make sure the type is listed as Chart Template Files. Input a name and click Save.

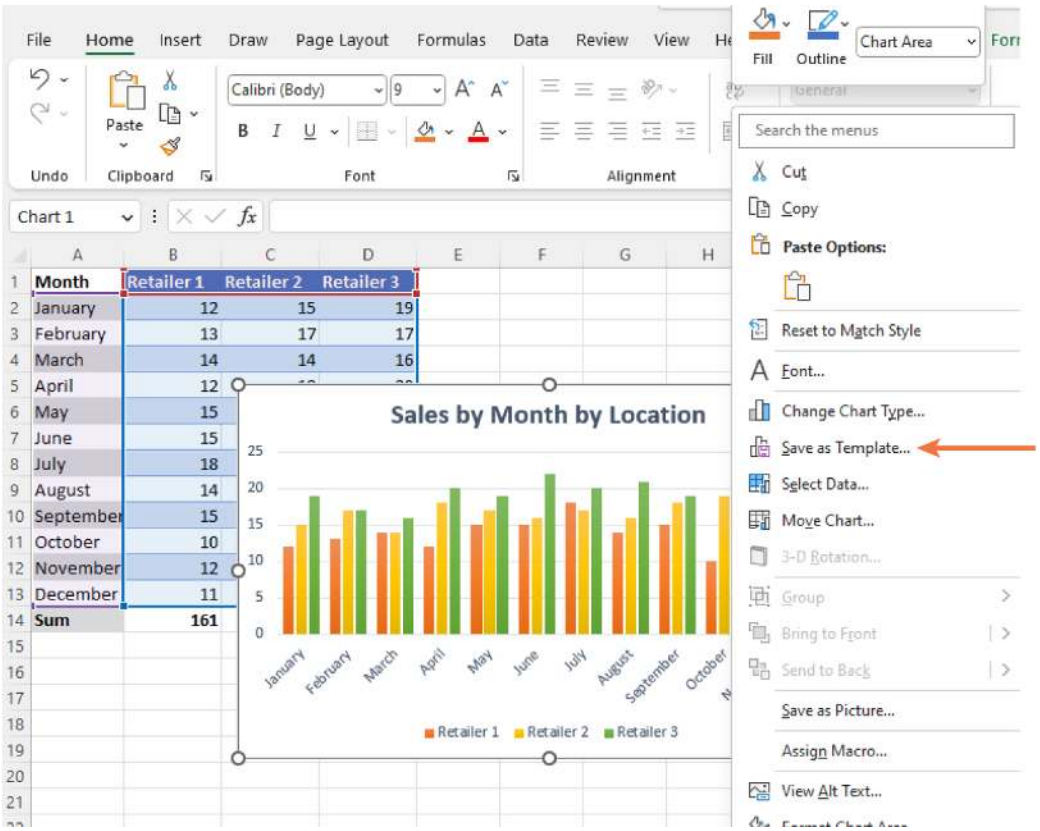


Figure 11.94: If you use a chart format and design on a regular basis, it might be easier to save it as a template for future use. (Used with permission from Microsoft)

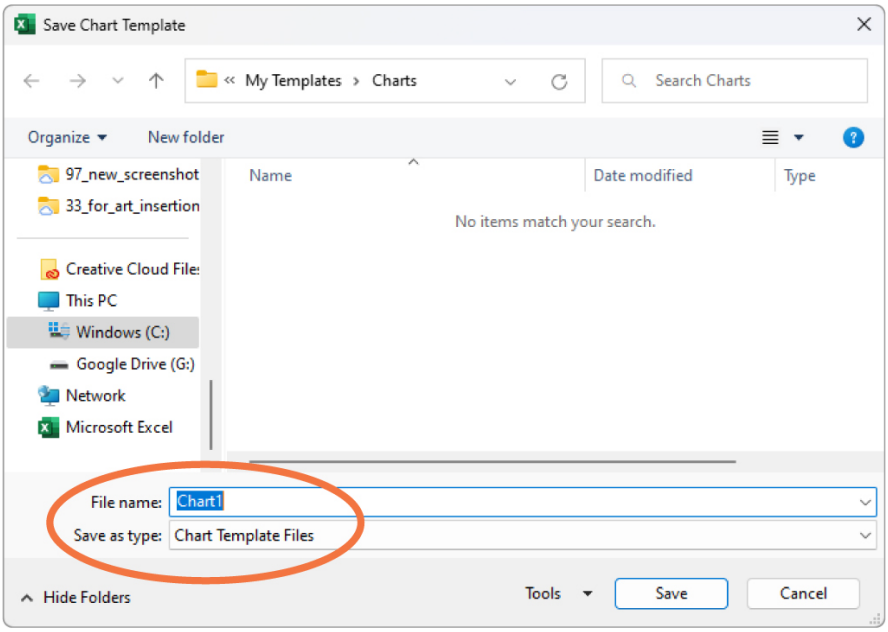


Figure 11.95: Remember to give it a file name and that the Save as file type is a chart template file. (Used with permission from Microsoft)

To access the saved template, go to the Insert tab and choose Recommended Charts (Figure 11.96). Then, select All Charts and Templates. The saved template should be listed, and you can select that template to apply to the new dataset. Click on the template, then click OK, and Excel creates the chart based on your new dataset.

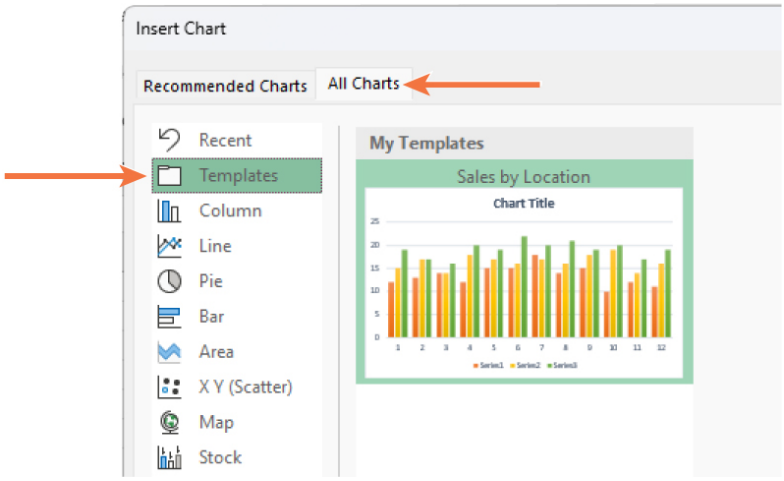
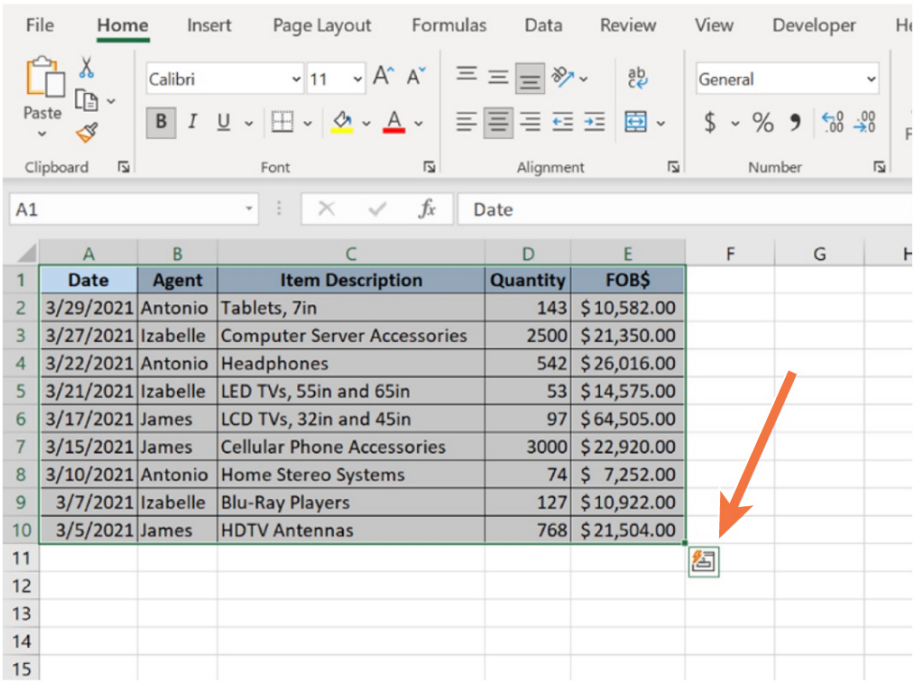


Figure 11.96: Chart templates are found under All Charts, then choose Templates. (Used with permission from Microsoft)

Quick Analysis Tool

The Quick Analysis tool provides a shortcut to analyzing a dataset with a group of options located in one place for ease of use. You can use these options to add formatting, to automatically insert totals and subtotals, or to add sparklines to your Data Table. There are three ways to access the Quick Analysis tool. If you highlight the Data Table you are interested in analyzing, the Quick Analysis tool icon will appear in the lower right of the selection (Figure 11.97). You can also use Ctrl+Q or right-click on a cell inside the dataset and select Quick Analysis from the menu that appears.



	A	B	C	D	E
1	Date	Agent	Item Description	Quantity	FOB$
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$ 21,350.00
4	3/22/2021	Antonio	Headphones	542	$ 26,016.00
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$ 14,575.00
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$ 64,505.00
7	3/15/2021	James	Cellular Phone Accessories	3000	$ 22,920.00
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00
9	3/7/2021	Izabelle	Blu-Ray Players	127	$ 10,922.00
10	3/5/2021	James	HDTV Antennas	768	$ 21,504.00
11					
12					
13					
14					
15					

Figure 11.97: The Quick Analysis tool can be used to add sparklines to the Data Table. (Used with permission from Microsoft)

When you access the tool, a menu of options appears (Figure 11.98). Choose the appropriate tab and click on the option you want to use.

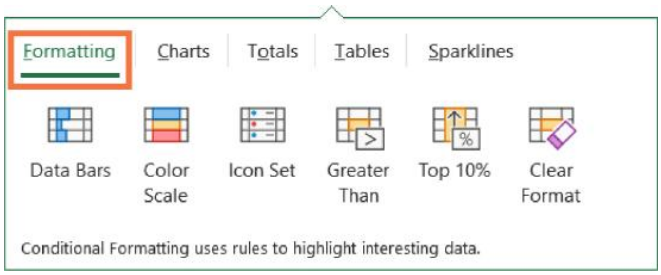


Figure 11.98: There are various formatting options in the Quick Analysis tool. (Used with permission from Microsoft)

Formatting

The Formatting options in the Quick Analysis tool will insert conditional formatting based on the criteria you select. You can also access these options through the Home tab in the Styles command group. Select the drop-down menu next to the Conditional Formatting button. Conditional Formatting provided more details on using conditional formatting for data. For formatting graphs and charts, there are a few options to choose from under the Conditional Formatting menu, and you can stack the formatting options on top of each other. For example, you can choose to have both the Data Bars and Icon Set displayed in your table at the same time. You can add data bars into the selected cells, and they will appear on top of the values and will be appropriately sized for the data in that cell (Figure 11.99). You can format the bars through the Conditional Formatting menu on the Home tab. To remove the data bars, click on Clear Format on the far right of the Format tab in the Quick Analysis tools. You can also clear the formats by choosing the Clear Rules option in the Conditional Format menu on the Home tab.

	A	B	C	D	E	F
1	Date	Agent	Item Description	Quantity	FOB$	
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00	
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$ 21,350.00	
4	3/22/2021	Antonio	Headphones	542	$ 26,016.00	
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$ 14,575.00	
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$ 64,505.00	
7	3/15/2021	James	Cellular Phone Accessories	3000	$ 22,920.00	
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	
9	3/7/2021	Izabelle	Blu-Ray Players	127	$ 10,922.00	
10	3/5/2021	James	HDTV Antennas	768	$ 21,504.00	
11						

Figure 11.99: Data bars provide a visual representation of the magnitude of the data in a cell in relation to the other cells. (Used with permission from Microsoft)

The Color Scale option adds colors to the cells based on the values relative to each other. There are several different color scales you can choose. For example, one color scale uses blues to represent the higher values and reds to represent the lower values in the dataset (Figure 11.100). Again, to remove the colors, click on Clear Formats in the Quick Analysis tools or Clear Rules under Conditional Formatting.

	A	B	C	D	E	F
1	Date	Agent	Item Description	Quantity	FOB$	
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00	
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$ 21,350.00	
4	3/22/2021	Antonio	Headphones	542	$ 26,016.00	
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$ 14,575.00	
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$ 64,505.00	
7	3/15/2021	James	Cellular Phone Accessories	3000	$ 22,920.00	
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	
9	3/7/2021	Izabelle	Blu-Ray Players	127	$ 10,922.00	
10	3/5/2021	James	HDTV Antennas	768	$ 21,504.00	
11						

Figure 11.100: Color scales are colors added to the cells based on the values relative to each other. (Used with permission from Microsoft)

Icon sets are a more visual way to see differences between the values in a dataset (Figure 11.101). The default icon is an arrow that is either red, yellow, or green based on the value in the cell. The icon can be changed by accessing the Conditional Formatting menu on the Home tab.

	A	B	C	D	E	F
1	Date	Agent	Item Description	Quantity	FOB$	
2	3/29/2021	Antonio	Tablets, 7in	143	$10,582.00	
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$21,350.00	
4	3/22/2021	Antonio	Headphones	542	$26,016.00	
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$14,575.00	
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$64,505.00	
7	3/15/2021	James	Cellular Phone Accessories	3000	$22,920.00	
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	
9	3/7/2021	Izabelle	Blu-Ray Players	127	$10,922.00	
10	3/5/2021	James	HDTV Antennas	768	$21,504.00	
11						

Figure 11.101: Adding an icon set is yet another way to visually examine the differences within a dataset. (Used with permission from Microsoft)

The Greater Than option in the Quick Analysis tools will highlight data that is greater than the value you set (Figure 11.102). You set this value in the input window, choose the color scheme for the highlighted cells that meet the criteria, and then click OK. Using the default color scheme, the cells that are greater than the value you set will be highlighted with a light red fill and a dark red text.

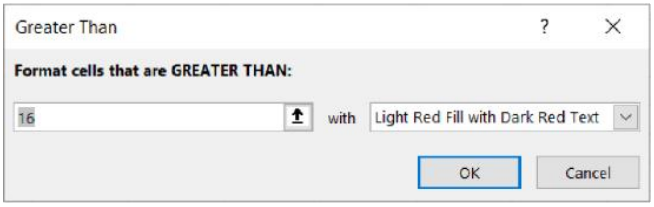


Figure 11.102: Using Greater Than, data that is outside the criteria you select is highlighted. (Used with permission from Microsoft)

The final option in the Formatting tab of the Quick Analysis tools is the Top 10% tool. This tool highlights the values that are in the top 10 percent in the dataset. The default is to highlight those with light red fill and dark red text. This can be changed as desired (Figure 11.103).

	A	B	C	D	E	F
1	Date	Agent	Item Description	Quantity	FOB$	
2	3/29/2021	Antonio	Tablets, 7in	143	$10,582.00	
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$21,350.00	
4	3/22/2021	Antonio	Headphones	542	$26,016.00	
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$14,575.00	
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$64,505.00	
7	3/15/2021	James	Cellular Phone Accessories	3000	$22,920.00	
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00	
9	3/7/2021	Izabelle	Blu-Ray Players	127	$10,922.00	
10	3/5/2021	James	HDTV Antennas	768	$21,504.00	
11						

Figure 11.103: The Top 10% tool is helpful to quickly see the top values in a dataset. (Used with permission from Microsoft)

Charts

The Quick Analysis tools give you the option to quickly insert a chart of the data (Figure 11.104) using the Charts tab. The chart will be inserted directly on the worksheet using the default color schemes. After you have created the chart, you can choose to customize it to meet your needs using the skills you have already learned. You can access charts not listed specifically by clicking on More Charts.

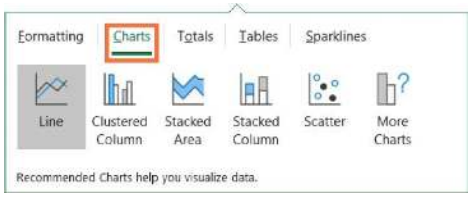
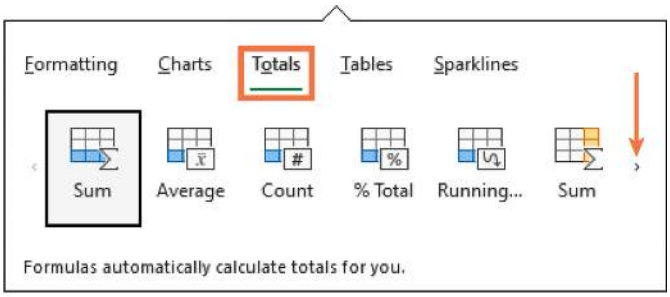


Figure 11.104: The Quick Analysis tool allows you to easily access several charting options. (Used with permission from Microsoft)

Totals

The Totals tab in the Quick Analysis tool gives you several options for summarizing your dataset. You can access the same options through the Formulas tab, but the process is much simpler through the Quick Analysis tool (Figure 11.105a). You can include the total of data (sum), average, count, percent of total, and running total. These options are available for both columns and rows. To access the additional formulas, click on the small arrow to the right of the window. With any of the options, the result of the formula will be included in your Data Table as another row or column (Figure 11.105b).



(a)

	A	B	C	D	E
1	Date	Agent	Item Description	Quantity	FOB$
2	3/29/2021	Antonio	Tablets, 7in	143	$ 10,582.00
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$ 21,350.00
4	3/22/2021	Antonio	Headphones	542	$ 26,016.00
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$ 14,575.00
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$ 64,505.00
7	3/15/2021	James	Cellular Phone Accessories	3000	$ 22,920.00
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00
9	3/7/2021	Izabelle	Blu-Ray Players	127	$ 10,922.00
10	3/5/2021	James	HDTV Antennas	768	$ 21,504.00
11				7304	$ 199,626.00

(b)

Figure 11.105: The Quick Analysis tool tab gives several ways to summarize the dataset. (a) The Totals tab has many options; more tools are available if you click on the arrow. (b) Adding the sum of a column inserts a new row with the total. (Used with permission from Microsoft)

Sparklines

One way to show trends in your data is to use a sparkline, a small chart inserted into a cell next to your data that shows changes over time. There are three options in the Sparklines tab: Line, Column, and Win/Loss (Figure 11.106). These can also be accessed through the Insert menu in the Sparklines command group.

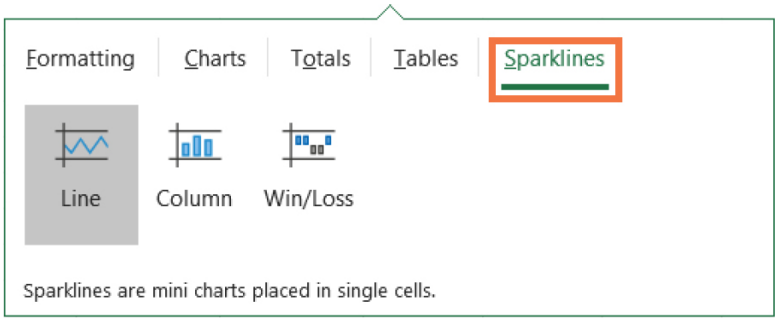


Figure 11.106: Sparklines are another option to add visual interest to your Data Table. (Used with permission from Microsoft)

By default, sparklines are inserted at the end of each row. Once the sparkline is inserted, you have access to the Sparkline formatting tab. Here, you can format the sparkline's style, change the input data, or change the type of sparkline. You can also add markers to the sparkline to show the highest and lowest points. In Figure 11.107, the Line sparkline was inserted. With just a quick glance, you can see that Antonio had the most sales in week two but did not do as well in week three, whereas Izabelle and James improved consistently.

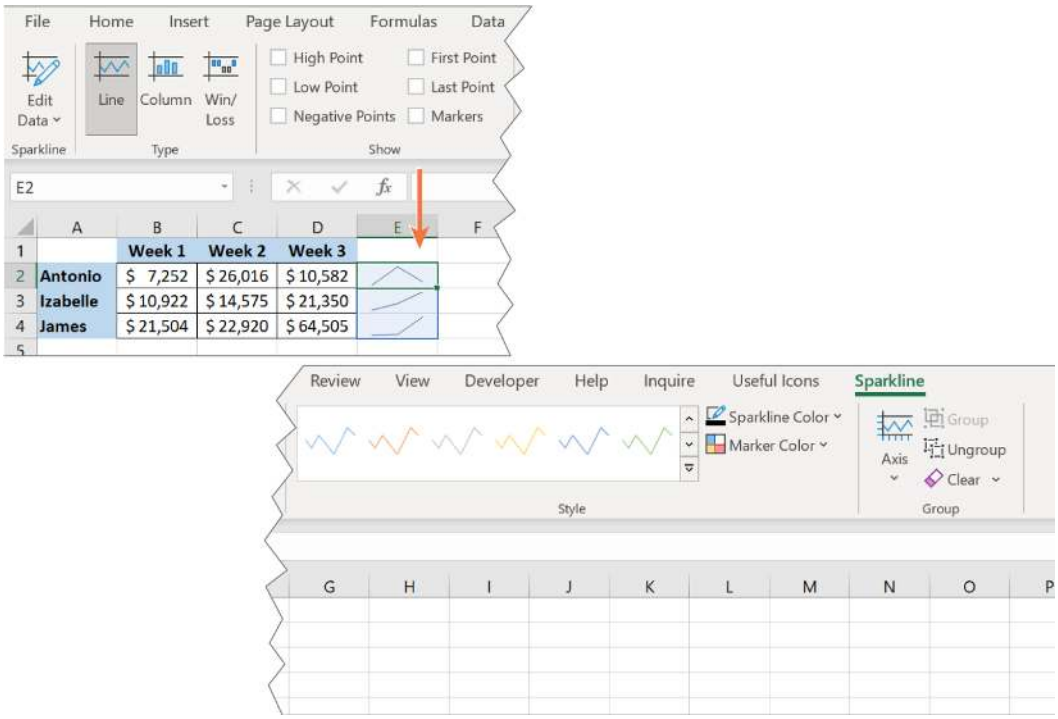


Figure 11.107: There are several design options for Sparklines. (Used with permission from Microsoft)

Link to Learning

Marimekko charts are a way to visually examine market share. They are used often in consulting and finance companies. You can also include different segments within an industry. Read this article to find out more about this special type of chart and how to create it in Excel.

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8.5: Preparing to Print

This page is a draft and is under active development.

Learning Objectives

- Review each worksheet in a workbook in Print Preview.
- Modify worksheets as needed to professionally print data and charts.

In this section, we will take a look at each of the worksheets created in the previous sections. Since these worksheets contain a combination of data and charts, there are specific things to watch for if you will be printing the sheets.

We will start by looking at each worksheet in Print Preview in Backstage View. We will then make any changes necessary, such as changing the orientation and scaling or moving charts around on the worksheet. To make sure we don't miss any worksheets, we are going to review the worksheets in the order they appear in the tabs.

Previewing Chart Sheets for Printing

Data file: Continue with CH4 Charting.

The **All Excel Classes** is a chart sheet. This means that it does not contain any data; remember that chart sheets just contain charts. We still need to review it in Print Preview.

1. Click on the **All Excel Classes**worksheet tab.
2. Go to Print Preview by clicking Print in Backstage View.
3. Notice that the chart will print on the entire page, in Landscape orientation.
4. There is nothing to change. Exit Backstage View.

Printing Worksheets with Data and Charts

The Stock Trend worksheet has a lot of data and multiple embedded charts. We need to print the data and the charts, which will require modifications to the page setup.

1. Click on the **Stock Trend** worksheet tab.
2. Go to Print Preview by clicking Print in Backstage View.

   Mac Users choose **"File/Print…"** from the Excel File menu option.
3. Notice that this worksheet is currently printing on seven pages.
4. As you click through each page you should make the following observations:
   - The data is split between the first and third pages.
   - The line chart starts on the first page, but part of it is also on the second page.
   - The double-line chart starts on the third page and then finishes on the fifth page.
   - The fourth and sixth pages are blank.
   - The last page (page 7) has a column of seemingly random numbers.
5. Exit Backstage View.
6. The first thing we are going to do is hide the numbers that are appearing on **page 7**. We are going to hide the column, instead of deleting the numbers, in case the numbers are being utilized somewhere else in the workbook.
7. Scroll to the right on the worksheet until you find the numbers in **column AH**.
8. Click anywhere in column AH.
9. On the Home ribbon, click the **Format** button in the Cells group.
10. In the Visibility section, select **Hide & Unhide** then select **Hide Columns**.

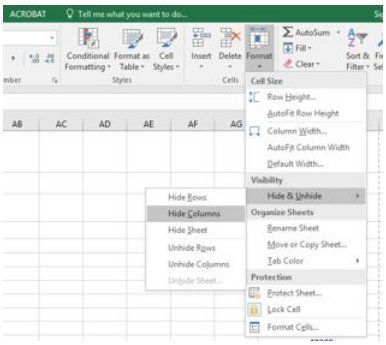


Figure 4.29 Hide Columns in Format Menu

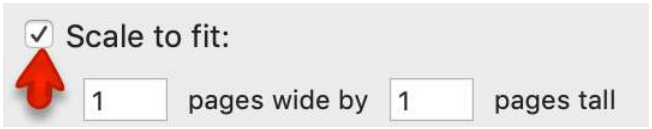
11. The visible column headings should now go from AG to AI.
12. Return to Print Preview in Backstage View to see the changes to the printed worksheet.
13. Notice that there are now five pages. The data and charts are still splitting across multiple pages, but the numbers in column AH are no longer going to print.
14. Remain in Backstage View for the next steps.

