

MUSIC FUNDAMENTALS



Terry B. Ewell & Catherine Schmidt-Jones
Connexions

Music Fundamentals

Terry B. Ewell & Catherine Schmidt-Jones

Connexions

This text is disseminated via the Open Education Resource (OER) LibreTexts Project (<https://LibreTexts.org>) and like the thousands of other texts available within this powerful platform, it is freely available for reading, printing, and "consuming."

The LibreTexts mission is to bring together students, faculty, and scholars in a collaborative effort to provide an accessible, and comprehensive platform that empowers our community to develop, curate, adapt, and adopt openly licensed resources and technologies; through these efforts we can reduce the financial burden born from traditional educational resource costs, ensuring education is more accessible for students and communities worldwide.

Most, but not all, pages in the library have licenses that may allow individuals to make changes, save, and print this book. Carefully consult the applicable license(s) before pursuing such effects. Instructors can adopt existing LibreTexts texts or Remix them to quickly build course-specific resources to meet the needs of their students. Unlike traditional textbooks, LibreTexts' web based origins allow powerful integration of advanced features and new technologies to support learning.



LibreTexts is the adaptable, user-friendly non-profit open education resource platform that educators trust for creating, customizing, and sharing accessible, interactive textbooks, adaptive homework, and ancillary materials. We collaborate with individuals and organizations to champion open education initiatives, support institutional publishing programs, drive curriculum development projects, and more.

The LibreTexts libraries are Powered by [NICE CXone Expert](#) and was supported by the Department of Education Open Textbook Pilot Project, the California Education Learning Lab, the UC Davis Office of the Provost, the UC Davis Library, the California State