The data is still split between pages 2 and 3, and the charts are splitting oddly as well. The first step we will try to fix these issues is to change the page orientation and scaling.

1. While still in Backstage View, change the **page orientation** to Landscape (use the Orientation drop-down menu in the Settings section).

Mac Users click the **Landscape Orientation** button 

2. This puts all of the data on one sheet, but the charts are still split between multiple pages.
3. Change the **page scaling** to Fit Sheet on One Page (use the Scaling drop-down menu in the Settings section).

Mac Users click the **Scale to Fit** option 

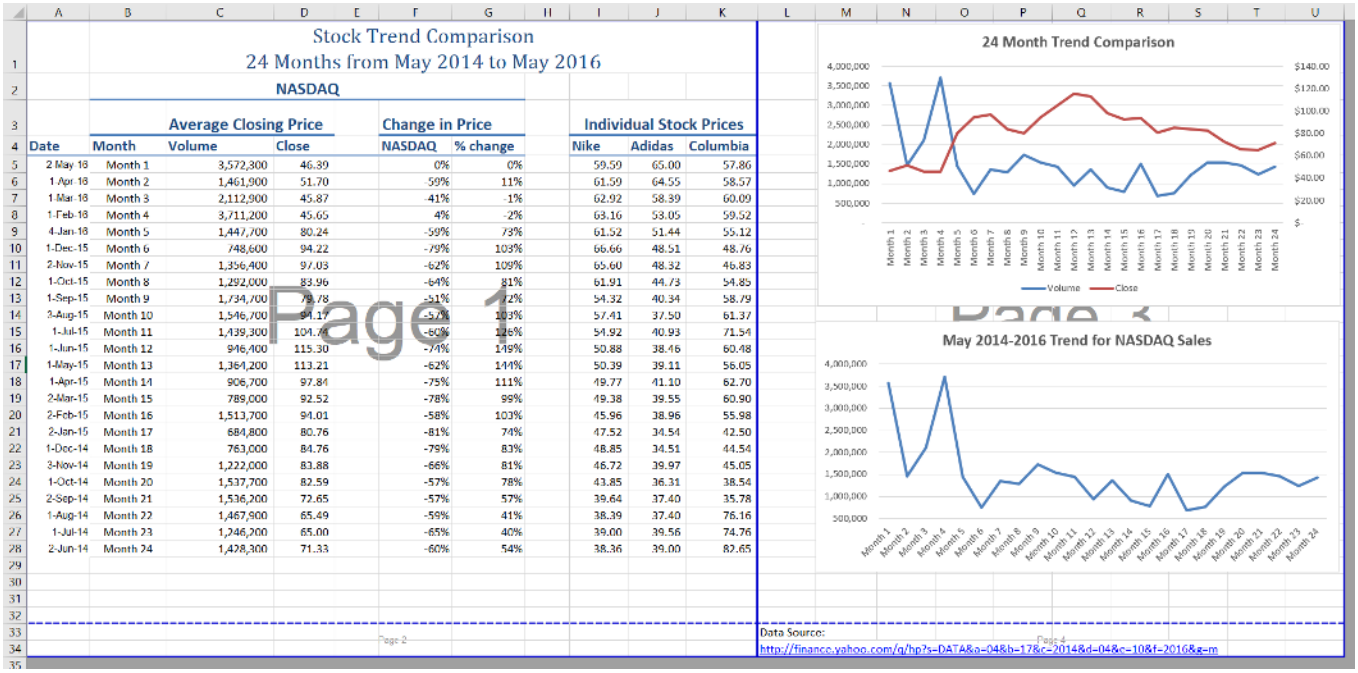
4. This fits everything on one page, but it is too small to be able to read.
5. Change the page scaling back to No Scaling.

Mac Users: uncheck the **Scale to Fit** option

The next thing we will try is moving one, or both, of the charts. In order to move the charts, we need to exit out of Backstage View.

1. Exit Backstage View.
2. Switch to the View ribbon and then select Page Break Preview. Your screen should look similar to **Figure 4.30**. (Remember that the dotted blue lines indicate automatic page breaks.)
3. Move the 24 Month Comparison (double-line) chart closer to the top of its page.
4. Move the May 2014-2015 Trend for NASDAQ Sales Volume (line chart) so that it is under the 24 Month Comparison chart.
5. The link to the data source is still at the bottom of page 2 (in A50:A51) so you need to move it as well. Using your preferred method, move the text from A50:A51 to M31:M32.

Now your screen should look similar to **Figure 4.30**.



Stock Trend Comparison
24 Months from May 2014 to May 2016
NASDAQ

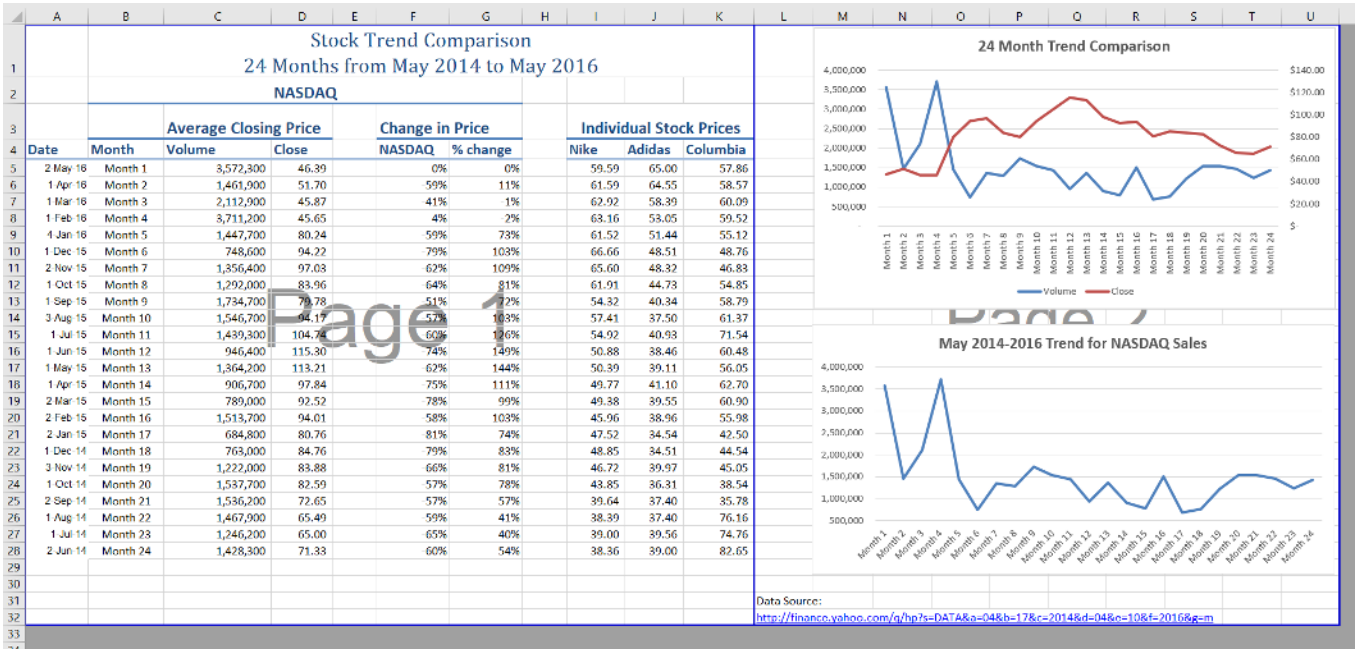
		Average Closing Price		Change in Price		Individual Stock Prices		
Date	Month	Volume	Close	NASDAQ	% change	Nike	Adidas	Columbia
2 May 16	Month 1	3,572,300	46.39	0%	0%	59.59	65.00	57.86
1 Apr 16	Month 2	1,461,900	51.70	59%	11%	61.59	64.55	58.57
1 Mar 16	Month 3	2,112,900	45.87	41%	-1%	62.92	58.39	60.09
1 Feb 16	Month 4	3,711,200	45.65	4%	-2%	63.16	53.05	59.52
4 Jan 16	Month 5	1,447,700	80.24	-59%	73%	61.52	51.44	55.12
1 Dec 15	Month 6	748,600	94.22	-79%	103%	66.66	48.51	48.76
2 Nov 15	Month 7	1,356,400	97.03	-62%	109%	65.60	48.32	46.83
1 Oct 15	Month 8	1,292,000	83.96	-64%	81%	61.91	44.73	54.85
1 Sep 15	Month 9	1,734,700	79.78	-51%	72%	54.32	40.34	58.79
3 Aug 15	Month 10	1,546,700	94.17	-57%	103%	57.41	37.50	61.37
1 Jul 15	Month 11	1,439,300	104.78	-60%	126%	54.92	40.93	71.54
1 Jun 15	Month 12	946,400	115.30	-74%	149%	50.88	38.46	60.48
1 May 15	Month 13	1,364,200	113.21	-62%	144%	50.39	39.11	56.05
1 Apr 15	Month 14	906,700	97.84	-75%	111%	49.77	41.10	62.70
2 Mar 15	Month 15	789,000	92.52	-78%	99%	49.38	39.55	60.90
2 Feb 15	Month 16	1,513,700	94.01	-58%	103%	45.96	38.96	55.98
2 Jan 15	Month 17	684,800	80.76	-81%	74%	47.52	34.54	42.50
1 Dec 14	Month 18	763,000	84.76	-79%	83%	48.85	34.51	44.54
3 Nov 14	Month 19	1,222,000	83.88	-66%	81%	46.72	39.97	45.05
1 Oct 14	Month 20	1,537,700	82.59	-57%	78%	43.85	36.31	38.54
2 Sep 14	Month 21	1,536,200	72.65	-57%	57%	39.64	37.40	35.78
1 Aug 14	Month 22	1,467,900	65.49	-59%	41%	38.39	37.40	76.16
1 Jul 14	Month 23	1,246,200	65.00	-65%	40%	39.00	39.56	74.76
2 Jun 14	Month 24	1,428,300	71.33	-60%	54%	38.36	39.00	82.65

Figure 4.30

We don't want the data source link text to print on its own page, but there is no room to move it onto the same page as the charts. To fix this, we are going to remove the automatic page break between the charts and the text in M31:M32.

1. Place your pointer on the horizontal blue dashed line (automatic page break) between the line chart and the Data Source link text.
2. When your pointer changes to the double arrow (pointing up and down), drag the page break down into the gray area. This removes the page break.
3. If your vertical automatic page break between columns L and M moves, drag it back between columns L and M. This will make it a solid blue line, which will no longer adjust automatically.

Note: you may need to slightly re-size the two charts in order to make your screen look like Figure 4.31. Your "goal" is to only have two pages.



Stock Trend Comparison
24 Months from May 2014 to May 2016
NASDAQ

Date	Month	Average Closing Price Volume	Average Closing Price Close	Change in Price NASDAQ	Change in Price % change	Individual Stock Prices Nike	Individual Stock Prices Adidas	Individual Stock Prices Columbia
2 May 16	Month 1	3,572,300	46.39	0%	0%	59.59	65.00	57.86
1 Apr 16	Month 2	1,461,900	51.70	59%	11%	61.59	64.55	58.57
1 Mar 16	Month 3	2,112,900	45.87	41%	1%	62.92	58.39	60.09
1 Feb 16	Month 4	3,711,200	45.65	4%	2%	63.16	53.05	59.52
4 Jan 16	Month 5	1,447,700	80.24	59%	73%	61.52	51.44	55.12
1 Dec 15	Month 6	748,600	94.22	79%	103%	66.66	48.51	48.76
2 Nov 15	Month 7	1,356,400	97.03	62%	109%	65.60	48.32	46.83
1 Oct 15	Month 8	1,292,000	83.96	64%	81%	61.91	44.73	54.85
1 Sep 15	Month 9	1,734,700	79.78	51%	72%	54.32	40.84	58.79
3 Aug 15	Month 10	1,546,700	94.17	57%	103%	57.41	37.50	61.37
1 Jul 15	Month 11	1,439,300	104.74	60%	126%	54.92	40.93	71.54
1 Jun 15	Month 12	946,400	115.30	74%	149%	50.88	38.46	60.48
1 May 15	Month 13	1,364,200	113.21	62%	144%	50.39	39.11	56.05
1 Apr 15	Month 14	906,700	97.84	75%	111%	49.77	41.10	62.70
2 Mar 15	Month 15	789,000	92.52	78%	99%	49.38	39.55	60.90
2 Feb 15	Month 16	1,513,700	94.01	58%	103%	45.96	38.96	55.98
2 Jan 15	Month 17	684,800	80.76	81%	74%	47.52	34.54	42.50
1 Dec 14	Month 18	763,000	84.76	79%	83%	48.85	34.51	44.54
3 Nov 14	Month 19	1,222,000	83.88	66%	81%	46.72	39.97	45.05
1 Oct 14	Month 20	1,537,700	82.59	57%	78%	43.85	36.31	38.54
2 Sep 14	Month 21	1,536,200	72.65	57%	57%	39.64	37.40	35.78
1 Aug 14	Month 22	1,467,900	65.40	59%	41%	38.39	37.40	76.16
1 Jul 14	Month 23	1,246,200	65.00	65%	40%	39.00	39.56	74.76
2 Jun 14	Month 24	1,428,300	71.33	60%	54%	38.36	39.00	82.65

Figure 4.31

Now you need to do one final check of this worksheet in Print Preview.

1. Go to Print Preview and look at both pages. Page 1 should contain just the data and page 2 should have both charts and the Data Source link text.
2. Exit Backstage View and save the file.

Preview Remaining Worksheets for Printing

The remaining worksheets need to be reviewed. Some of them will need minor changes and some will not need any changes. You will need to preview each one and then make the specified changes. In the following steps, you will preview and modify all other worksheets.

1. **Grade Distribution, Enrollment Statistics, and Admissions sheets** – the charts split across two pages. Fix this by changing the orientation (Landscape) and scaling (Fit Sheet on One Page).
2. **The remaining chart sheets** should not need any changes.

Printing a Chart Only

Sometimes you might have a worksheet that has data and a chart, but you only want the chart to print. That is the case with the **Enrollment Statistics** worksheet.

1. Switch to the **Enrollment Statistics** worksheet.
2. Select the **Gender Comparision** chart.

Mac Users: Steps 3-5 will not work in Excel for Mac. See alternate steps below step 5.

3. Go to Print Preview. Only the chart is printing. (If it shows the data printing along with the chart, exit Backstage View and be sure to select just the chart on the worksheet.)
4. If needed, change the orientation to Landscape. This orientation looks better when printing just a chart.
5. Exit Backstage View.

Mac Users: the only way to print a Chart separately is to click on the chart you want to print move it to a new sheet by clicking on the chart, click the Move Chart button on the Chart Design tab, click New Sheet then choose File/Print from the Excel menu and switch to Landscape Orientation if necessary.

Hiding a Worksheet

You have actually decided that you do not want the **Expenses** sheet to be visible at all, but you do not want to delete it. We are going to hide it from anyone looking at the workbook.

1. Right-click on the **Expenses** tab.

   Mac Users should hold down the **CTRL** key and click on the **Expenses** tab

2. Select **Hide** from the menu that appears. The sheet should no longer be visible.
3. Save the **CH4 Charting** workbook.
4. Submit all three files from this chapter: **CH4 Charting.xlsx**, **CH4 CC Enrollment.docx**, and **CH4 PowerPoint CC Enrollment.pptx** as directed by your instructor.

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8.6: Chapter Practice

This page is a draft and is under active development.

To assess your understanding of the material covered in the chapter, please complete the following assignments.

Although Excel is primarily used in business and scientific applications, you will find it useful in other areas of study as well. In these exercises, we will use Excel to create charts using historical, and health data.

Charting Historical Data (Comprehensive Review)

Download Data File: PR4 Data

Excel is an excellent tool for helping display historical data. In this exercise, we will be examining ways to display information on minimum mage data and life expectancy.

Task1 – National Minimum Wages Changes in The United States 2019-2020

Since the beginning of the previous century, the United States has set a minimum wage, in order to set a "floor" beneath which wages cannot fall. Most states have set their own minimum wages, but none are lower than the national minimum wage. Follow the below steps to insert a Map Chart outlining what the current minimum wage is per state.

1. Open the file named **PR4 Data** and then Save As **PR4 Historical Data.**
2. On the **Minimum Wage** worksheet, select the range **B4:B55.** Press and hold the **CTRL** key and select **D4:D55**.

   Mac Users: hold down the "**Command**" key **not** the CTRL key
3. Select the **Insert** tab, then the **Map Chart** tool in the **Charts** group.
4. Move the Chart as a **New Sheet**. Rename the sheet **Map**.
5. Update the Chart Title to **US Minimum Wage 2020.**
6. From the **Charts Element** menu choose to display the **Data Labels**.
7. From the Charts Element menu, turn off the **Legend**.
8. Prepare the **Minimum Wage** worksheet for printing by changing the scaling to **Fit Sheet on One Page**.
9. Save your work.

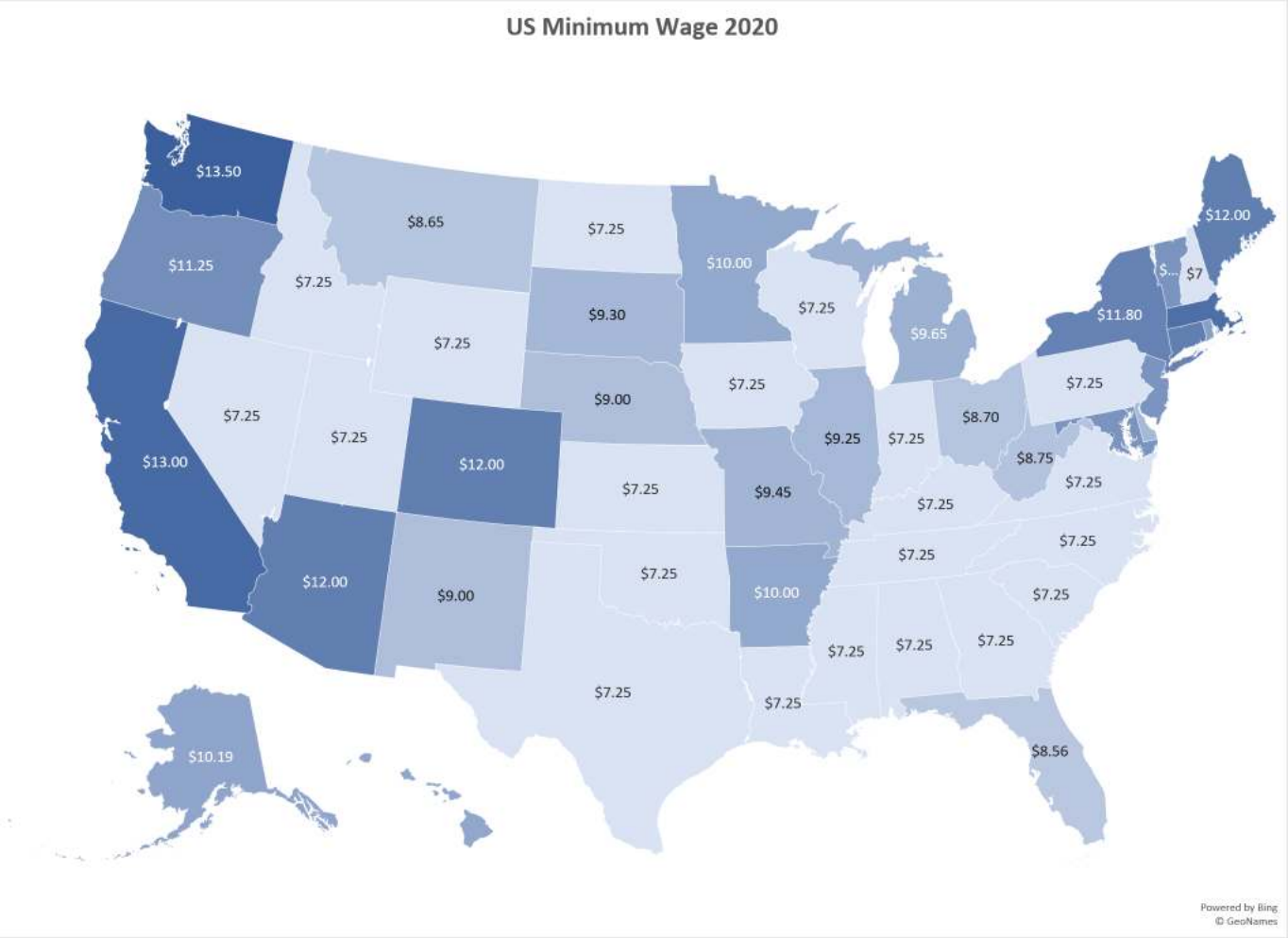


Figure 4.32 Map Chart

TASK 2 – OREGON: PROJECTED LIFE EXPECTANCY AT BIRTH

In the past 40 years, between 1970 and 2010, life expectancy for Oregon men improved by 8.7 years and for women by 5.5 years. Oregon's life expectancy has remained slightly higher than the U.S. average. The life expectancy will continue to improve for both men and women. However, the gain for men has been outpacing the gain for women. Consequently, the difference between men's and

women's life expectancies has continued to shrink.

www.oregon.gov/das/OEA/Documents/OR_pop_trend2012.pdf

1. On the **Life Expectancy** sheet, select **A5:B11.**
2. From the Insert tab choose Recommend Charts. Select the second option, Clustered Column chart.
3. Move the chart to a new sheet. Name the sheet **Men.**

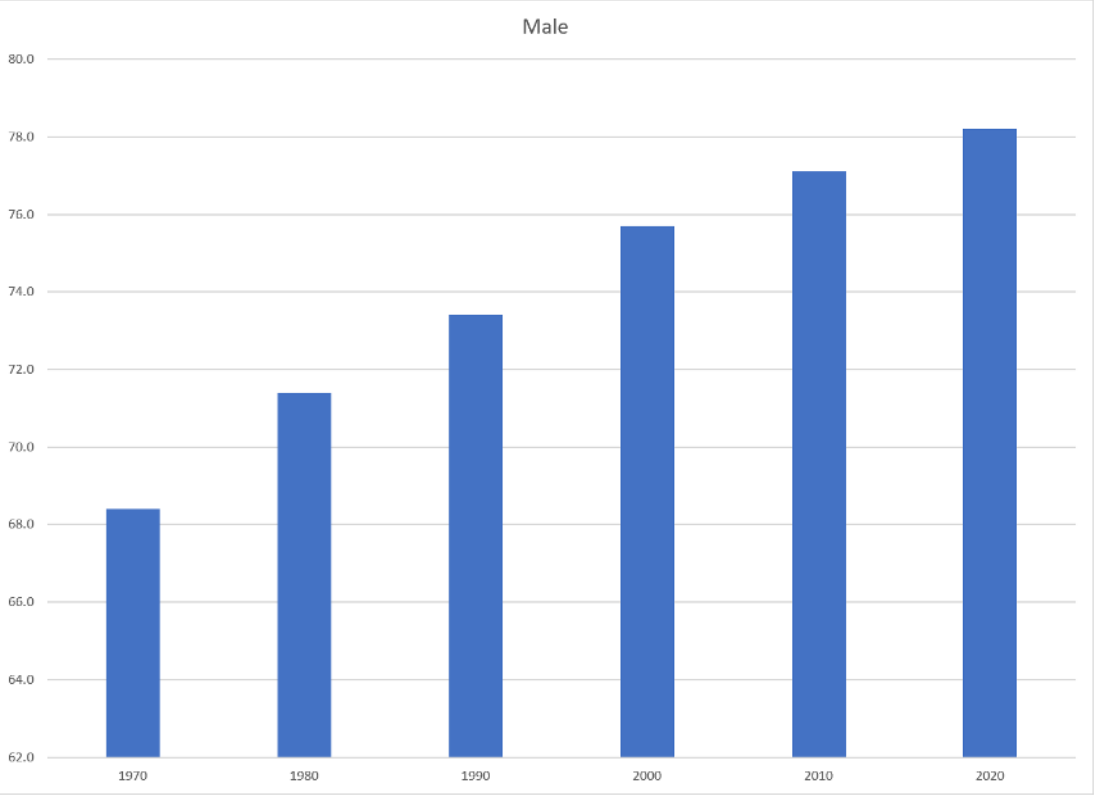


Figure 4.33 Male Bar Chart Solution

4. Repeat steps above to create a matching chart for **Life Expectancy for Oregon Women,** by selecting **A5:A11**. Press and hold the CTRL key and select **C5:C11**.Mac Users hold down the **Command** key
5. Use the Recommended Charts and select the Clustered Column chart.
6. Move the chart to a new sheet. Name the sheet **Women**.

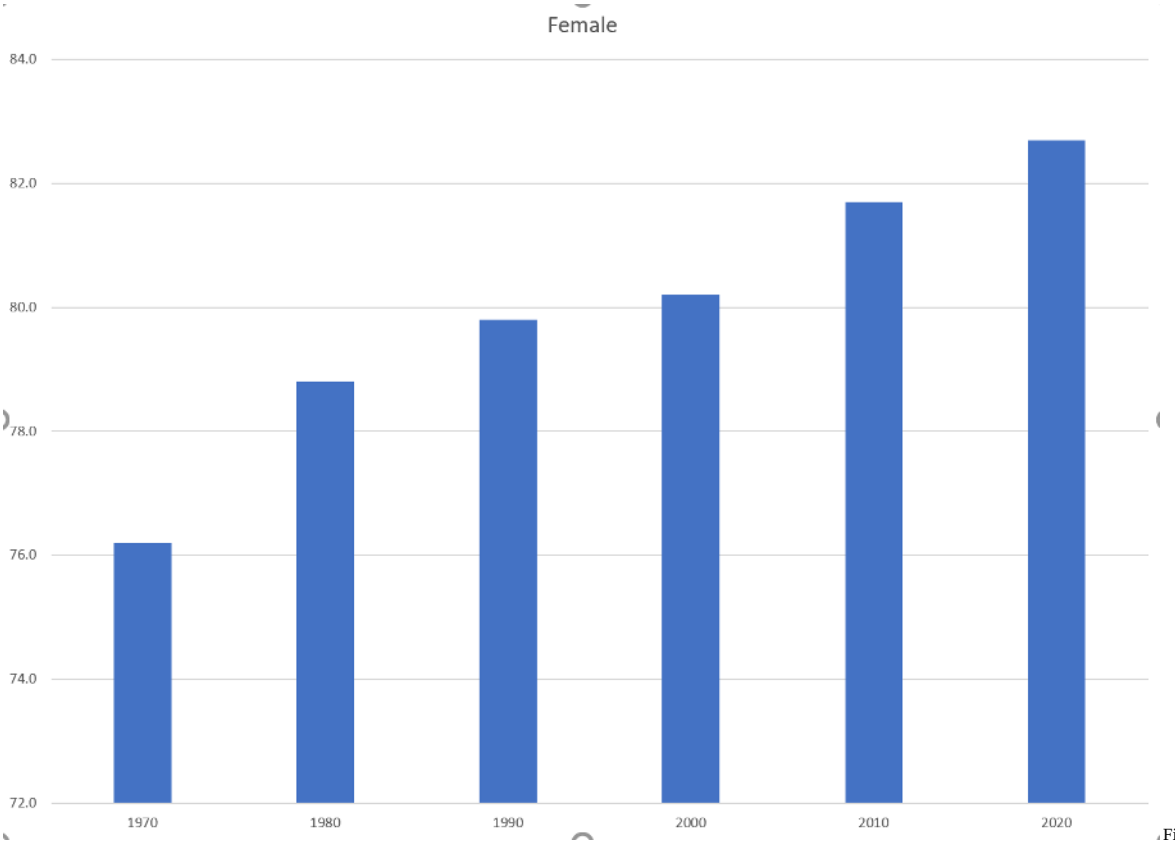


Figure 4.34 Female Bar Chart

7. Notice on the men's and women's vertical axis the min and maximum bounds do not match. To ensure data is comparable, adjust the min and max bounds of both the Mens and Womens chart to char

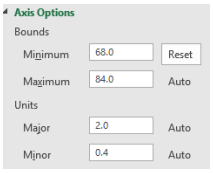
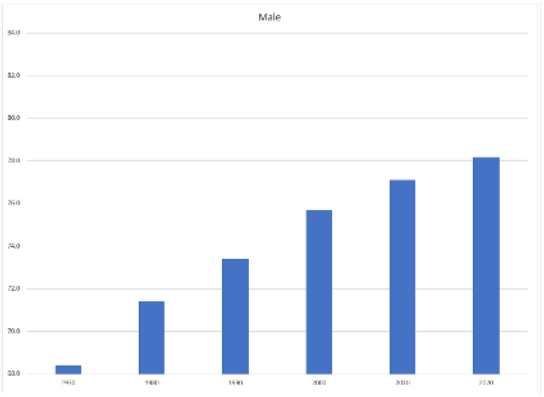
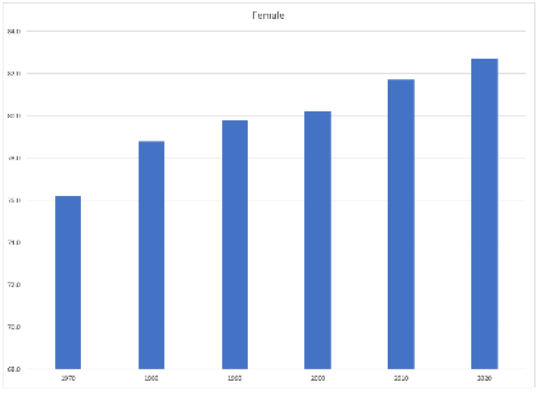


Figure 4.35 Axis Bounds





8. Return to the **Life Expectancy** tab, select **A5:D11.**
9. Use the **Recommended Charts** tool to create a simple line chart.
10. Change the Chart Title to **Oregon: Projected Life Expectancy at Birth**.
11. Leave the chart embedded in the worksheet. Move and resize it accordingly.

12. The green line across the bottom of the chart represents the difference between men's and women's life expectancy. It is not very helpful as it is. Right-click on the green line to open the pop-up menu.

    Mac Users should hold down the **CTRL key** and click the green line.

    Select **Format Data Series**. In the **Format Data Series** pane, under the **Series Options** tab, select the radio button in front of **Secondary Axis**.

13. Close the **Format Data Series** pane.
14. Use the **Chart Style**s tools to change your chart to something a bit more dramatic.
15. Preview the **Life Expectancy** worksheet in Print Preview and make any necessary changes. The solutions are shown in below in Figure 4.35.
16. Check the spelling on all of the worksheets and make any necessary changes. Save the **PR4 Historical Data** workbook.
17. Submit the **PR4 Historical Data** workbook as directed by your instructor.

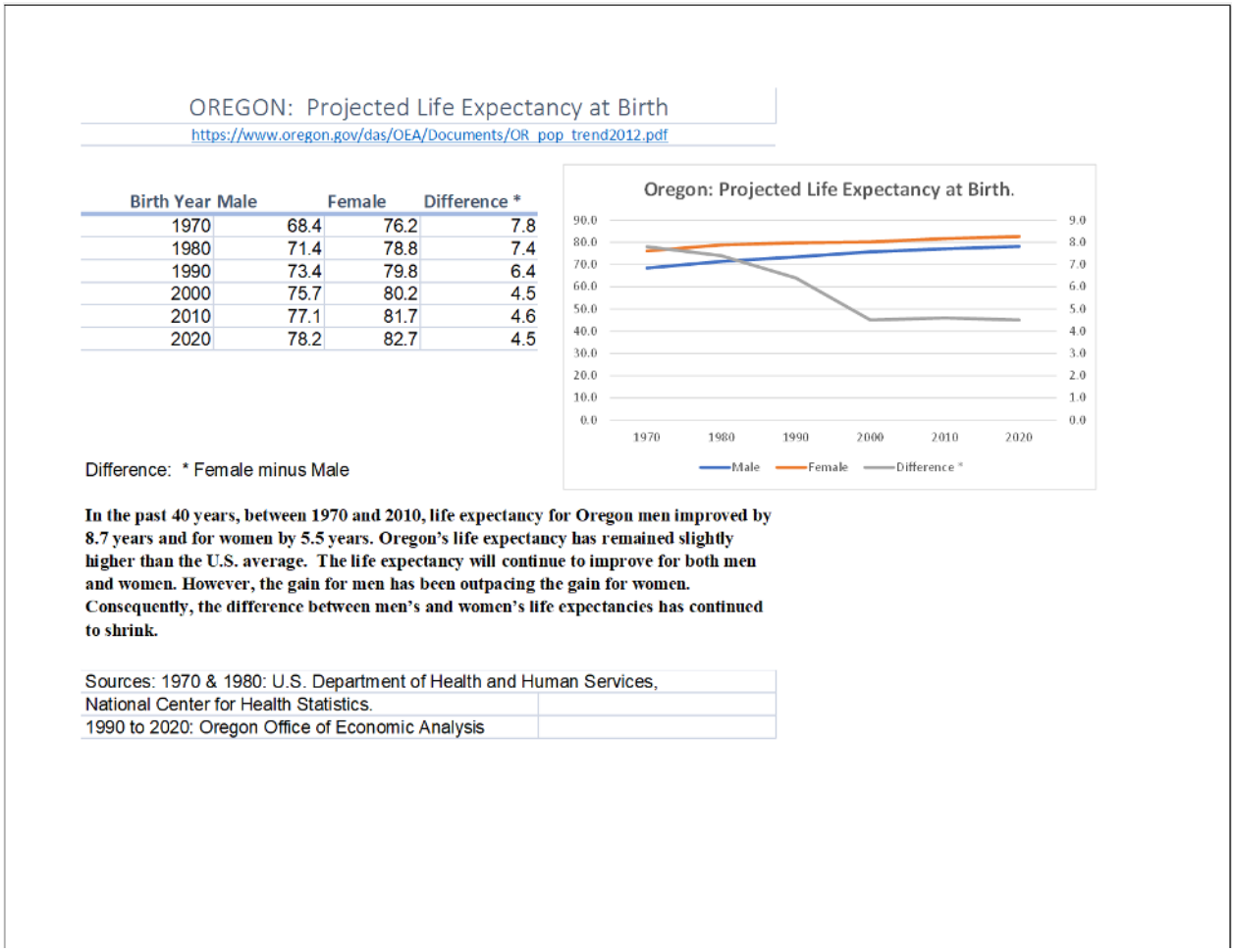


Figure 4.36
Projected Life Expectancy Line Chart

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CHAPTER OVERVIEW

9: Automating and Integrating Excel

> This page is a draft and is under active development.

9.1: Automating Tasks With Macros
9.2: Power Query
9.3: What-If Analysis
9.4: Integration with Microsoft Excel and Microsoft Word
9.5: Microsoft Excel and Microsoft PowerPoint Integration

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9.1: Automating Tasks With Macros

> This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Define and describe the purpose of a macro in Excel.
- Record a macro using the Macro Recorder.
- Assign a macro to a button or shape for easy access.
- Save and enable a macro-enabled workbook (`.xlsm` file).
- View and make simple edits to a recorded macro using the VBA editor.

Automating Repetitive Tasks

Many business professionals spend a large portion of their time performing the same steps in Excel—formatting reports, cleaning up data, or generating charts every week or month. Excel's **Macro Recorder** can automate these repetitive tasks. A **macro** is a set of recorded actions that Excel can repeat with a single click.

Instead of performing the same steps over and over, you can record the process once, save it as a macro, and run it whenever needed. For example, you might create a macro that formats a worksheet by applying bold headings, resizing columns, and adding borders—all automatically.

Macros can be recorded without any coding knowledge using the **Macro Recorder**, or they can be edited with **Visual Basic for Applications (VBA)** for more advanced customization.

Accessing the Developer Tab

Before you can record a macro, you need to make sure the **Developer tab** is visible. This tab contains all the tools for creating and managing macros.

1. Click **File** → **Options** → **Customize Ribbon**.
2. On the right side, check the box next to **Developer**.
3. Click **OK** to save changes.

The **Developer** tab will now appear on the ribbon (Figure 10.1.1)

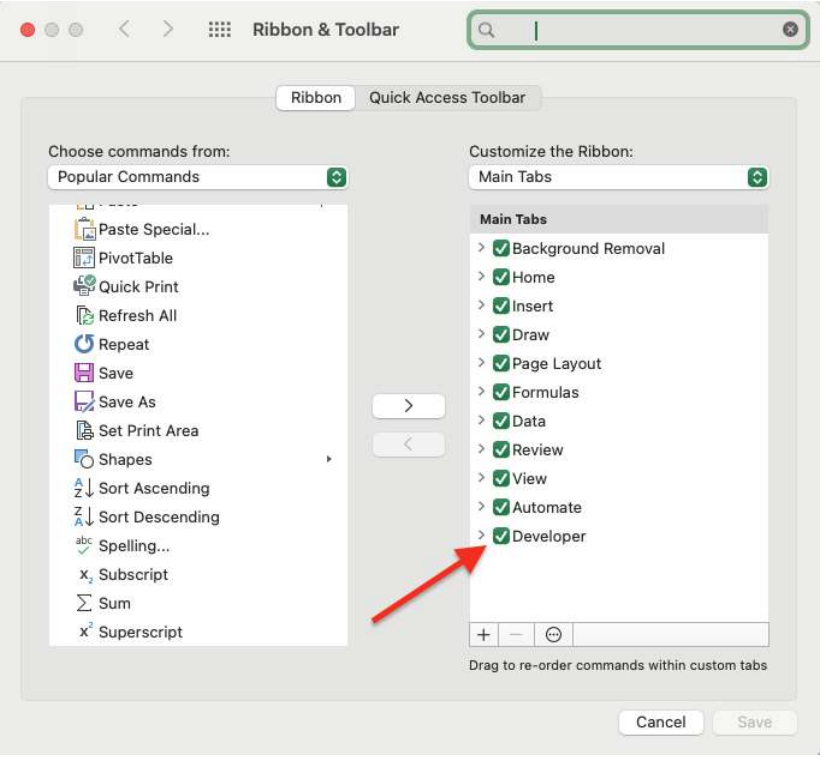


Figure 10.1.1

Recording a Macro

Once the Developer tab is visible, you can record your first macro.

1. On the **Developer** tab, click **Record Macro**.
2. In the dialog box that appears, enter a **macro name** (no spaces allowed, e.g., *FormatReport*).
3. Optionally, assign a **shortcut key** (e.g., Ctrl+Shift+R).
4. Choose where to store the macro:
   - **This Workbook** (default) to keep it within your current file.
   - **Personal Macro Workbook** to make it available in all workbooks.
5. Click **OK** to begin recording.

Now, perform the actions you want Excel to remember (for example: bold headers, change font size, apply borders). When finished, click **Stop Recording** on the Developer tab (Figure 10.1.3)

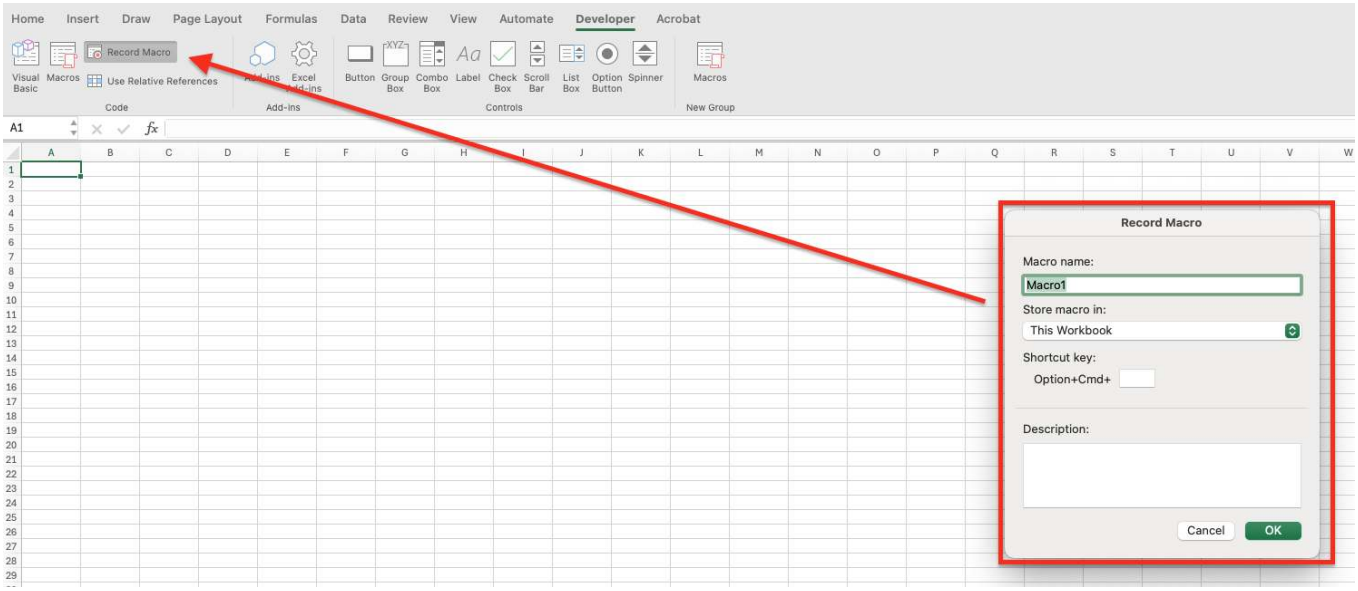


Figure 10.1.2

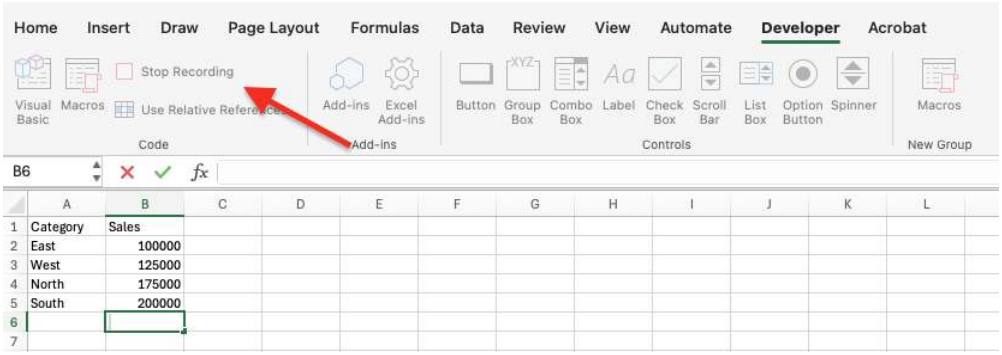


Figure 10.1.3

Assigning a Macro to a Button

After recording, you can make running your macro easy by assigning it to a button or shape.

1. Go to the **Developer tab** and click **Insert** in the Controls group, then select **Button (Form Control)**.
2. Draw the button on your worksheet by clicking and dragging.
3. The **Assign Macro** dialog box will appear automatically—select your macro (e.g., FormatReport) and click **OK**.
4. Right-click the button and select **Edit Text** to change the label to something more descriptive, such as "Format Report."

Now, clicking the button will automatically perform your recorded steps (Figure 10.1.4).

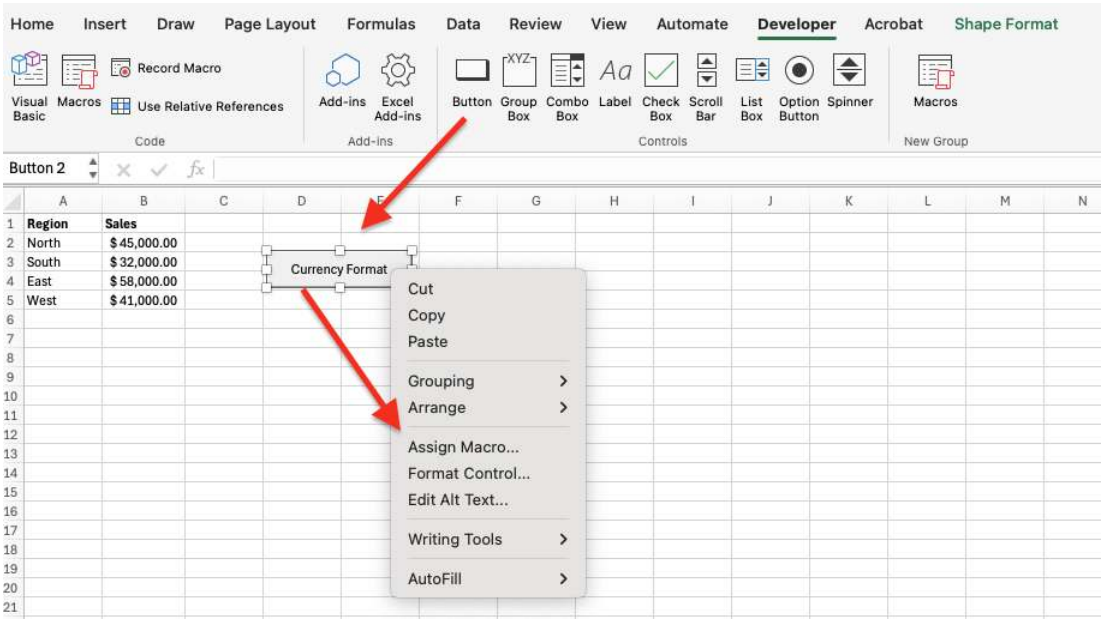


Figure 10.1.4

Saving and Enabling Macros

Macros can only run in workbooks saved as **Macro-Enabled Workbooks (.xlsm)**.

When you attempt to save, choose **File → Save As**, and from the **Save as type** dropdown, select **Excel Macro-Enabled Workbook (*.xlsm)** (Figure 10.1.5).

If you open a workbook that contains macros, Excel may display a **security warning** prompting you to enable content. Click **Enable Content** to allow the macros to run.

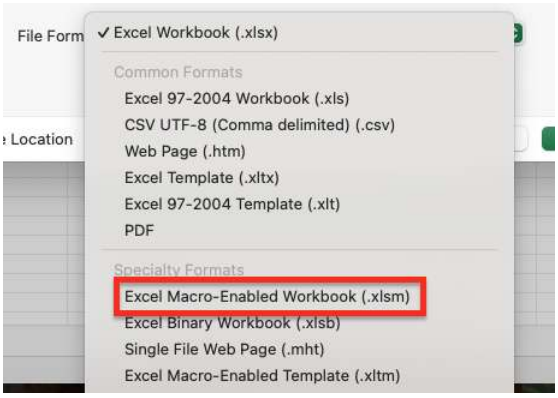


Figure 10.1.5

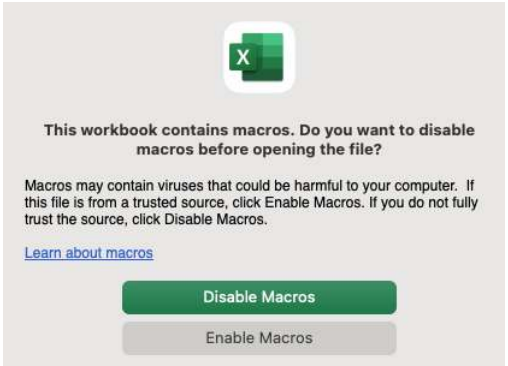


Figure 10.1.6

Viewing and Editing a Macro

Every recorded macro is written in a simple programming language called **Visual Basic for Applications (VBA)**. You don't need to know how to code to record a macro, but viewing your code can help you understand how Excel interprets your actions.

To view your macro:

1. Go to the **Developer** tab and click **Macros**.
2. Select your macro name and click **Edit**.

The **VBA Editor** will open, showing the underlying code (Figure 10.1.7).
Each action you perform while recording appears as a line of VBA code.

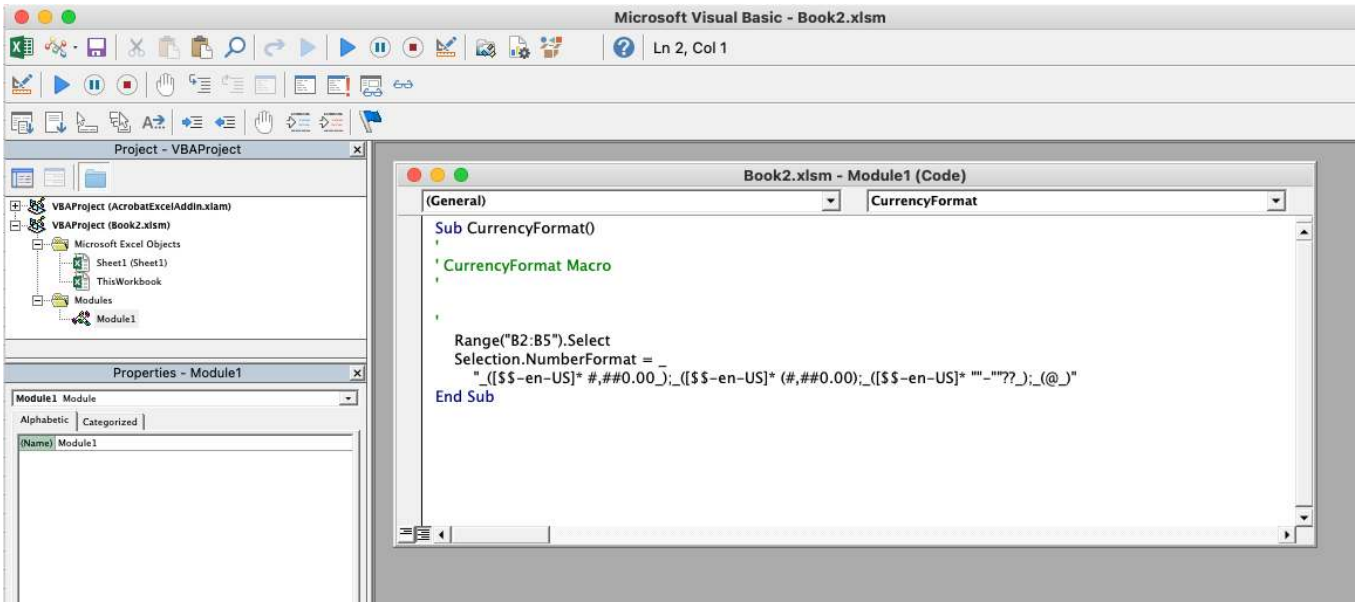


Figure 10.1.7

Summary

Macros are one of Excel's most powerful time-saving tools because they automate repetitive or routine tasks. Instead of performing the same steps manually—such as formatting headers, creating charts, or updating reports—users can record those actions once and replay them at any time with a single click. This process not only speeds up work but also ensures consistency and accuracy across reports.

At a technical level, every recorded macro is written in **Visual Basic for Applications (VBA)**, the programming language that underlies Microsoft Office. When you use the **Macro Recorder**, Excel automatically converts each of your actions into a sequence of VBA commands. These commands can be reviewed or edited to make small customizations—such as applying conditional formatting, looping through data, or adding user prompts. For beginners, this provides a gentle introduction to programming logic without requiring you to write code from scratch.

Macros are especially valuable in **business and data management settings**. For instance, analysts often receive monthly data files that need the same cleaning and formatting before analysis. By creating a macro that handles these steps automatically—deleting blank rows, applying number formats, or generating charts—employees can focus on interpreting results rather than performing repetitive setup work. This type of automation supports productivity, data integrity, and more efficient reporting cycles.

However, it's important to understand that macros can contain executable code, so Excel protects users by disabling them in new workbooks until permission is granted. Always save macro projects as **macro-enabled workbooks (.xlsm)** and enable content only

from trusted sources.

In this section, you learned how to:

- Access and use the **Developer tab** to record and manage macros.
- Record a macro using the **Macro Recorder** and assign it to a button or shape.
- Save the file as a macro-enabled workbook and enable macros securely.
- View and edit recorded macros in the **VBA Editor** for simple customizations.

By mastering these techniques, you gain a foundational understanding of how automation can enhance business efficiency. Macros serve as the gateway to more advanced Excel capabilities like **Power Query** and **VBA programming**, both of which allow for dynamic data transformation and customizable solutions that scale with organizational needs.

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9.2: Power Query

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Explain the purpose and advantages of using Power Query in Excel.
- Import data from multiple sources into Excel using Power Query.
- Apply basic data cleaning and transformation steps.
- Combine (append or merge) multiple datasets.
- Load transformed data back into Excel for analysis.

Introduction to Power Query

Modern organizations generate and collect data from an ever-growing number of sources: point-of-sale systems, customer databases, online forms, surveys, and cloud services, to name a few. Managing all of this information can be challenging because raw data often arrives **inconsistent, incomplete, or unstructured**. Cleaning, reshaping, and combining datasets manually with formulas can quickly become time-consuming and prone to human error.

Power Query was designed to solve this problem. It is an advanced data-connection and transformation tool built directly into Excel that allows you to **import, clean, combine, and automate** the preparation of data — all through a simple, step-by-step interface. Instead of writing formulas or code, users perform actions such as *filtering rows*, *renaming columns*, *or merging tables*, and Power Query automatically records each step as part of a repeatable process.

When you use Power Query, every cleaning or transformation step is saved in an ordered list called **Applied Steps**, visible on the right-hand side of the Power Query Editor. This list acts like a "recipe" for preparing your data: you can review, reorder, or remove any step at any time. The next time new data is added or a file is updated, clicking **Refresh** automatically re-applies the same steps, ensuring that your data is always consistent and up to date.

From a business perspective, Power Query plays a vital role in **data automation and integrity**. For example:

- A marketing analyst can combine weekly ad performance reports exported from different platforms into one clean master sheet.
- A finance team can import monthly sales ledgers, remove duplicate transactions, and standardize region names before analysis.
- A human-resources department can merge data from multiple branches into one report to track staffing trends.

Each of these tasks would require dozens of manual edits without Power Query. With it, data preparation becomes **fast, consistent, and repeatable**, freeing time for deeper analysis and decision-making.

Power Query is accessed from the **Data** tab in Excel, under the **Get & Transform Data** group. It supports a wide range of sources, including Excel tables, text or CSV files, databases, and online feeds. The cleaned data can then be **loaded back into Excel** as a table or **connected directly to dashboards** in tools such as Power BI or Tableau.

In this section, you will explore how to:

- Import data from different sources.
- Clean and transform data using built-in tools.
- Combine multiple datasets with **Append** and **Merge** functions.
- Load the final, prepared data back into Excel for reporting and analysis.

By the end of this section, you will understand how Power Query transforms Excel from a simple spreadsheet into a **powerful data management and automation tool**, giving professionals more control and reliability over the data they depend on.

Accessing Power Query

Power Query is located under the **Data** tab in Excel within the **Get & Transform Data** group. You can use it to import data from various sources such as:

- Excel tables or ranges
- CSV or text files
- Databases (SQL, Access)
- Online or cloud data (SharePoint, Web URLs, etc.)

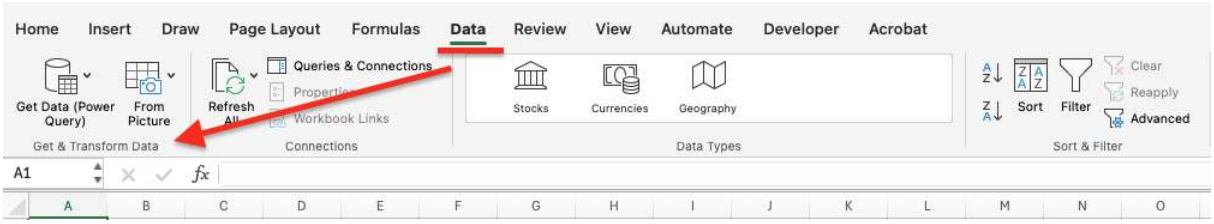


Figure 12.8

Importing Data into Power Query

Let's walk through an example using a simple sales dataset stored in another worksheet or CSV file.

1. Click the **Data** tab.
2. Choose **Get Data → From File → From Workbook (or From Text/CSV)**.
3. Navigate to your file and select **Import**.
4. The **Navigator** window will appear, displaying available tables or sheets.
5. Click **Transform Data** to open the **Power Query Editor** (Figure 12.9).

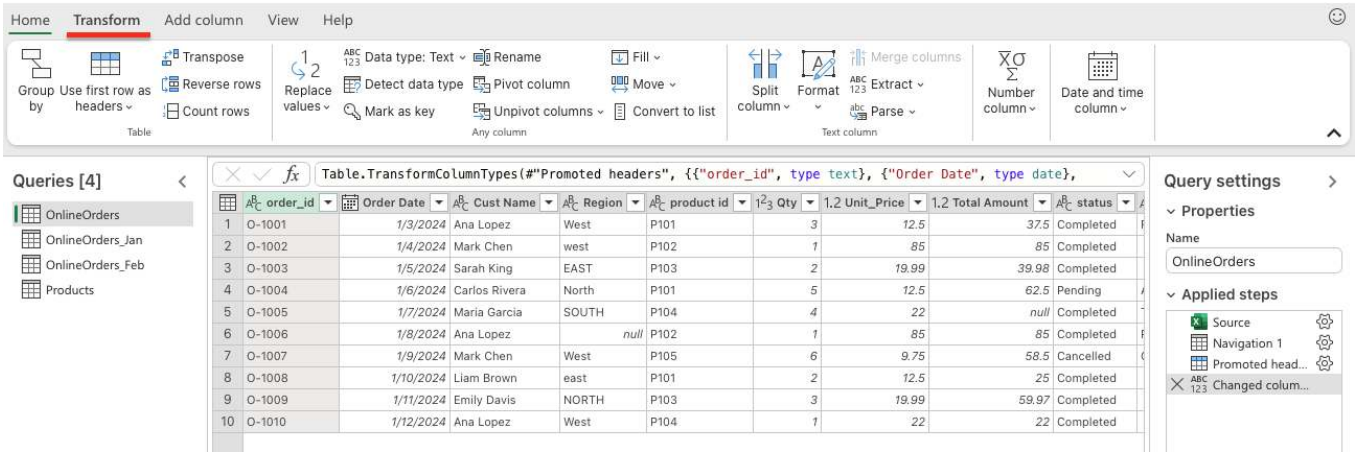


Figure 12.9

Cleaning and Transforming Data

Inside the **Power Query Editor**, you'll find a ribbon similar to Excel's, with options to filter, rename, split, or merge columns. Each transformation you make is recorded as a "step" in the **Applied Steps** panel, which you can edit or remove at any time.

Common transformations include:

- **Remove Columns** – delete unnecessary data.
- **Rename Columns** – make headers clearer.
- **Split Columns** – separate first and last names or extract data from delimiters.
- **Change Data Types** – convert text to numbers, dates, etc.
- **Filter Rows** – keep only records that meet specific criteria.

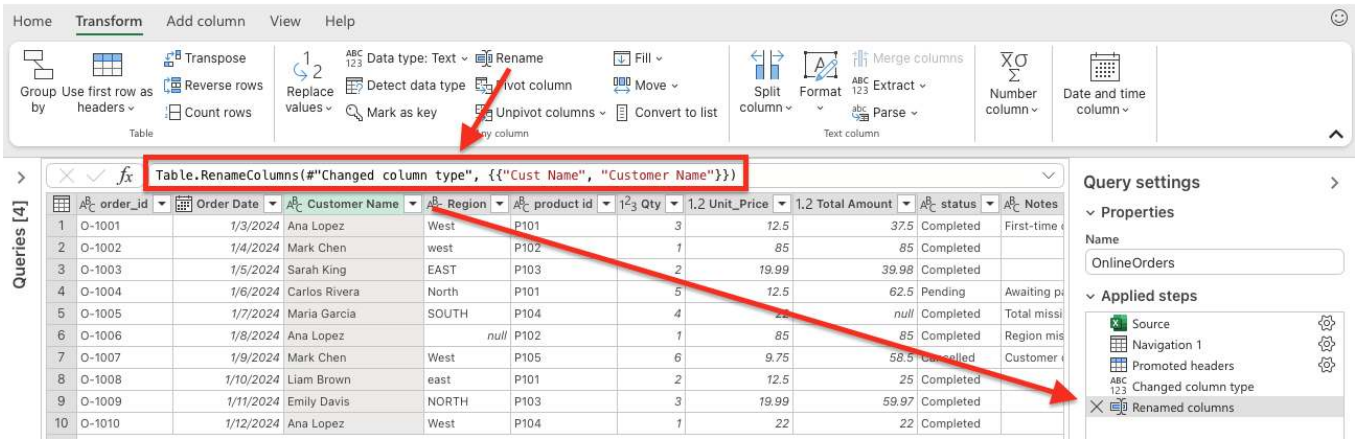


Figure 12.10

Each time you make a change, Power Query stores the step automatically. When the data is refreshed, all steps are re-applied in the same order, ensuring data consistency without repeated manual work.

Combining Data with Append and Merge

Power Query can also combine multiple datasets:

- **Append Queries:** Stack data from similar tables (e.g., January, February, and March sales files).
- **Merge Queries:** Join tables using a shared column, similar to a VLOOKUP or database join.

To combine data:

1. Open the Power Query Editor.
2. Go to the **Home** tab and choose either **Append Queries** or **Merge Queries**.
3. Select your tables and the columns to match.
4. Review the preview, then click **OK**.

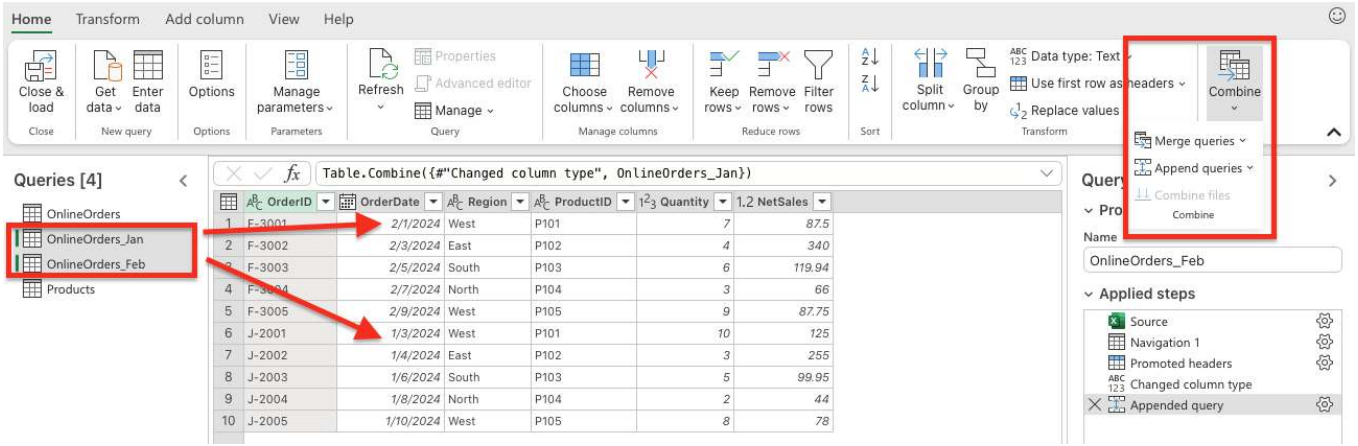


Figure 12.11

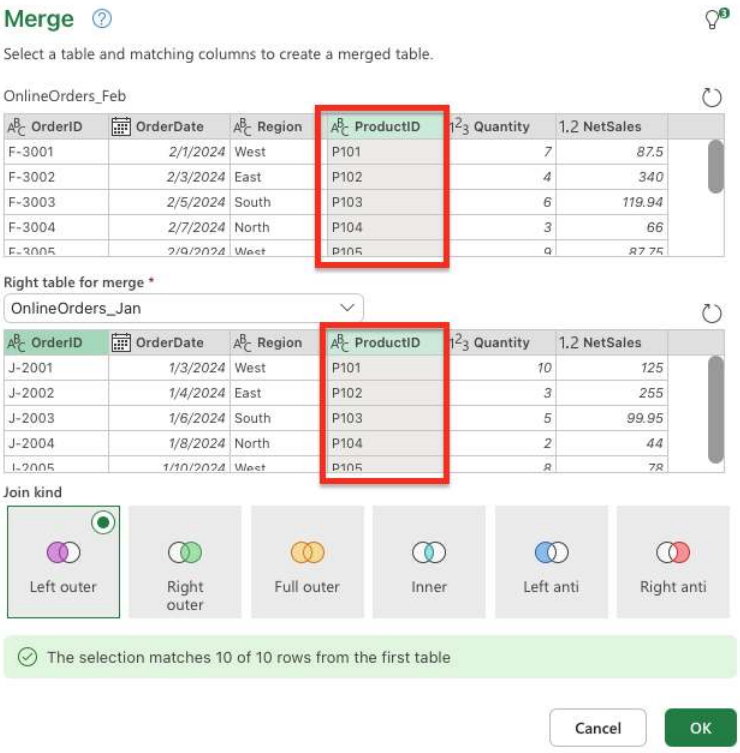


Figure 12.12

Loading Transformed Data

Once you finish cleaning or combining data, click **Close & Load** in the **Home** tab of the Power Query Editor.
Your cleaned dataset will appear as a new worksheet or Excel table.

If the source data changes, simply right-click anywhere in the table and select **Refresh** — Power Query will re-import and reapply all the steps you created (Figure 12.13).

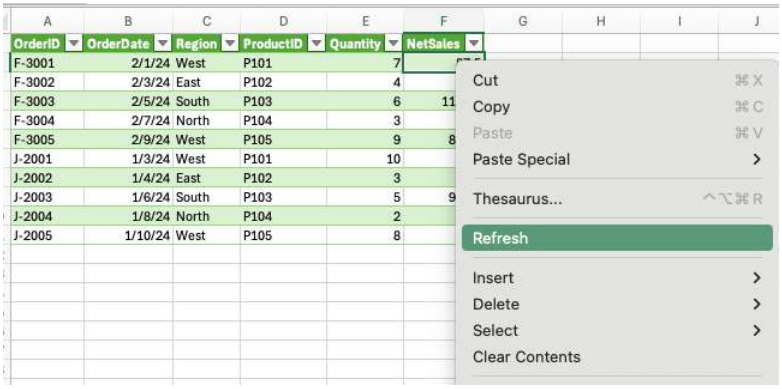


Figure 12.13

Summary

Power Query is one of Excel's most powerful tools for transforming raw data into organized, ready-to-analyze information. It allows users to connect to multiple data sources, clean and reshape data, and automate the preparation process — all without writing formulas or code.

In business environments, Power Query streamlines repetitive and error-prone data tasks. Analysts can import monthly sales reports, standardize column names, remove duplicates, and merge data from multiple files in just a few clicks. Once set up, these steps become part of a repeatable workflow: when new data is added or updated, refreshing the query instantly applies all the same transformations.

By learning Power Query, you gain the ability to:

- **Connect** to data from files, databases, and online sources.
- **Clean** and reformat messy or inconsistent information.
- **Combine** multiple datasets using append and merge operations.
- **Automate** routine reporting tasks for greater efficiency and accuracy.

In real-world applications, businesses use Power Query to prepare data for financial reporting, marketing dashboards, inventory tracking, and customer analysis. It eliminates the need for manual cleanup, reduces human error, and ensures that data-driven decisions are based on accurate and consistent information.

Ultimately, Power Query empowers professionals to spend less time preparing data and more time interpreting insights — a critical skill for anyone working with analytics, reporting, or business intelligence.

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9.3: What-If Analysis

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Use Scenario Manager to evaluate different variables
- Determine a desired result using Goal Seek

Having a backup plan is helpful when things do not go as expected. The plan offers an alternative course of action to pursue in case the first path does not work out. In business, this practice is called contingency planning, and it is essential for the business to be successful. This planning process can involve investigating alternatives if sales are lower than expected. It can involve planning for the eventual retirement of key personnel in the business. It could also address items such as the long-term strategic direction of the company. The contingency plan is a proactive attempt to anticipate some situations that might be different from your expected course of action and that might negatively impact the success of your business. Having this plan in place certainly does not guarantee that nothing outside of the plan will happen, but it helps a business to deal with specific situations they have identified, as well as some degree of uncertainty. You cannot always plan for the unexpected, such as natural disasters or shifts in consumer preferences, but there are some things that you can plan around. For example, the business can have a plan in place in the event that sales are lower than expected. This plan could involve budget cuts or enhanced marketing efforts to boost sales.

There is a process to developing a contingency plan for a business. These steps might also be helpful in your personal life as you plan for your future career. The first step is to list the risks or the events that have some uncertainty associated with them. For example, if you are unsure of what the utility costs might be for a new building, that could be a risk for your business. Some areas where a business may experience risks are unplanned issues with time or schedule, cost adjustments, availability of resources, or technical problems. Next, you will need to rank the risks according to the impact to the business. For example, if your business is an e-commerce site, a technical issue that crashes your website would be a significant priority over increased office supply expenses. Next, you need to set a plan for each event that you have identified. Each plan should be detailed enough to provide an alternative course of action for the business. Your business should revisit the contingency plan often and make any adjustments necessary, based on any changes in the business. There are many templates online that can help you with contingency planning in business. Some Excel templates use formatting to make the plan easy to understand and professional so that you can easily share it with others in the company.

Using Scenario Manager

The Scenario Manager tool in Excel provides a way to look quantitatively at contingency planning. It allows the user to change attributes without altering live data to examine the resulting impact on key variables. You can change up to 32 cells and view the results of those changes all at the same time. This feature can be quite helpful for contingency planning. For example, you might already have metrics that identify the best- and worst-case scenarios for sales. Using this range and the Scenario Manager tool, you can look at the impact to the overall profit picture for the business. You could also use the tool for planning your personal finances. You could investigate the impact of increasing your monthly mortgage payment on the time it will take you to pay off the loan. The tool can be instrumental in helping a business navigate multiple courses of action to determine the best approach moving forward. You can also merge the scenarios from a single or multiple worksheets together for more in-depth analysis.

What Is a Scenario?

The Scenario Manager is part of the What-If Analysis tools suite in the Forecast command group. The tool is accessed from the Data tab and is in the Forecast command group (Figure 11.63).

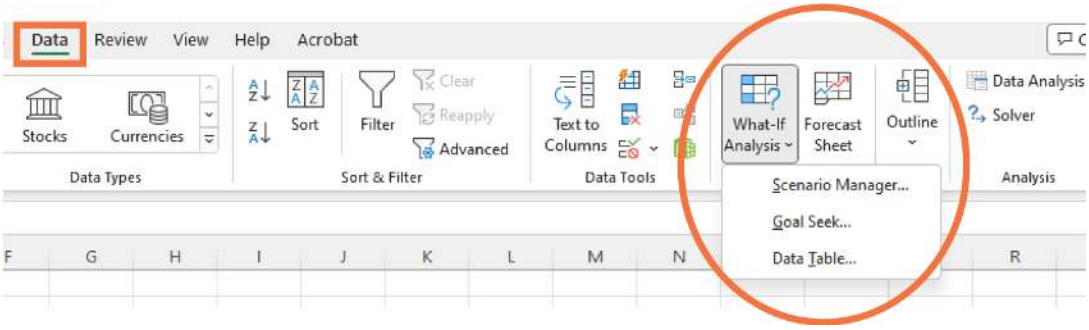


Figure 11.63: The Scenario Manager tool provides a way to look quantitatively at contingency planning. (Used with permission from Microsoft)

A scenario determines the values that Excel will use to change the input cells. You can save different scenarios with different values to view the impact on your target cell(s) at the same time. When you choose Scenario Manager, an input window will appear (Figure 11.64). From here, you will set the changing cells that define the scenario and the target cell for the results.

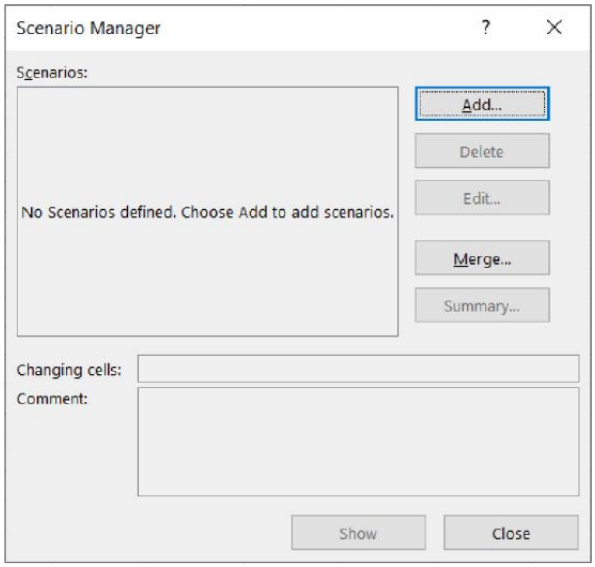


Figure 11.64: To use the Scenario Manager, first set the changing cells and target cell. (Used with permission from Microsoft)

Let's begin with a simple example of obtaining a home mortgage. The initial mortgage is for $150,000 for 30 years with an interest rate of 5 percent. You want to find a better interest rate and see the impact that rate will have on your payment and the total amount you will pay. Using the PMT (payment) and FV (future value) functions from the Function Library, you can quickly determine the status of the loan (Figure 11.65). With these values at the current rate of 5 percent, you will pay just over $800 per month and at the end of the life of the loan, you will have paid nearly $260,000. The functions by default return a negative number for the results, as indicated by the parentheses and the red font color. You will need to adjust the equation to convert the number to a positive number. You can either put a "-" in front of the function or use the ABS function at the beginning of the formula to use the absolute value of the number. You can use the Scenario Manager to investigate different interest rates and different payment terms if you decide you want to pay the loan over 15 years or a time frame other than the standard 30-year mortgage term. You will use the same mortgage example to investigate different levels of interest rate and repayment terms.

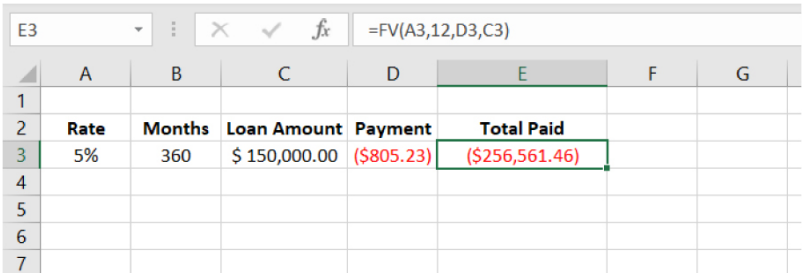


Figure 11.65: The functions by default return a negative number for the results as indicated by the parentheses and the red font color. (Used with permission from Microsoft)

Adding and Deleting a Scenario

Using the mortgage example, you can create a scenario to look at the impact of lowering the interest rate on both the payment and the total amount paid for the loan. First, to add a scenario, go to the Data tab, choose What-If Analysis, and select Scenario Manager. Click Add and the Add Scenario dialog box will appear (Figure 11.66). Here, you will define the changing cells and name the scenario. You can name this scenario "rate changes."

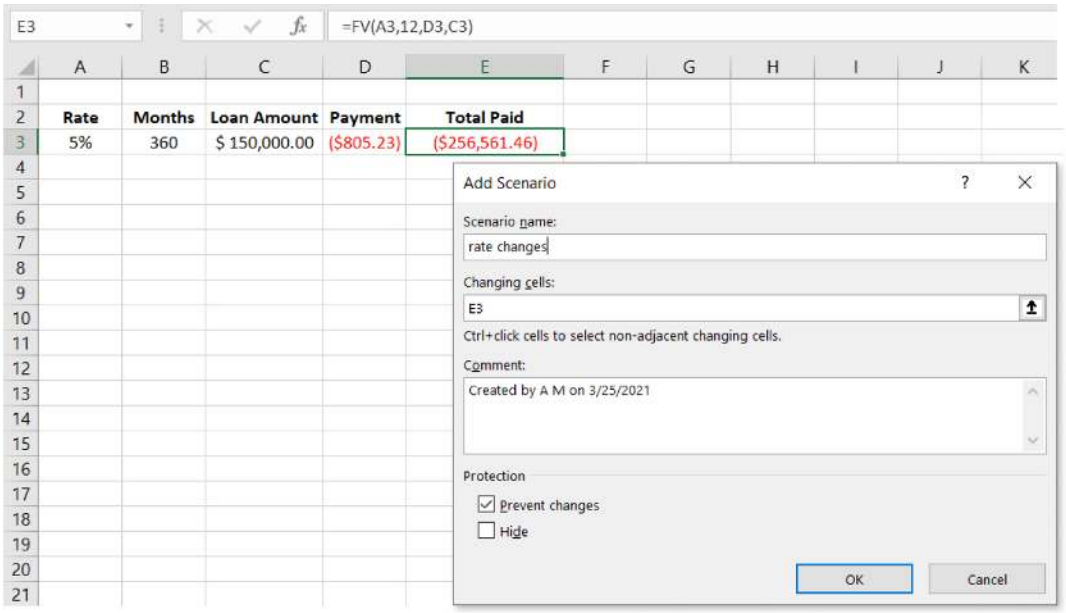


Figure 11.66: To add a scenario, click Add in the Scenario Manager window and define your scenario in the dialog box. (Used with permission from Microsoft)

Next, select the cell you want to change. To change the rate, you would select cell A3. The Scenario Manager does allow you to add more than one cell in the scenario. In this example, you will also change the length of time for the loan. Select A3:B3 for changing cells. You can add comments if desired to explain the scenario, such as details about the reason for the selected ranges and other relevant information. Then, click OK. Next, you will define the levels or range of values that Excel will use to change the value in cells A3 and B3. Assume you want to compare the impact of a rate higher than the original 5 percent and a loan term shorter than the original 360 months to the impact of a lower rate and longer loan term (Figure 11.67). Add two separate scenarios at the various levels for each cell, A3 and B3. Click OK. This will take you back to the Scenario Manager window. Add the other scenario in the same way.

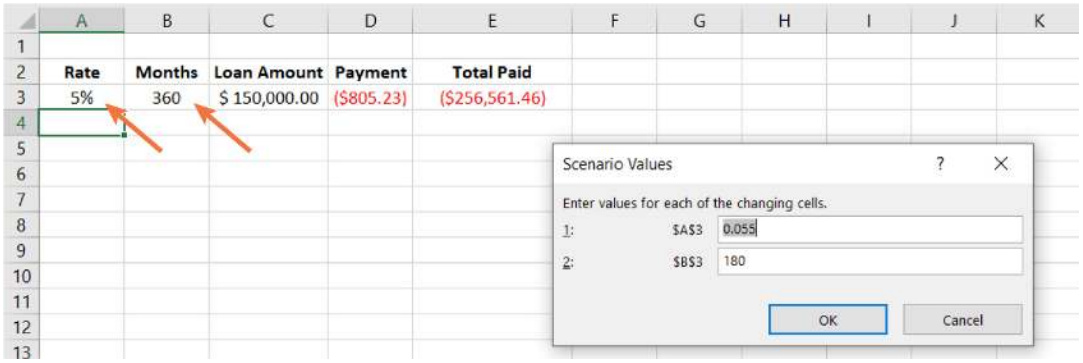


Figure 11.67: Define the ranges of values for Excel to manipulate in the scenario. (Used with permission from Microsoft)

Notice that you have two scenarios listed in the Scenario Manager (Figure 11.68).

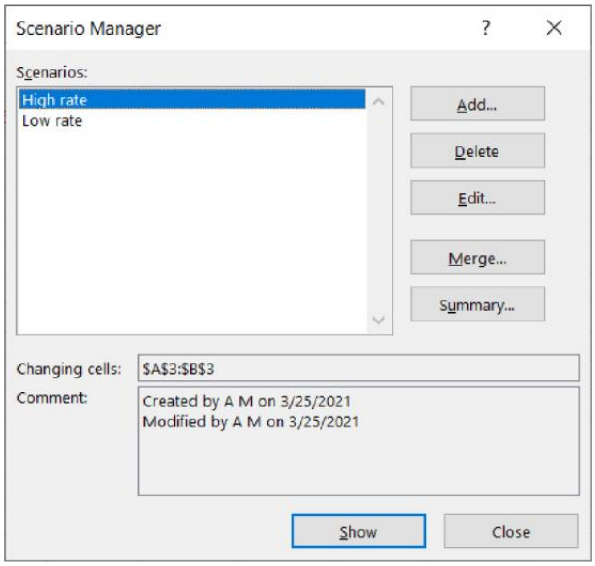
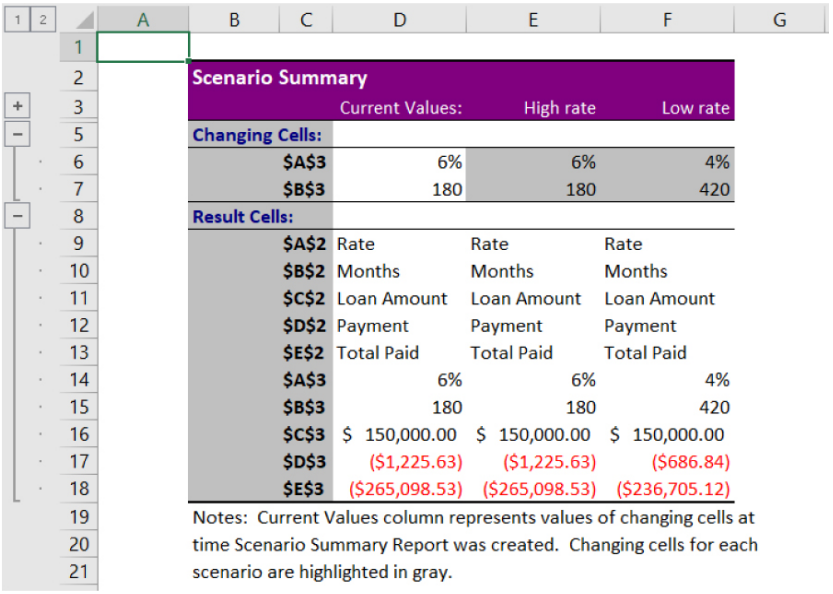


Figure 11.68: The Scenario Manager lists all the active scenarios on a spreadsheet. (Used with permission from Microsoft)

There are a couple of options at this point. If you want to see the results from either scenario on the spreadsheet, click the appropriate scenario in the list and click Show. This will change the value in the spreadsheet, but only for one scenario at a time. If you choose Summary, the Scenario Manager will compile the information for all the scenarios in the list in a clear table on a separate worksheet so that you can compare the results (Figure 11.69). You can then format and adjust the table to fit your needs. One other functionality of the Scenario Manager is that it can merge scenarios from other worksheets into a single worksheet using the Merge button.



Scenario Summary			
	Current Values:	High rate	Low rate
Changing Cells:			
$A$3	6%	6%	4%
$B$3	180	180	420
Result Cells:			
$A$2	Rate	Rate	Rate
$B$2	Months	Months	Months
$C$2	Loan Amount	Loan Amount	Loan Amount
$D$2	Payment	Payment	Payment
$E$2	Total Paid	Total Paid	Total Paid
$A$3	6%	6%	4%
$B$3	180	180	420
$C$3	$ 150,000.00	$ 150,000.00	$ 150,000.00
$D$3	($1,225.63)	($1,225.63)	($686.84)
$E$3	($265,098.53)	($265,098.53)	($236,705.12)

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

Figure 11.69: The Scenario Manager tool provides a summary of the results on a separate worksheet. (Used with permission from Microsoft)

To delete a scenario, go to the Scenario Manager and select the scenario you want to delete from the list and choose Delete. If you have created a scenario summary table, the table will remain even if you delete the scenario. If you instead select Show and the scenario is displayed on the spreadsheet, the numbers will not revert to the original values even if you delete the scenario. Rather, you will lose your original data. For this reason, it is generally better to use the Scenario Summary rather than the Show option.

Real-World Application - Personal Budgeting

You've learned that Excel can be a helpful tool for managing your personal finances. It can also be a handy tool to help you plan for future purchases and accumulate savings for retirement. Take a look at this article to see how the Scenario Manager can help with budgeting your personal finances. Let's use the Scenario Manager to save for a vacation. You will need to investigate the cost of the vacation—for instance, factor in all costs associated with the travel (flight, hotel, food, etc.). Ideally, you will want to compare more than one cost associated with the vacation—perhaps you are comparing hotels, or flights, or even another destination altogether. Then, determine what your sources of income might be. You will use the Scenario Manager to determine the costs of the vacation by comparing the different vacation options using your budget information.

Think about the following:

- How can the Scenario Manager tool be used to help you reach your goals?
- What assumptions did you need to make in order to establish your budget?

Editing a Scenario

To edit a scenario, open the Scenario Manager, select the scenario you want to edit, and choose Edit on the right of the window. This will open the initial scenario window. You can make changes to the target cells, comments, or the name of the scenario. Then, click OK. You will be prompted to adjust the values if desired. Then, click OK. You will need to run the Summary again to see the updated results based on the changes you made.

Using Goal Seek

Goal Seek is another tool in the What-If Analysis group. It is like Solver but restricted to a single input variable. The Goal Seek tool allows you to select a target cell and value for that cell by changing another cell that contains a formula. For example, Goal Seek could determine how much money you need to set aside to reach your retirement fund goal. It could also determine the mortgage interest rate needed to keep a monthly payment within your budget. In a small business, this tool can help when considering a purchase of equipment or property for the business. In this case, the duration and the total amount of the loan are typically known. Goal Seek can investigate financing options to get the monthly installment payment within budget. Conversely,

Goal Seek can determine how much in total a person or business can afford for a loan based on a set interest rate and length of the loan.

To begin, open the spreadsheet with the information needed for your analysis or create a new one. Using the mortgage example, suppose you would like to determine what value of home you can afford. Most mortgages have a term of 30 years (360 months), and you are planning on a 5 percent interest rate. You would like a monthly payment not to exceed $850. The Goal Seek tool can determine the loan amount that will keep the mortgage payment within your budget. Go to the Data tab, click on the drop-down arrow next to What-If Analysis, and choose Goal Seek (Figure 11.70). Notice the input window has three arguments: Set cell, To value, and By changing cell.

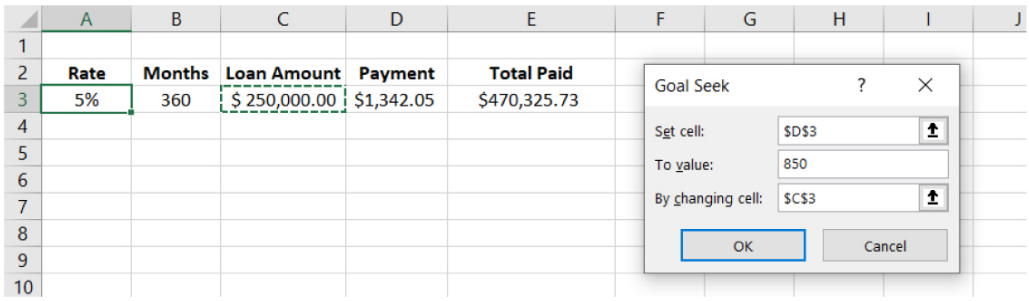


Figure 11.70: Goal Seek is similar to Solver, but you are restricted to a single input variable. (Used with permission from Microsoft)

In this example, type $D$3 in the Set cell field, 850 in the To value field, and $C$3 in the By changing cell field (loan amount). Click OK (Figure 11.71). The result will display in the window if Excel found a solution.

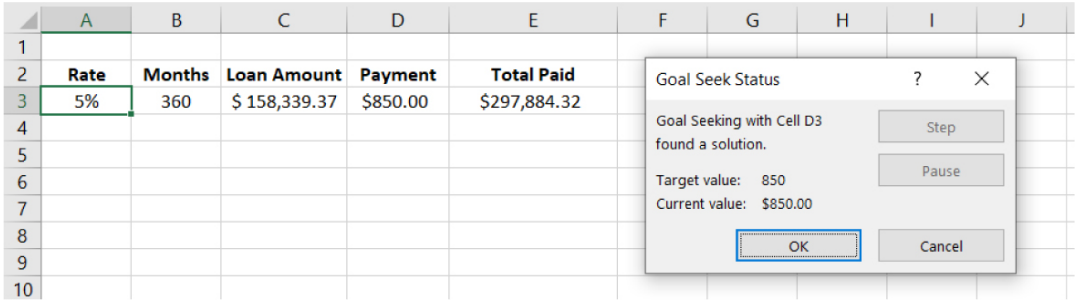


Figure 11.71: Goal Seek displays the result if a solution is found in the Goal Seek Status window. (Used with permission from Microsoft)

Your budgeted monthly payment of $850 will allow you to afford a home that is approximately $158,000. The result window also provides the target value (850) and current value ($850.00) for the solution. When you click OK, Excel retains the solution in the spreadsheet. If you want the values to return to their original numbers, click Cancel instead. You can use the tool to examine various options, such as the price you could afford if you increased your monthly payment to $900. This tool provides information for data analysis and contingency planning when you are focused on one input variable, but it is limited in its use for in-depth planning and analysis.

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9.4: Integration with Microsoft Excel and Microsoft Word

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Integrate Word documents into Excel worksheets
- Link Excel worksheets to Word documents
- Insert Excel charts into Word documents
- Embed Access data into Word documents

One key advantage of a suite like Microsoft 365 (Office) is that it enables you to insert information from other file types into its applications. For example, suppose you want to connect a file with a more narrative structure to explain your analysis in an Excel worksheet. You can use file integration to include notes that detail the specific calculations or data sources in Excel. Conversely, in a company-wide report, it may be helpful to include chart visuals to illustrate how sales have changed over the last quarter. These are just a few examples of the value of integrating Word and Excel when conveying information to a broad audience.

Integrating Microsoft Word Documents into Microsoft Excel Worksheets

The previous section provided a general overview of linking and embedding in Microsoft. Now we look specifically at the process for linking and embedding Word files into Excel worksheets. Keep in mind that Excel is a spreadsheet program. It is not designed to handle large amounts of text. It is a good idea to spend a little time thinking through the best approach before you try to integrate a lengthy Word document into an Excel workbook.

Here is an example scenario: You have just finished summarizing information from three of WorldCorp's top sales agents for the past month. You have created a Monthly Report memo in Word and an Excel worksheet that includes a PivotTable. Because the memo is rather short, you decide to incorporate it into your Excel worksheet rather than sharing two separate files with your team. This makes the most sense because you want others to be able to manipulate the PivotTable and analyze the information to best meet their needs. Figure 15.11 shows the Excel file with the PivotTable and chart of the summarized data and Figure 15.12 shows the memo created in Word.

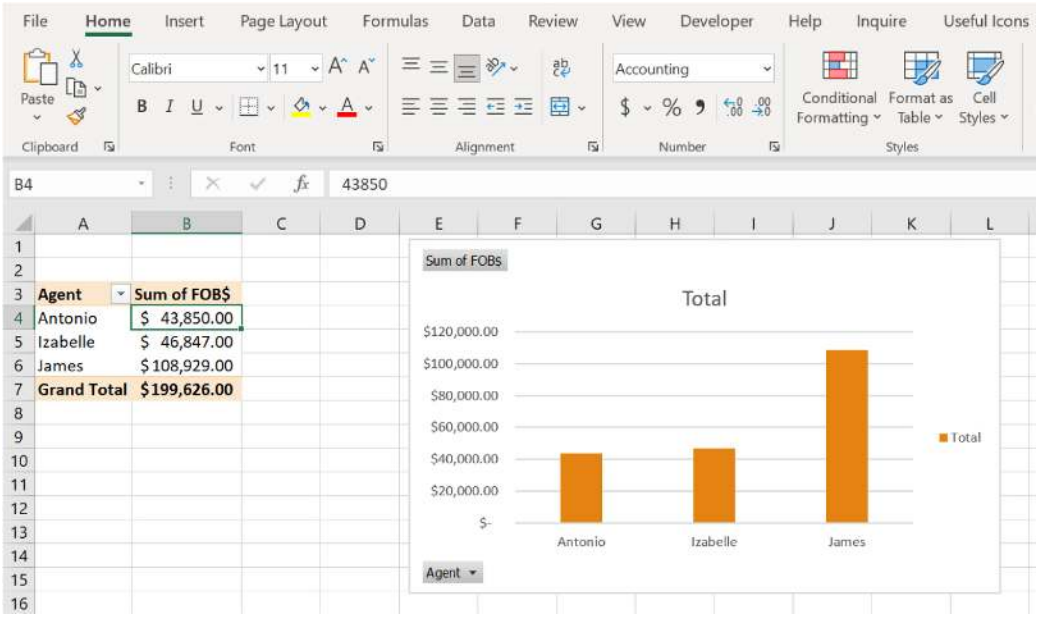


Figure 15.11: The summarized data is contained in an Excel file. (Used with permission from Microsoft)

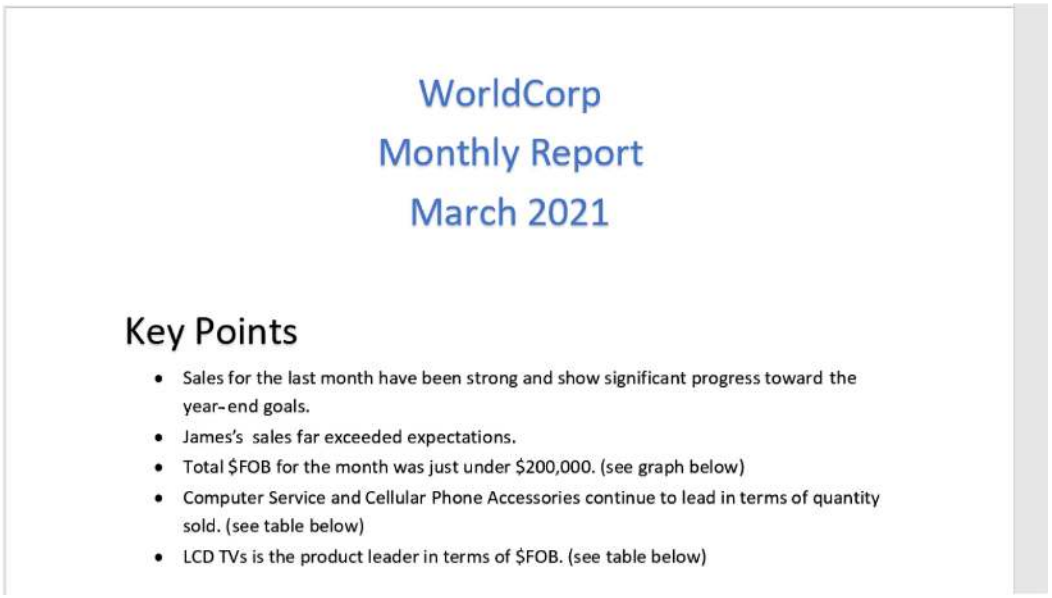


Figure 15.12: The summary memo is in a Word file that can be incorporated into the Excel file by using the Insert Object function. (Used with permission from Microsoft)

Using the Insert Object function in Excel, you can integrate the Word document into the file. First, place your cursor where you would like to have the memo information placed in the Excel document. In this example, let's choose cell A10. The object will be inserted into the selected cell. Note that you will be able to move and resize the object once you have placed it on the worksheet, but it is easier to manipulate the object if you insert it in the general location where you would like it to be. Also note that resizing an object can compromise its readability—another reason to be cautious about placing large amounts of text in Excel.

As covered in Microsoft 365: Collaboration and Integration, go to the Insert tab and the Text command group, and choose Object (Figure 15.13). From there, you have two options: Create New or Create from File. Select Create from File (see Figure 15.14).

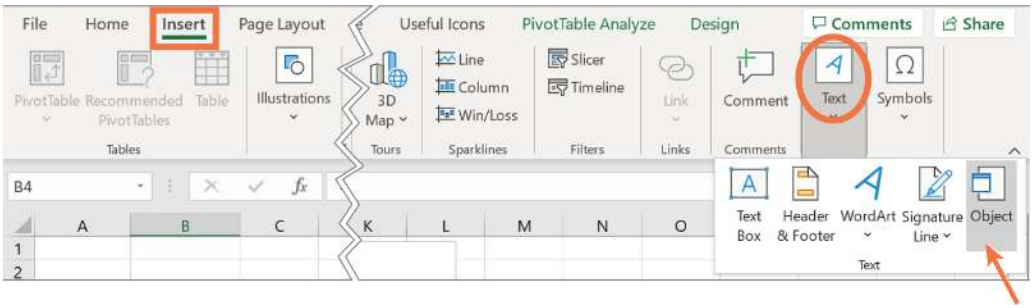


Figure 15.13: Excel considers inserting a file into an existing workbook as inserting an Object. (Used with permission from Microsoft)

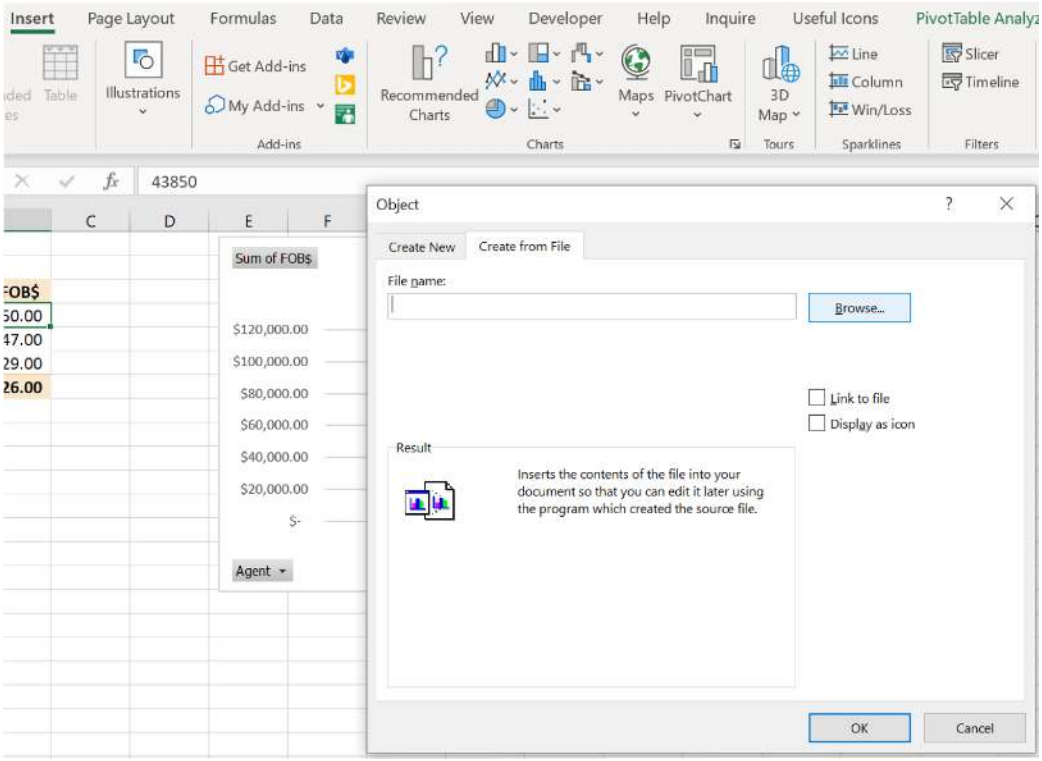


Figure 15.14: Remember to choose Create from File when you have the information already saved in another file. (Used with permission from Microsoft)

The Word file was previously created and saved as Monthly Report. Choose this file and click OK. If the file you are trying to insert is open, you will get an error message indicating that the file is in use. (Only one person can be working in a shared file at the same time. Once the person is finished and has closed the file, it will become available for others to edit.) In that case, simply close the file and insert the object again. Notice that the Link to File and Display as icon options are available here as well. The information from the Word document is now in the Excel file (Figure 15.15). Because we did not choose Link to File, the Word memo is embedded in the Excel worksheet and has become part of the Excel file. This means that if you make any changes in the Word document (the source file), they will not be reflected in the Excel file. Notice in the formula bar you see "=EMBED("Document",")". Excel automatically adds this to indicate that an object has been embedded (or more specifically is now a part of) into the Excel file. In this case, we embedded a Word document, so you see the word "Document" in the formula. This will be inserted when you choose to embed an object or file. You should not edit or change this formula.

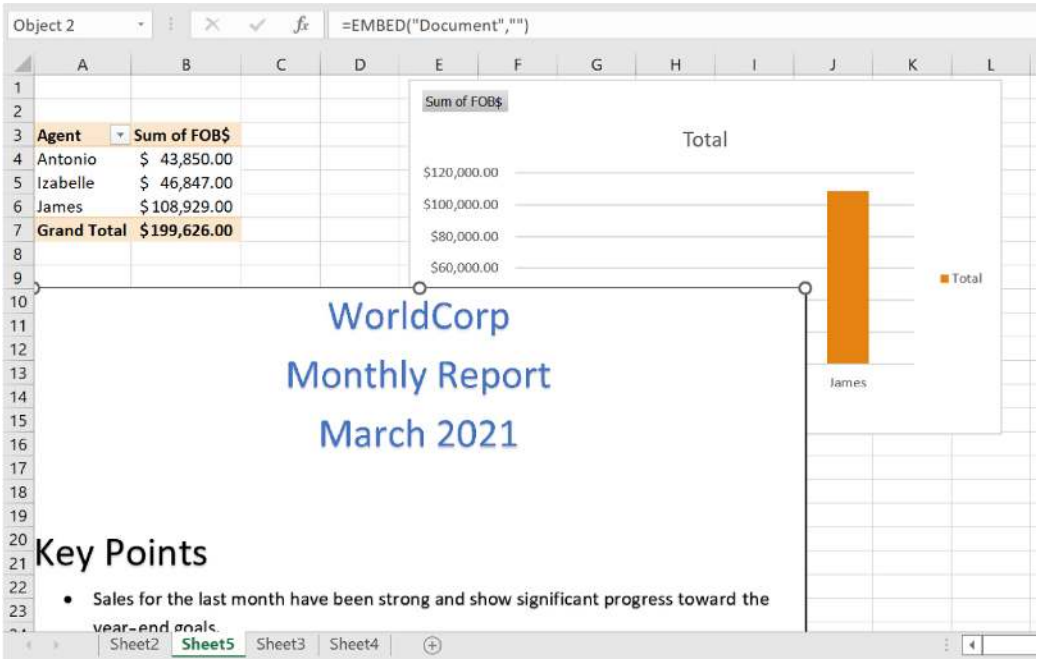


Figure 15.15: The memo was inserted into cell A10. (Used with permission from Microsoft)

Note that although we selected cell A10 as the cell to insert the memo into, the memo takes up much more space than this. The cell we select is simply where the top left corner of the object will be, but the object itself may cover many other cells. This is why resizing is important (Figure 15.16).

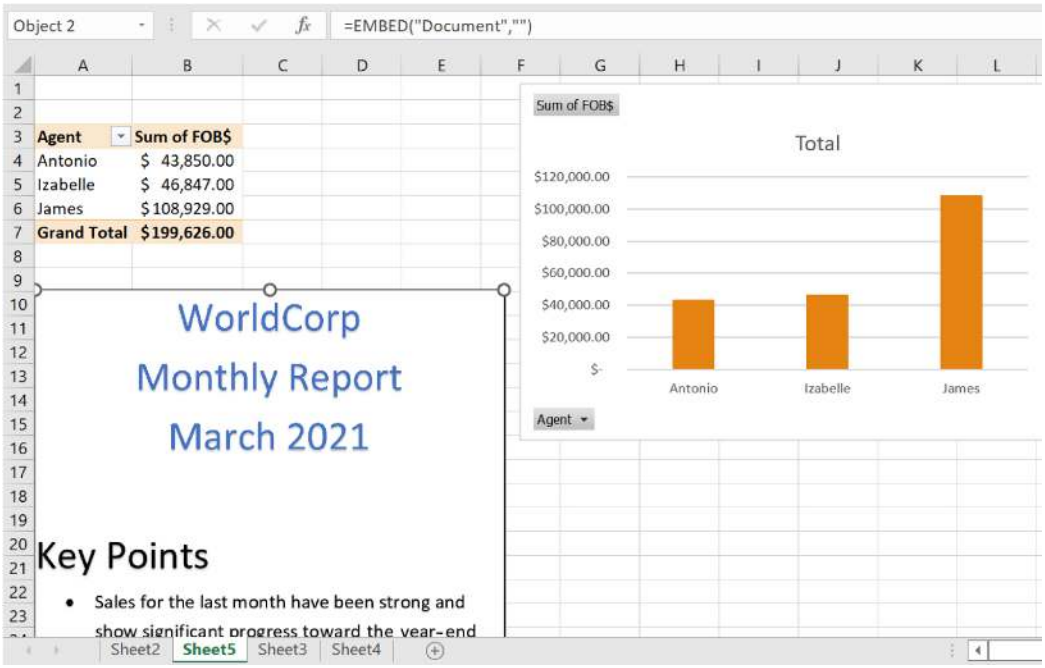


Figure 15.16: Resizing the object enables you to fit it into the space next to the chart, but this also makes the text a bit harder to read. (Used with permission from Microsoft)

As an alternative to placing the actual text into the worksheet, you can choose to insert the information as an icon. Adding the icon to the spreadsheet creates a link rather than embedding the text into the Excel file. The user simply double-clicks on the icon to access the Word file. By choosing Display as icon, you can avoid some of the drawbacks of inserting blocks of text into a worksheet and have a direct link to the source file. To do this, select the Display as icon option. Remember that you can change the look of the icon that will be inserted by choosing Change Icon (Figure 15.17).

When the icon is placed in the worksheet, it will contain the file name, “monthly report.docx” in this case. However, because the file name has a space in it, the program will insert the Unicode for a space, which is “%20”. (Note: Unicode was discussed in Document Preparation.) Notice that the icon displays the file name with the “%20” where the space was located. This is a quirk of the program that cannot be avoided.

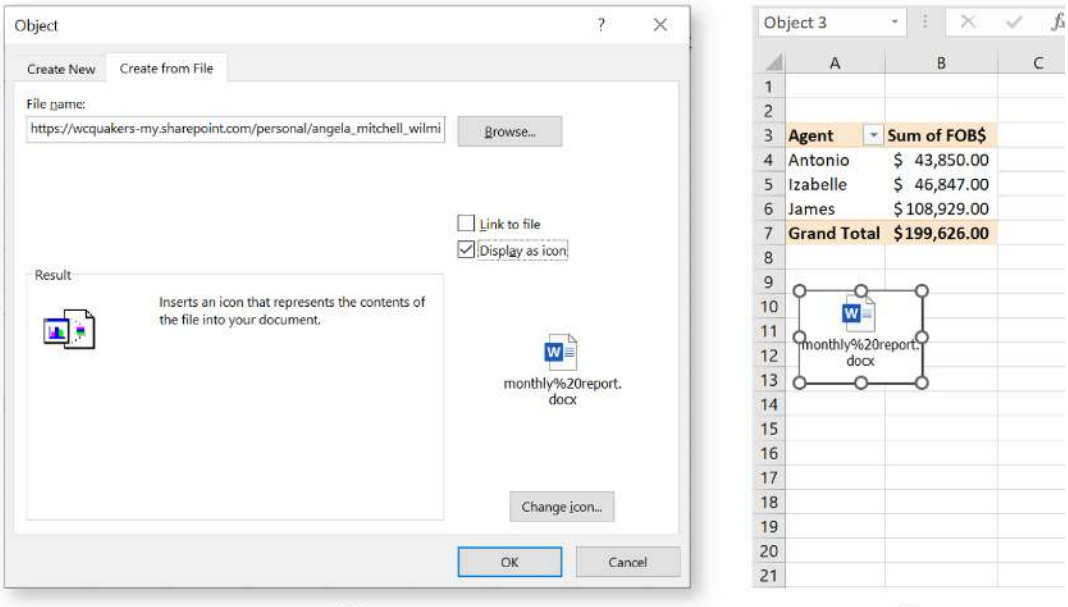


Figure 15.17: (a) Make sure there is a check in the Display as icon box if you want to insert an icon rather than the actual text in the Word file. (b) The icon appears much smaller than the embedded memo content. The Word icon makes it clear that the file is a Word document. (Used with permission from Microsoft)

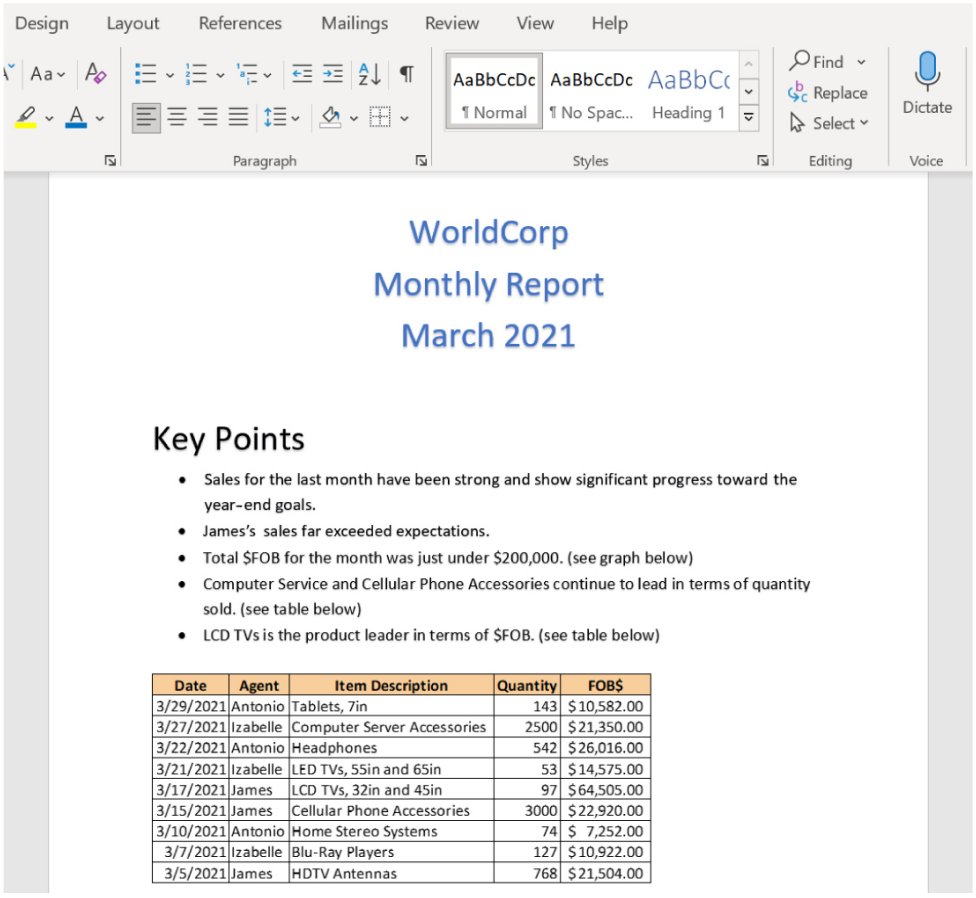
Finally, you can choose to link the Word document and the Excel spreadsheet using the Link to File option. This provides a dynamic link to the file so that any changes made in the Word file will also be reflected in the Excel file. To insert a link to the file, tick the checkbox, Link to File, and click OK. Generally speaking, providing a link is the preferred option unless you are certain that the source file is not going to change. However, remember that if the file path (where the source file is saved on your computer or in your cloud drive) changes, you will need to insert the link again into your Excel worksheet.

Integrating Microsoft Excel Worksheets into Microsoft Word Documents

Now we look at integrating an Excel file into Word. This is quite common in organizations when preparing summary reports that include data. Excel is used to summarize, analyze, and prepare visuals such as charts of the data. Word is then used to provide some textual context and additional information. We follow steps similar to those that have previously been discussed for integrating Excel worksheets into Word documents.

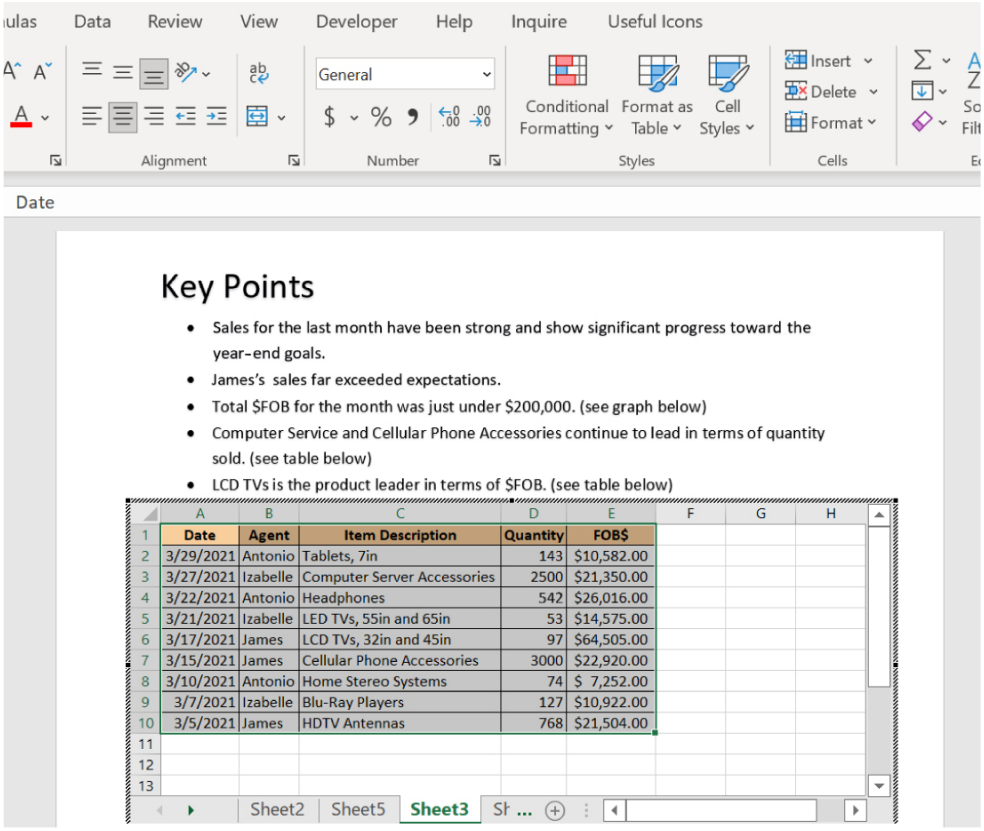
Let’s go back to the WorldCorp Monthly Report example. The management team would like to include information from the sales department in their monthly report. The monthly report is created in Word and ideally would include some text, the data tables, and any charts or graphs that help summarize the data. The report is distributed to all members of the management team to keep them updated on the company’s progress toward year-end goals. You want to include the data from the Excel worksheet in the document.

We start by embedding the summary table from the March sales data in the Excel file into the monthly report file created in Word. First, open the Word document and determine where you would like to display the Excel information. The information will be embedded at the cursor location in the Word file. Go to the Insert tab, then the Text command group, then Object. Follow the same procedure we used previously. The Excel data will insert as a clean table into your Word document (Figure 15.18). If your Excel file has multiple worksheets, you will have to double-click on the table to see those other worksheets. You can also use this double-click functionality to access the Excel data and edit it directly in Word (Figure 15.19). Remember, the Excel file must not be open when using the Insert Object tool. Also remember that you are embedding this into the Word document. If any information in the source file (the Excel file) changes, it will not be updated in the Word file.



Date	Agent	Item Description	Quantity	FOB$
3/29/2021	Antonio	Tablets, 7in	143	$10,582.00
3/27/2021	Izabelle	Computer Server Accessories	2500	$21,350.00
3/22/2021	Antonio	Headphones	542	$26,016.00
3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$14,575.00
3/17/2021	James	LCD TVs, 32in and 45in	97	$64,505.00
3/15/2021	James	Cellular Phone Accessories	3000	$22,920.00
3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00
3/7/2021	Izabelle	Blu-Ray Players	127	$10,922.00
3/5/2021	James	HDTV Antennas	768	$21,504.00

Figure 15.18: The table from the current worksheet in the Excel file will be embedded into the Word document. (Used with permission from Microsoft)



	A	B	C	D	E	F	G	H
1	Date	Agent	Item Description	Quantity	FOB$			
2	3/29/2021	Antonio	Tablets, 7in	143	$10,582.00			
3	3/27/2021	Izabelle	Computer Server Accessories	2500	$21,350.00			
4	3/22/2021	Antonio	Headphones	542	$26,016.00			
5	3/21/2021	Izabelle	LED TVs, 55in and 65in	53	$14,575.00			
6	3/17/2021	James	LCD TVs, 32in and 45in	97	$64,505.00			
7	3/15/2021	James	Cellular Phone Accessories	3000	$22,920.00			
8	3/10/2021	Antonio	Home Stereo Systems	74	$ 7,252.00			
9	3/7/2021	Izabelle	Blu-Ray Players	127	$10,922.00			
10	3/5/2021	James	HDTV Antennas	768	$21,504.00			
11								
12								
13								

Figure 15.19: Double-clicking on

the table will give you Excel functionality to make changes to the table. You can also see the other tabs when you do this. (Used with permission from Microsoft)

At this point, the report is still a draft, so you anticipate changes to the data. You want to be sure that the report reflects accurate information when it is distributed, so you would like to replace the embedded information with a link. Linking to the Excel file means that information that is changed in the source Excel file will also be updated in the Word file. Choose the Link to File option to create the connection between the two files of different types. Visually, the result will look the same in the Word document, but any changes that are made to the source will be automatically reflected in the table in the Word document. Double-clicking on the table will open a new Excel window of the source file. Finally, you again have the option to include an icon instead of the actual table.

Another available method for inserting Excel content into a Word document is to use the Insert tab to place an Excel workbook into a Word file, allowing you to work in that interface as you normally would in Excel. To do this, go to the Insert tab, then select the Table drop-down menu and choose Excel Spreadsheet, as shown in Figure 15.20a. A blank Excel object will appear in Word, as shown in Figure 15.20b. (Note that this option is not available to Mac users.) You can then paste the copied table onto this blank document or add new data and create the table. This table will not be linked. This method gives you the same functionality for sizing columns, sorting, and inserting formulas as you would have in Excel. The Excel worksheet is simply placed inside the Word file. Keep in mind that when you choose this option, the Excel file you create inside the Word document does not stand alone but becomes part of the Word file. Therefore, to make changes to the Excel spreadsheet, you need to access the Word file. As a result, this option is not very practical if you need to create a large dataset. You might need to make changes to the Excel file, and working in Excel as an object in a Word file can be cumbersome. However, it can be useful as a quick and easy way of providing others with access to Excel data without sending multiple files.

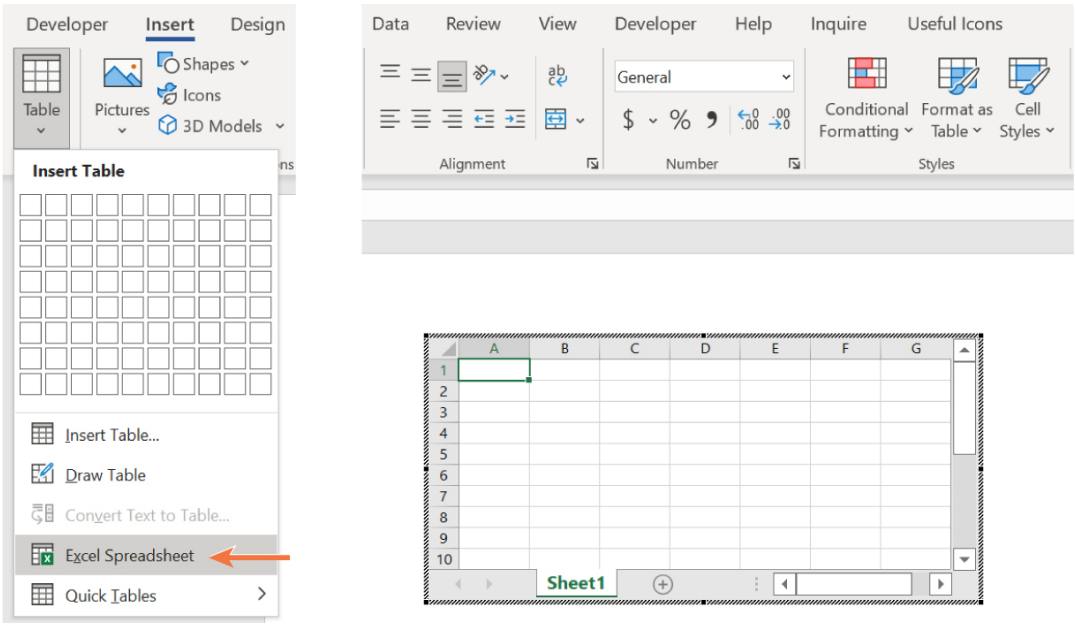


Figure 15.20: (a) You can insert an Excel spreadsheet as an object in a Word file. This option is under the Insert Table drop-down, rather than the Insert Object drop-down menu. (b) You will now have an Excel window within the Word document that you can use to add data, make charts, and calculate formulas. (Used with permission from Microsoft)

Finally, you can always copy and paste Excel information into the Word file. To do this, go to the Paste drop-down menu, accessible from the Home tab. This drop-down menu gives you six options, as seen in Figure 15.21.

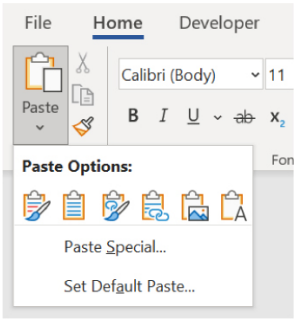


Figure 15.21: When copying an Excel table to be inserted into a Word document, you have several options for pasting the table into the document. (Used with permission from Microsoft)

You begin by selecting a table in the worksheet in Excel and copying it with Ctrl+C or by using the Copy tool from the Home tab. Then head to Word to paste the table into the document file. The table shown lists the different options for pasting the Excel information into the Word file Figure 15.22.

Icon						
Callout text	Keep Source Formatting	Use Destination Styles	Link & Keep Source Formatting	Link & Use Destination Styles	Picture	Text only
Explanation	This choice will copy the Excel table, unlinked, and will use the original formatting of the table.	This choice will copy the table, unlinked, and will use the Word formatting. Since there is no theme or styles in the Word file, the formatting is simple, with no cell fill colors.	This is essentially the same as the first command, "Keep source formatting," except that it is linked. It will keep the original formatting, and it will be updated if the original Excel file changes. It is not an embedded object.	This is essentially the same as the second command, "Use destination styles," except that it is linked. It will keep the Word file's formatting, and it will be updated if the original Excel file changes. It is not an embedded object.	This will convert the table into a screen capture, and it will be the most exact copy of the original, in regard to formatting. It is not linked to the original Excel file. It is also not editable.	This will paste only the text from the table, with no lines, formatting, table borders, or cells. It will simply appear as text.

Figure 15.22: There are six copy-and-paste methods you can use when importing from Excel. Each one will result in a different appearance on the page. (Used with permission from Microsoft)

Let's look at an example of each copy-and-paste option. Figure 15.23 shows an example Excel table, as it appears in Excel. Notice the differences between the copy-and-paste options; you may have to adjust the Excel table to get it to look the way it is supposed to.

A1 | Model

	A	B	C	D	E	F
1	Model	Price	Cost	Margin	Volume Sold	Marginal Profit
2	32" LCD #E-900s	$170.00	85.00	85.00	8752	$ 743,920.00
3	45" LCD #E-900m	$380.00	183.20	196.80	10563	$2,078,798.40
4	55" LED #E-900l	$550.00	253.70	296.30	9543	$2,827,590.90
5	65" LED #E-900xl	$780.00	343.20	436.80	4326	$1,889,596.80
6				Total		$7,539,906.10

Figure 15.23: Notice the formatting of the original Excel table. The cells are a certain width, and the text is aligned in a certain way in each cell. You will see some differences once you copy and paste this data into Word. (Used with permission from Microsoft)

For example, using the Keep Source Formatting option (Figure 15.24) keeps the font and cell background colors, but you will need to adjust some of the column widths to display the dollar values correctly. Note that the option Link & Keep Source Formatting will appear the same, except that the data will be a link, not an embedded object.

Model	Price	Cost	Margin	Volume Sold	Marginal Profit
32" LCD #E-900s	$ 170.00	85.00	85.00	8752	$ 743,920.00
45" LCD #E-900m	$ 380.00	183.20	196.80	10563	$ 2,078,798.40
55" LED #E-900l	$ 550.00	253.70	296.30	9543	$ 2,827,590.90
65" LED #E-900xl	$ 780.00	343.20	436.80	4326	$ 1,889,596.80
			Total		$ 7,539,906.10

(Ctrl)

Figure 15.24: Notice that the “Price” and “Marginal Profit” columns are not wide enough to fit the whole amount on one line, which makes it hard to read. You will need to manually adjust the column widths. (Used with permission from Microsoft)

In Figure 15.25, you can see the result of the Use Destination Styles option. In this case, our “destination style” is the style of the Word document we are pasting into, which of course does not contain any cell background colors or special formatting. As a result, you will lose some of the formatting, such as the blue fill color. Note that the option Link & Use Destination Styles will appear the same except that the data will be a link, not an embedded object.

Model	Price	Cost	Margin	Volume Sold	Marginal Profit
32" LCD #E-900s	$ 170.00	85.00	85.00	8752	$ 743,920.00
45" LCD #E-900m	$ 380.00	183.20	196.80	10563	$ 2,078,798.40
55" LED #E-900l	$ 550.00	253.70	296.30	9543	$ 2,827,590.90
65" LED #E-900xl	$ 780.00	343.20	436.80	4326	$ 1,889,596.80
		Total			$ 7,539,906.10

(Ctrl)

Figure 15.25: The Use Destination Styles option can be useful if you want the Excel data to match the rest of the Word document, instead of maintaining its original formatting. (Used with permission from Microsoft)

The option to copy and paste the Excel data as a Picture will result in the cleanest appearance (see Figure 15.26). The inserted picture will appear exactly how the original Excel table appears; note that there are no issues with the column widths or the cell background color. However, the picture is static and cannot be edited.

Model	Price	Cost	Margin	Volume Sold	Marginal Profit
32" LCD #E-900s	$170.00	85.00	85.00	8752	$ 743,920.00
45" LCD #E-900m	$380.00	183.20	196.80	10563	$2,078,798.40
55" LED #E-900l	$550.00	253.70	296.30	9543	$2,827,590.90
65" LED #E-900xl	$780.00	343.20	436.80	4326	$1,889,596.80
			Total		$7,539,906.10

Figure 15.26: The option to copy and paste the Excel data as a picture results in a snapshot of the Excel table that can be resized and modified like an image. (Used with permission from Microsoft)

Last, there is the Text Only copy-and-paste option. This option is exactly as it sounds: it pastes only the text of the Excel table and does not include any formatting, cell borders, or background colors. The issue with this is that much information in Excel is represented in cell format, so once the cell borders are gone, it becomes difficult to parse the information. You can see in Figure 15.27 how difficult this is to read. This option is useful only when you need to strip out all formatting and manipulate the text on its own.

Model Price Cost Margin Volume Sold Marginal Profit

32" LCD #E-900s $170.00 85.00 85.00 8752 $743,920.00

45" LCD #E-900m $380.00 183.20 196.80 10563 $2,078,798.40

55" LED #E-900l $550.00 253.70 296.30 9543 $2,827,590.90

65" LED #E-900xl $780.00 343.20 436.80 4326 $1,889,596.80

Total $7,539,906.10

(Ctrl)

Figure 15.27: The Text Only option typically results in unreadable text, as the columns are no longer aligned, and it is not clear how the information should be parsed. (Used with permission from Microsoft)

You also have the option to use the Paste Special tool and choose the Object Linking and Embedding (OLE) option. Paste Special gives you some options in addition to the shortcuts shown as icons on the drop-down menu. (Several of the options we already discussed are included in the list as well.) Go to the same Paste drop-down command (in Figure 15.21), but this time choose Paste Special. This will open a new dialog box that will give you additional choices, as seen in Figure 15.28. Select the first option, Microsoft Excel Worksheet Object. If you have Paste selected (on the left side of the dialog box), the OLE Excel object will not be linked to the original, meaning that it will be static; it will not update if the original file changes. If you have Paste link selected, the object will look the same, but it will be updated if the original file changes. Both options will result in a similar image; however, the Paste link option will simply result in a linked file. You can see the result in Figure 15.29.

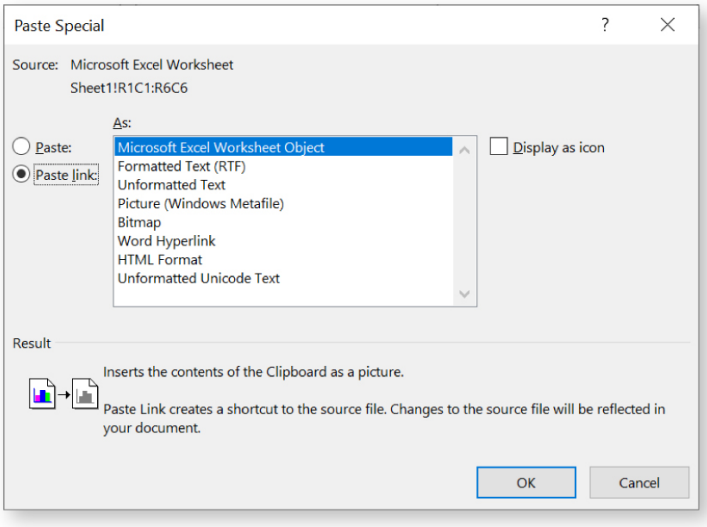
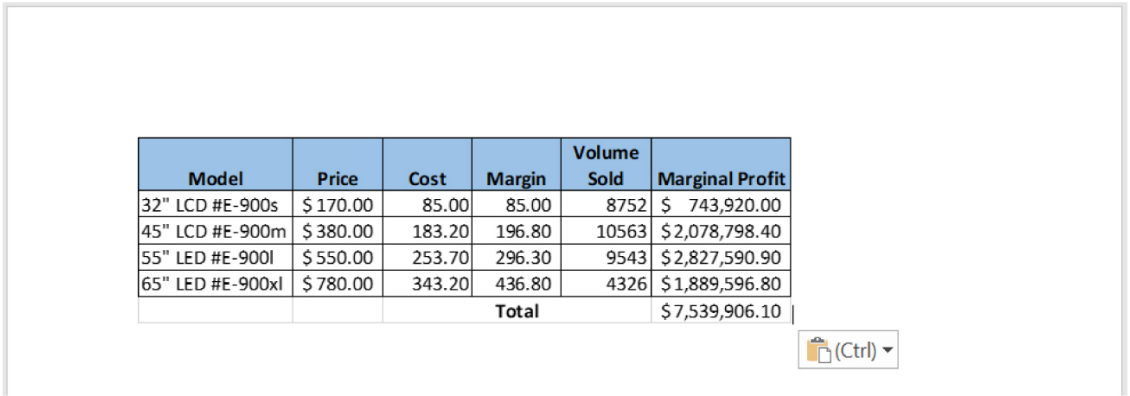


Figure 15.28: The Paste Special tool has additional options beyond the shortcuts in the Paste menu. (Used with permission from Microsoft)



Model	Price	Cost	Margin	Volume Sold	Marginal Profit
32" LCD #E-900s	$ 170.00	85.00	85.00	8752	$ 743,920.00
45" LCD #E-900m	$ 380.00	183.20	196.80	10563	$2,078,798.40
55" LED #E-900l	$ 550.00	253.70	296.30	9543	$2,827,590.90
65" LED #E-900xl	$ 780.00	343.20	436.80	4326	$1,889,596.80
			Total		$7,539,906.10

Figure 15.29: You can embed or link an Excel table to your Word document using the Paste Special tool, just like you can with the Insert Object tool. (Used with permission from Microsoft)

Inserting Microsoft Excel Charts into Microsoft Word Documents

To integrate charts into Word documents, you simply follow the same procedure as outlined previously for inserting objects. Here, we are looking at ways to directly integrate the two file types rather than simply copying and pasting the information from one to

the other. The concepts in this chapter are particularly useful when collaborating with others on workbooks or documents. Multiple users can make changes to either file, or those with access to files will see those changes in real time.

There are a few options when integrating Excel charts into Word documents, all of which use the same methods for inserting that you already learned in this section. You can include the chart as a picture, or you can choose to embed or link the chart into the Word document. Finally, if you also want to include the Excel data along with the chart, you can use the Insert Object tool. However, if you just want to include the chart and not the spreadsheet data, linking or embedding will be the best option.

Think about the differences between linking and embedding when you determine which option is appropriate. Let's look at the same example of the sales data broken down by agent (refer to Figure 15.11). What do we do if we only want to include the chart in a Word document, and not the PivotTable?

First, we copy the chart. Then we open our Word document—the Monthly Report—and determine where we would like to include the chart in the file. In this example, let's include the chart below the table of data we integrated in the previous section. Be sure to have the cursor at the location where you want the chart to be placed. Use the Paste Special function on the Home tab to either link or embed the chart into the Word file, selecting "Microsoft Excel Chart Object," similar to what we did in Figure 15.28. See Figure 15.30 to see the different options that appear in this dialog box when you have a chart as your source file.

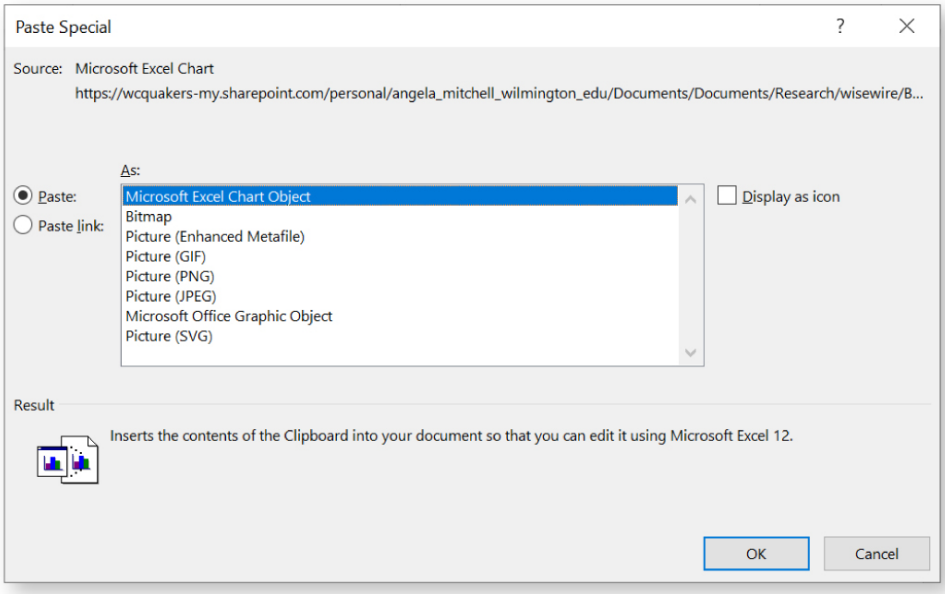


Figure 15.30: You have the option to Display as icon rather than including the actual chart. (Used with permission from Microsoft)

To embed the chart, choose Microsoft Excel Chart Object and click OK. If you would prefer to link the chart, choose Microsoft Excel Chart Object and check the option Paste link. This will establish the link rather than embedding the chart. The final chart should appear as it does in Excel and may need to be resized to fit on your Word page (Figure 15.31).

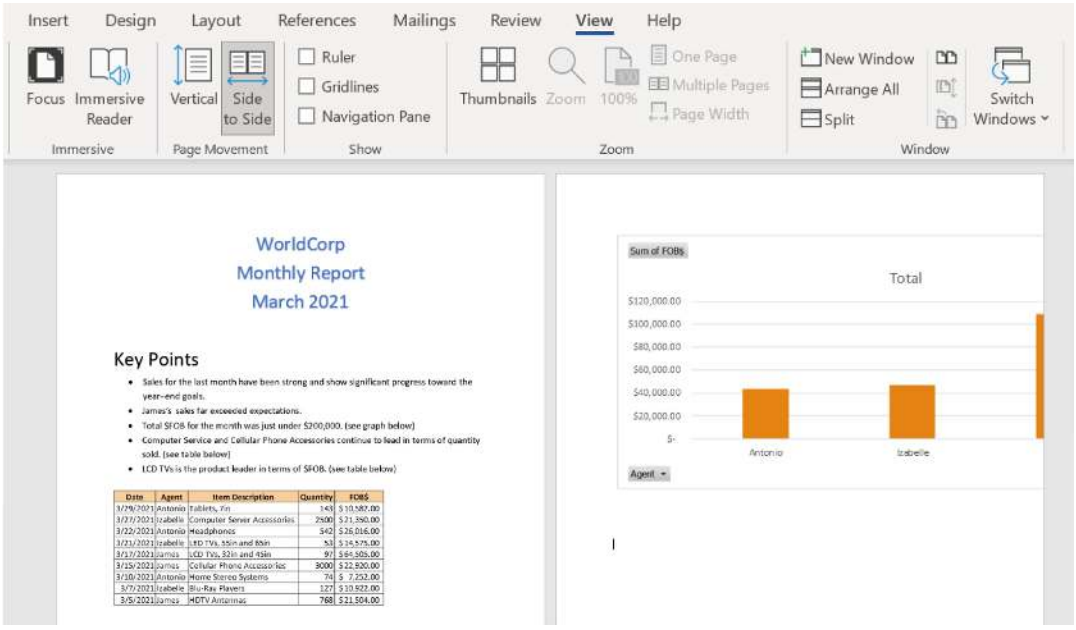


Figure 15.31: You will likely need to resize the chart when embedding it into the Word document. You can do this by simply grabbing one of the corners of the chart and dragging it to where you would like it to be, as you would with an image. (Used with permission from Microsoft)

If you linked the chart to your Word document, the chart should automatically update when you alter the source data in the original Excel file. Let's walk through an example of changing information in the Excel file to see how this affects the chart. We will change Izabelle's Sum of FOB$ from the current value of $46,847 to a new value of $26,847 (Figure 15.32).

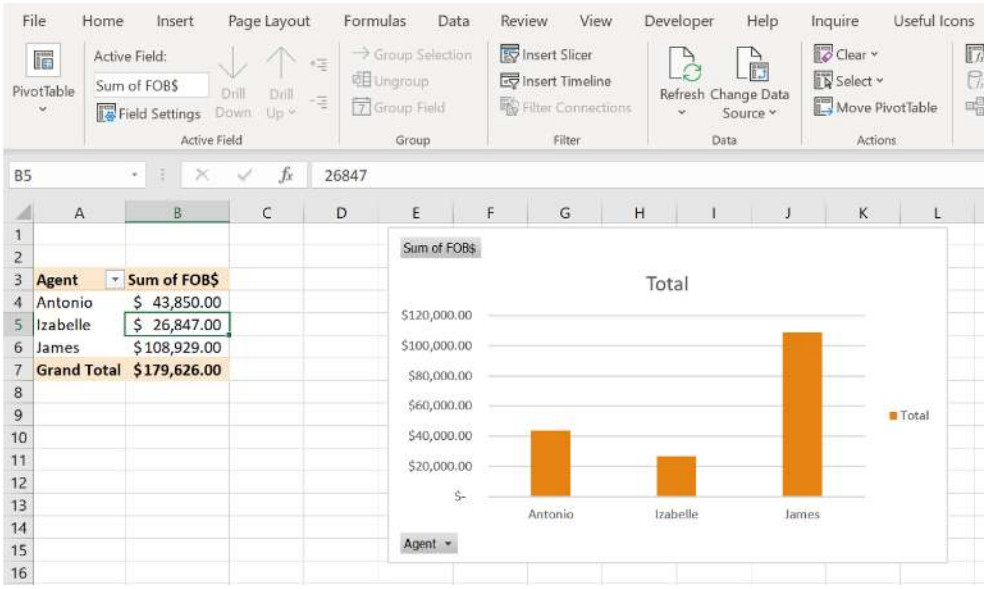


Figure 15.32: This is the PivotTable and chart as they appear in the Excel source file. Notice the chart reflects the decrease in Izabelle's FOB$. (Used with permission from Microsoft)

When you open the Monthly Report Word file again, these values will be automatically updated in the chart. You will be presented with a window asking if you would like to update the linked information. Choose Yes to update the linked Excel chart. As an alternative, if you are already working in the Word file, you can right-click on the chart and choose Update Link to automatically update the chart with the new Excel chart, as Figure 15.33 shows.

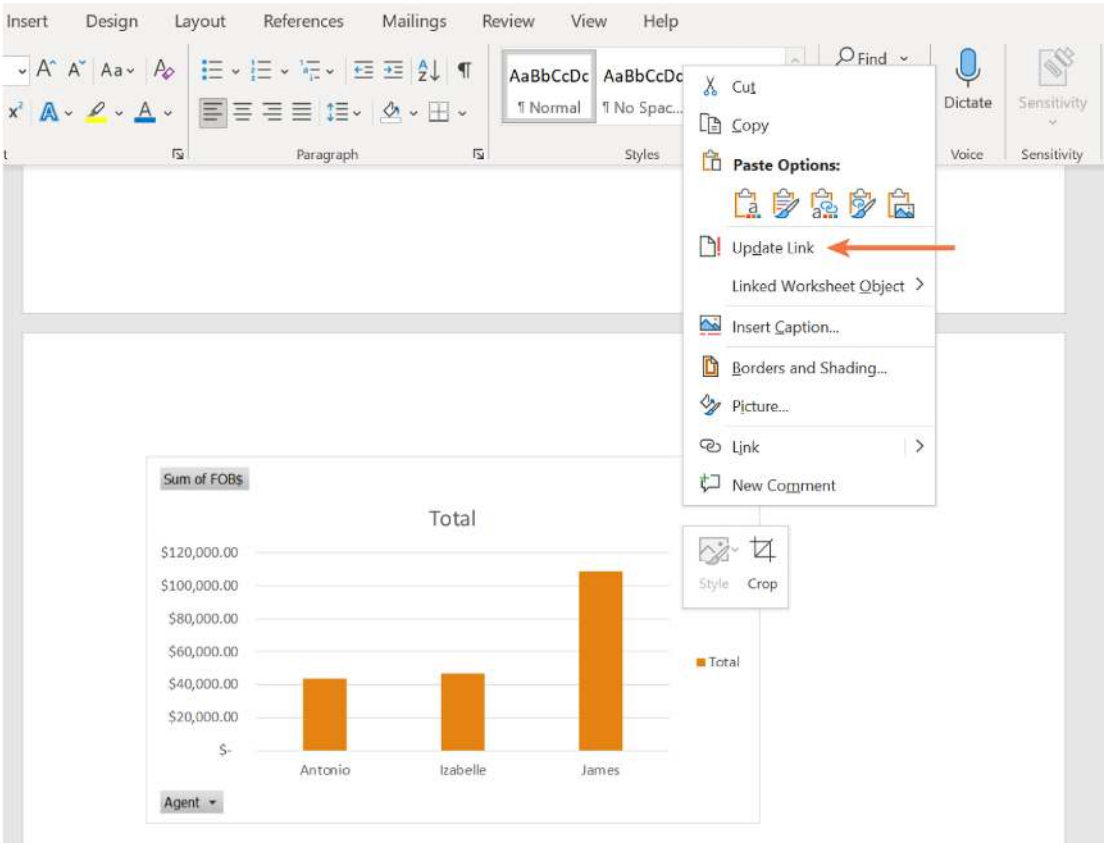


Figure 15.33: If you already have the Word file open, you can update the link by right-clicking on the chart and choosing Update Link. Notice that the chart is now updated to reflect the decrease in Izabelle's FOB$. (Used with permission from Microsoft)

Embed Microsoft Access Data into Microsoft Word Documents

The process for importing data from Access is similar to what we just did with Excel. You can use the classic copy and paste, or you can choose Paste Special options. You can also add exported data from Access to Word. Because Access files can be very lengthy databases, it may not always make sense to integrate them with Word files. In some cases, however, you may want to integrate these files. For example, you may want to integrate an Access database into a Word document to make it easier to print customer lists or product sales in a full document. You also may want to use portions of a database to create mailing labels or product summary cards for sales personnel.

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9.5: Microsoft Excel and Microsoft PowerPoint Integration

This page is a draft and is under active development.

Learning Objectives

By the end of this section, you will be able to:

- Add PowerPoint slides to Excel worksheets
- Incorporate Excel worksheets into PowerPoint slides
- Integrate Excel charts into PowerPoint slides

WorldCorp shares information in a variety of ways and with multiple audiences. Integrating Excel and PowerPoint data is simply another way of presenting information to others in a streamlined format, often eliminating the need for sending multiple files. For example, you may need to share some key financial data with an external stakeholder, but you only wish to share some of that data as well as provide some context for it. A PowerPoint presentation that includes Excel charts and data tables can be a useful and visually interesting way of sharing this type of information. Using many of the same approaches covered in earlier sections, integrating Excel and PowerPoint is quite simple.

Add Microsoft PowerPoint Slides to Microsoft Excel Worksheets

The accounting department at WorldCorp has prepared a summary of recent transactions and saved that information in an Excel file. They also created a short PowerPoint presentation to explain the data and analysis. A formal meeting will not be held, but the department felt that including the presentation as part of the spreadsheet would be helpful when distributing the information to other departments. The presentation and Excel files have been created, but now we need to integrate the presentation into the Excel file so that it can be distributed to others.

The workbook is arranged into three sheets, with the first sheet being a brief summary of the data (Figure 15.40). We will integrate the PowerPoint file on the summary sheet. The first step is to select a cell where the slides will be integrated into Excel. We selected cell F1.

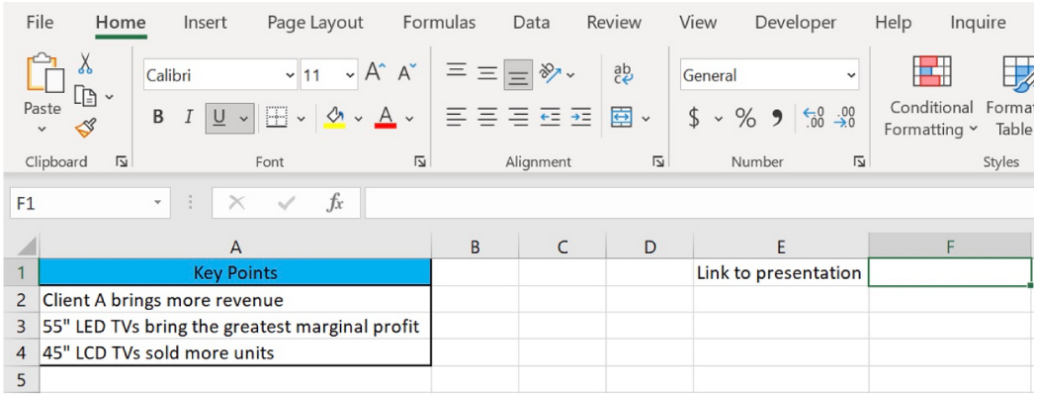


Figure 15.40: It is helpful to include a statement indicating that the presentation is linked. This helps users understand what they are looking at. (Used with permission from Microsoft)

As with other applications, you can either embed or link the file in Excel. Be aware that embedding the slideshow file, which makes it a part of the Excel file, can increase the size of the file considerably, especially if your presentation includes many graphics. You should have no problems sharing such a file via OneDrive, but you may experience some challenges if you need to email the large file to others, as some email systems restrict the size of files you can attach and send. Instead, you may want to choose linking, which simply establishes the connection between the two files. Let's link the PowerPoint to our Excel file and display it as an icon rather than an image of the first slide in the slideshow.

We follow a similar path as in previous examples: Insert tab, then Text command group, then Object (Figure 15.41).

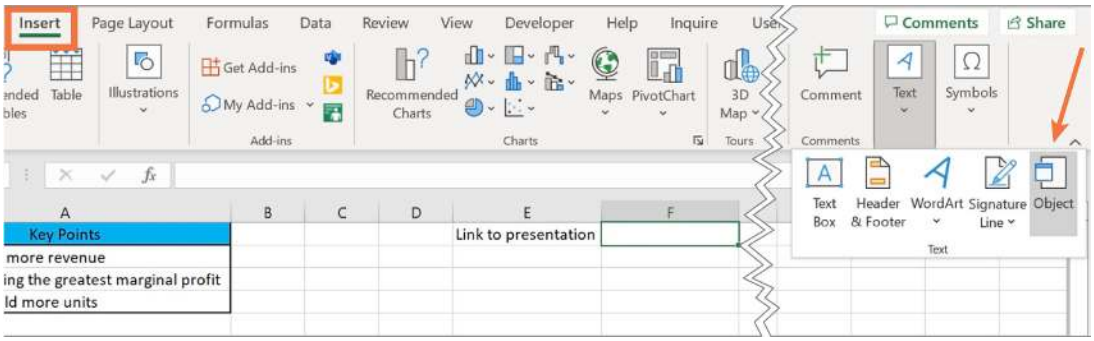


Figure 15.41: In Excel, the text command group is all the way on the right side of the ribbon. (Used with permission from Microsoft)

In the Insert Object dialog window that appears, select Create from File and find the PowerPoint file name (in this case, AccountingReport.pptx). Be sure to select Link to File and Display as Icon, then click OK (Figure 15.42). The icon that was displayed in the Insert Object window will be inserted into cell F1. You can resize and move the icon if desired. Also remember, you can change the icon to a different picture by clicking Change Icon. You can access the PowerPoint presentation by either double-clicking on the icon or right-clicking and choosing one of the options listed.

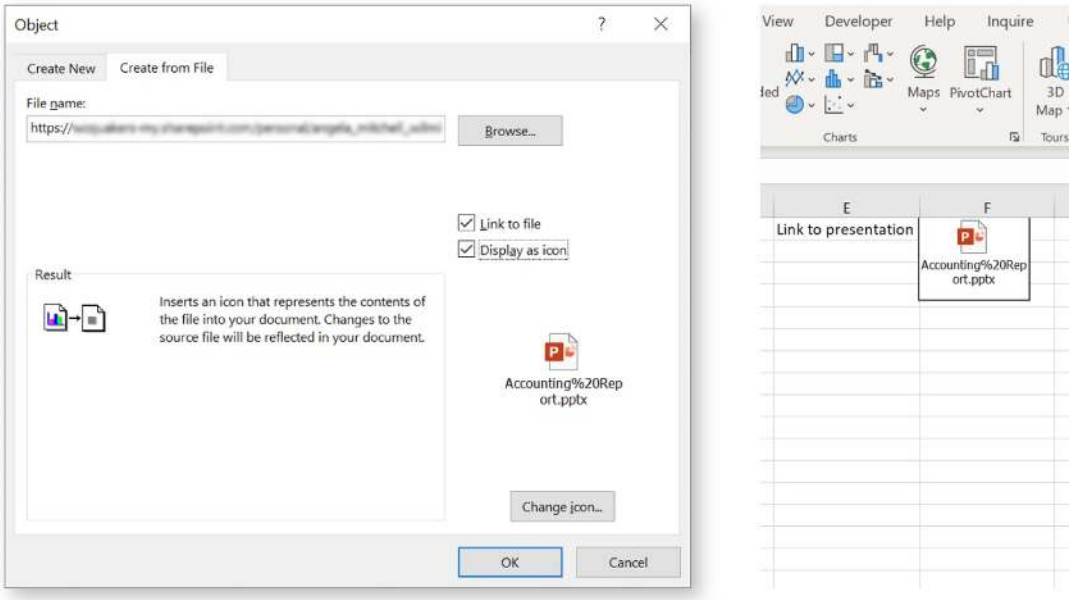


Figure 15.42: (a) To embed the PowerPoint file, click the Link to file box. (b) The icon clearly indicates that the file is a PowerPoint file. It uses the standard PowerPoint red color and shows the letter “P” so that users know what kind of file they are opening. (Used with permission from Microsoft)

Remember the shortcut on the Insert tab for linking a file. If you choose this option, you will get a drop-down list of the files you used most recently. You can also Browse to find the file you want to link by choosing Insert Link from the bottom of the drop-down list. When you click on the file name, a link with the name of the file will be inserted into the cell, as Figure 15.43 shows. You do not have an option to embed or display as an icon. Instead, the file name (Accounting Report) will be displayed. When you click on the link, the PowerPoint file will be opened in the PowerPoint application rather than within the Excel worksheet environment.

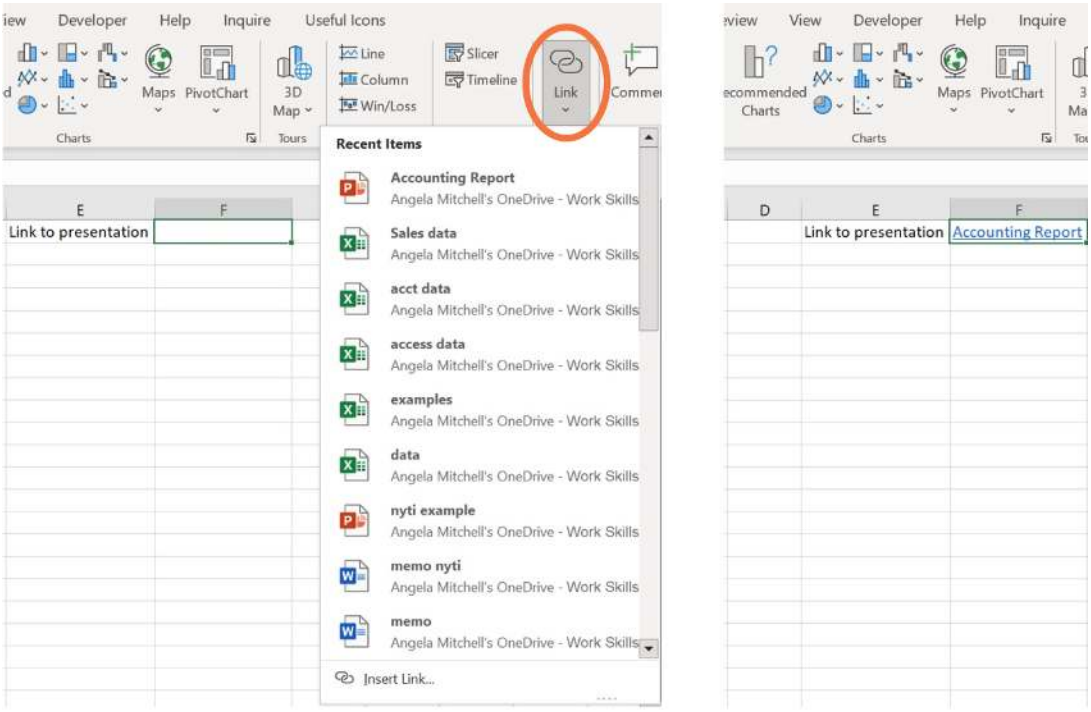


Figure 15.43: (a) If the file you want to link is not in the Recent list, you can browse to find it. (b) Click on the link to access the PowerPoint file. (Used with permission from Microsoft)

Incorporate Microsoft Excel Worksheets into Microsoft PowerPoint Slides

Recall that you can use copy and paste to insert individual tables or charts into slides. Here we discuss going a bit further than simply copying and pasting. We are integrating the entire Excel file or specific parts of the Excel file into another application. We do this by either linking or embedding.

First, let us look at linking or embedding the entire Excel file into the PowerPoint file. To begin, open the slideshow file; in this example, it is called AccountingReport.pptx. The accounting department would like the recipients of the slideshow to also have access to the actual data file. This will enable the recipients to do their own data analysis. Choose the location to include the embedded or linked object in the presentation. In this example, let's include an embedded object on the last slide and display it as an icon (see Figure 15.44). Click on the slide where you would like to insert the Excel object and complete the usual steps for inserting an object. The icon will then appear on the slide (Figure 15.45). It may be helpful to give the user some text indicating whether the Excel file is linked or embedded.

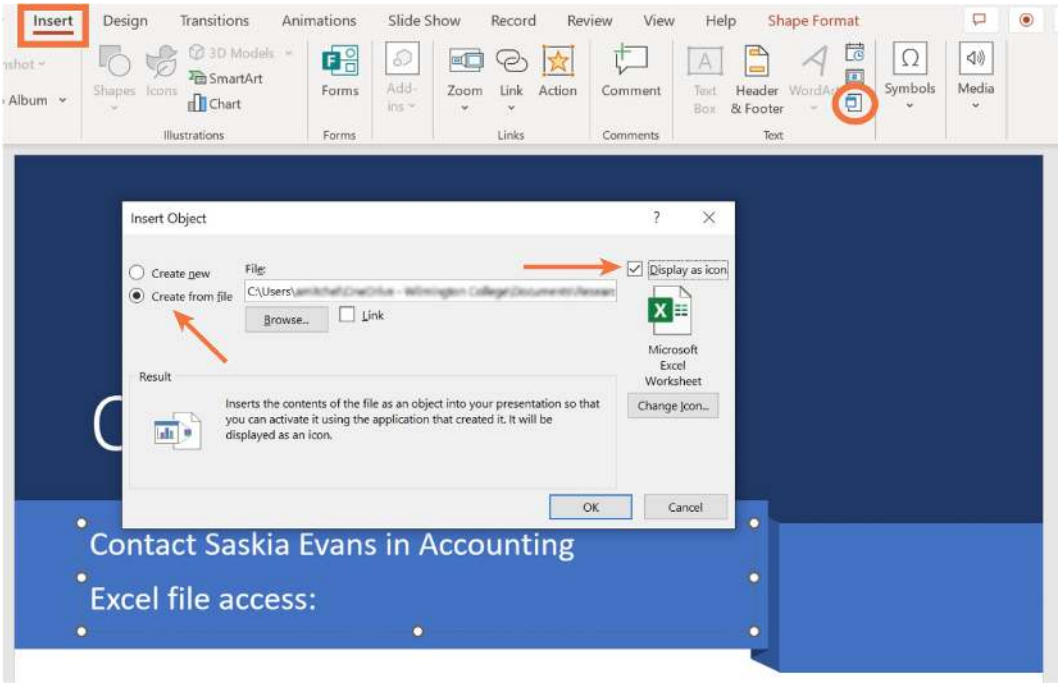


Figure 15.44: Note that we added a text box to the bottom of the last slide, explaining who to contact with questions and showing exactly where the linked icon will be. (Used with permission from Microsoft)

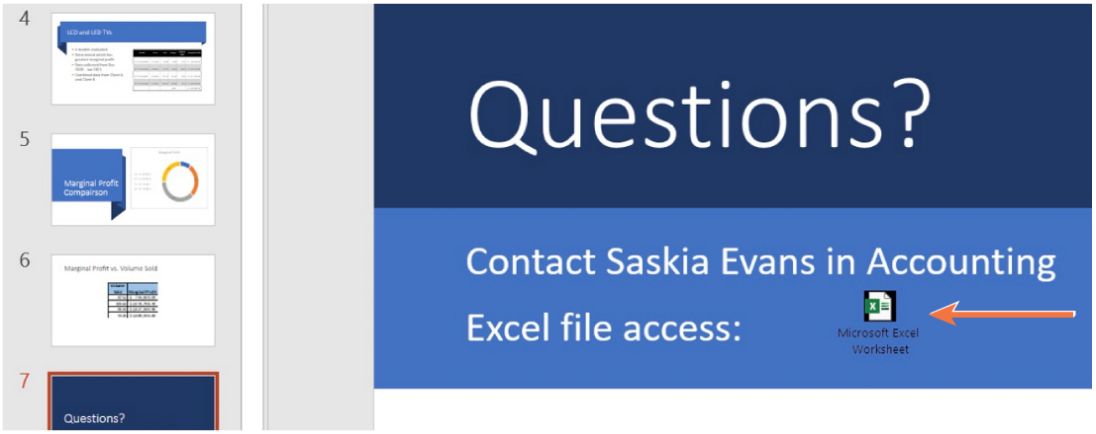


Figure 15.45: You can move and resize the icon if desired. (Used with permission from Microsoft)

To access the Excel file, double-click on the icon and the file will open in Excel. You can also right-click on the icon and choose Worksheet Object and then Open.

Just as in Excel, there is a shortcut on the Insert tab to link a file directly. The file will be linked with the file name displayed as in the example covered earlier in the chapter. Choose the drop-down menu from Link on the Insert tab to see a list of the most recent files. Remember, you can also browse for files, choosing the option at the bottom of the drop-down menu. When the file is linked in your slideshow, the font color will be light blue—a default setting in Office for indicating a linked file. It is possible that this color may not work well with your slide design, as you can see in Figure 15.46. In that case, simply select the file name text and change the font color and/or size to meet your needs. Refer to previous chapters to review the process for changing font colors, styles, and size in PowerPoint.

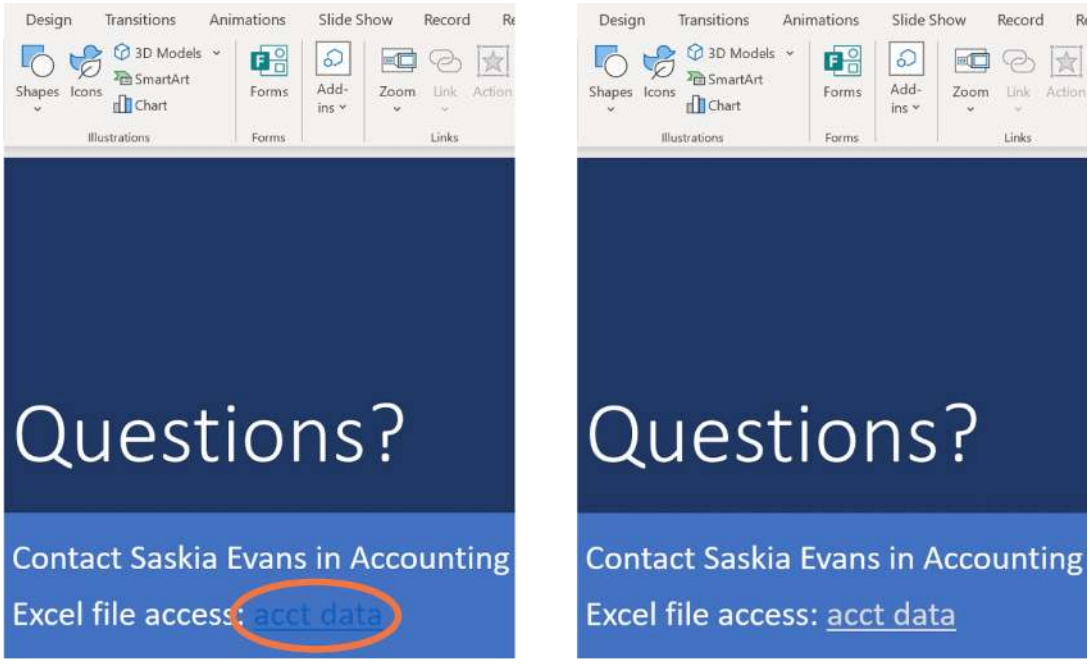


Figure 15.46: (a) The default for inserted file links is a light blue font with underlining. (b) You can change the font size and color to make it more visible against the blue background. (Used with permission from Microsoft)

If you would like to link only some of the information contained in the Excel file, you will need to use the Paste Special approach. You can also use the standard copy-and-paste approach, but this may alter the formatting or will not be updated if you make changes to the table. Therefore, using Paste Special is a better approach as it offers you more options for preserving formatting. One thing to note is that the columns/rows must be adjacent to each other when making your selection; you cannot copy rows or columns that are noncontiguous (not immediately adjacent to each other).

For this example, let's link only the Volume Sold and Marginal Profit columns to our PowerPoint slide. First select the two columns you want to link, then copy those columns using either the Copy icon on the Home tab or right-click, then Copy (Figure 15.47). Determine where in the slideshow you would like the link to the Excel information to appear (Figure 15.48). Then choose Paste Special from the Paste options in the Clipboard command group. Choose Paste Link and click OK. The two columns are now linked in the PowerPoint file and should appear neatly, with their formatting preserved, on your slide (Figure 15.49).

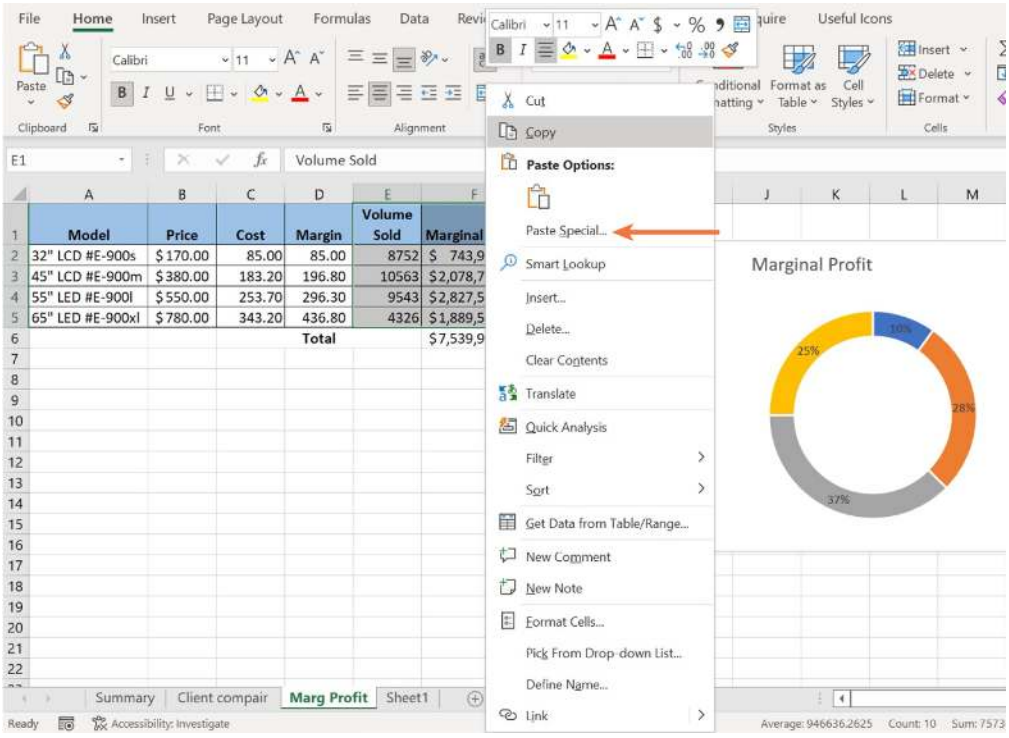


Figure 15.47: You need to first manually select and copy the cells you wish to link or embed into the PowerPoint file. (Used with permission from Microsoft)

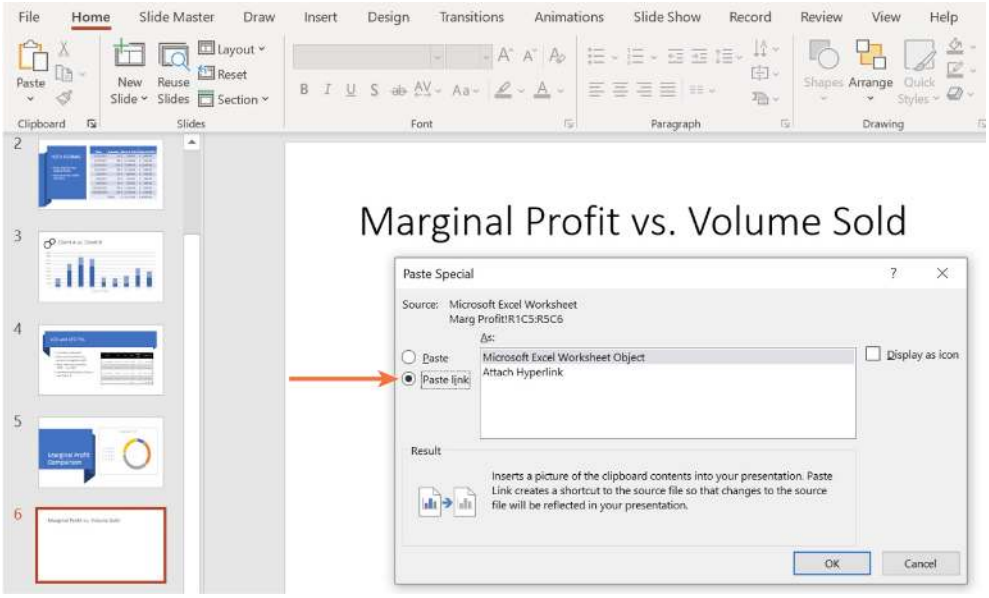


Figure 15.48: Notice that the slide we want the link to appear in is selected in the lefthand thumbnail pane. (Used with permission from Microsoft)

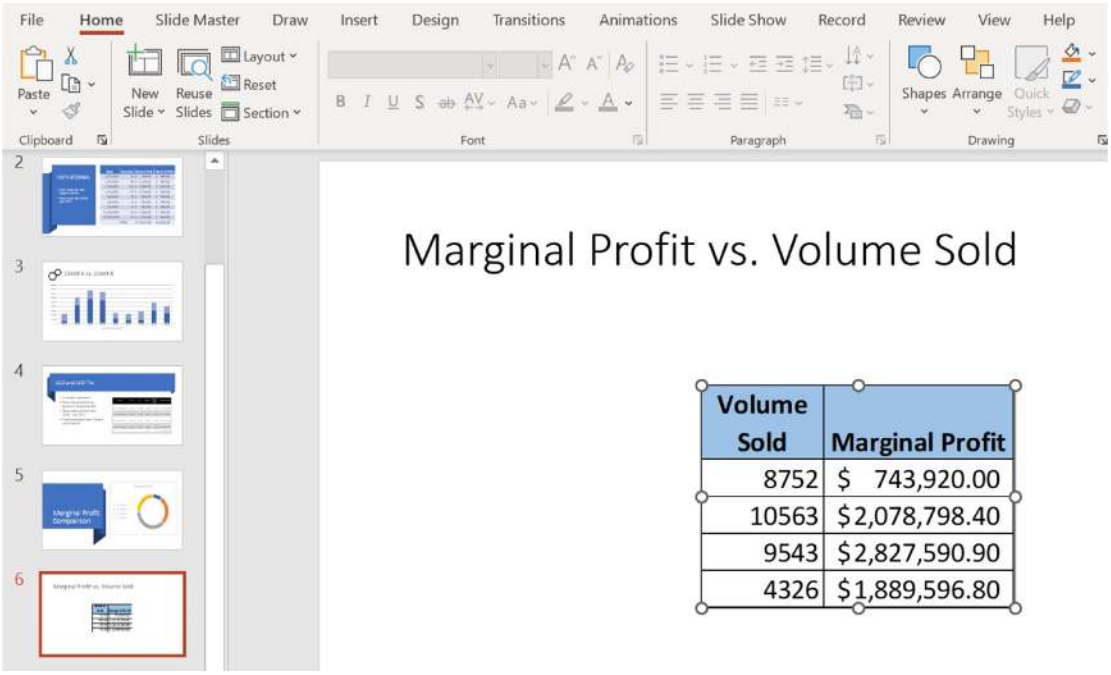


Figure 15.49: You can resize and reposition the table if desired. (Used with permission from Microsoft)

Integrate Microsoft Excel Charts into Microsoft PowerPoint Slides

Integrating Excel charts into PowerPoint slides is similar to the process of selecting and integrating parts of a table. You will use the Copy, then Paste Special approach to either link or embed charts into the PowerPoint slideshow. Returning to our example slideshow, let's embed the Marginal Profit donut chart in the PowerPoint file. First go to the Excel file and select the chart you wish to integrate. Then copy the chart using one of the two approaches for copying information: right-click, then copy; or select Copy from the Home tab. Determine the placement of the chart in the PowerPoint slide. Then, from the Home tab, select Paste, then Paste Special.

Notice there are several options for integrating the chart into the slide, as Figure 15.50 shows. We choose to embed the chart as a Microsoft Excel Chart Object to integrate the information. The other options, many of which allow you to insert the chart as if it were an image (e.g., the JPEG and PNG file formats), will not embed or link. They will simply place a copy of the Excel chart into the file (see Figure 15.51). Then click OK. The image can then be resized like usual.

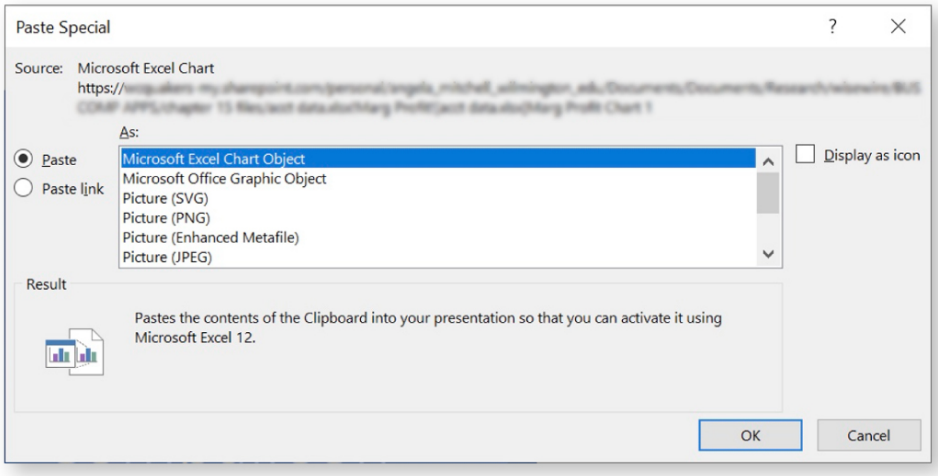


Figure 15.50: The file path for the copied information is at the top of the Paste Special window. (Used with permission from Microsoft)

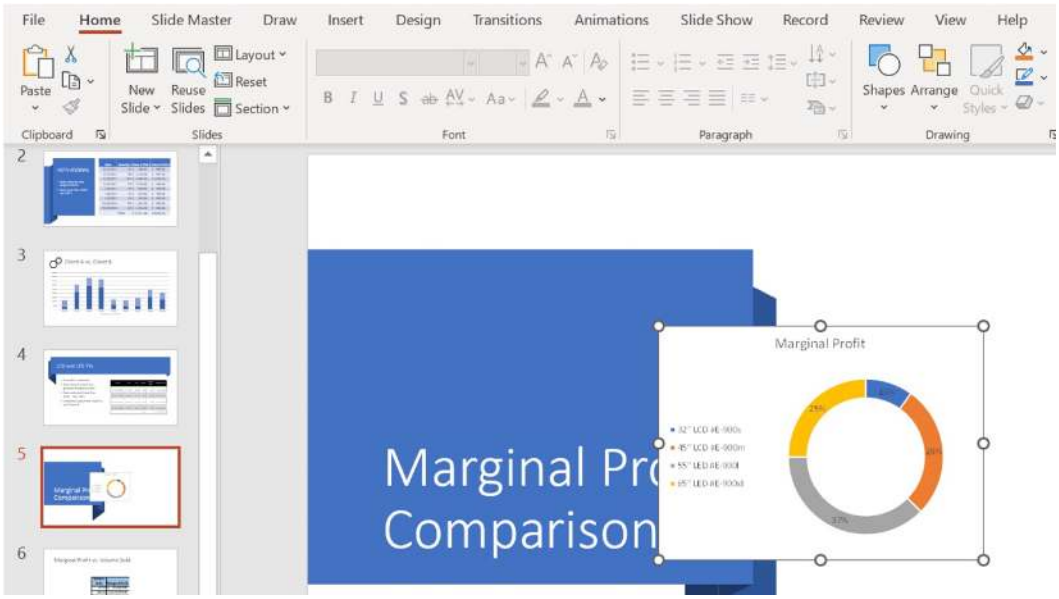


Figure 15.51: You will most likely need to resize and move the integrated chart. (Used with permission from Microsoft)

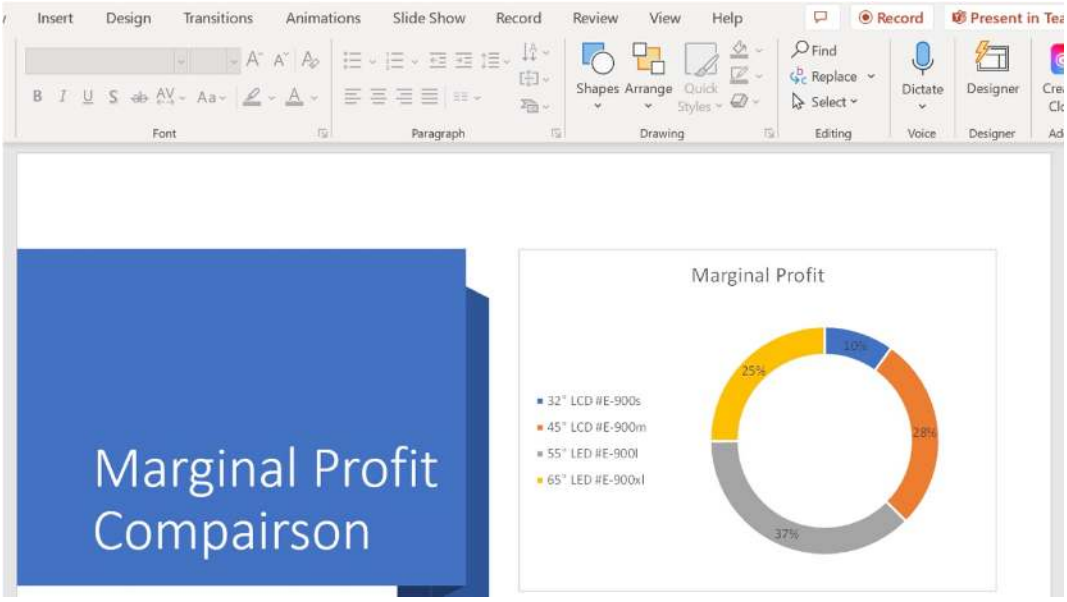


Figure 15.52: Select the image and move or resize it to fit the design of the slide. (Used with permission from Microsoft)

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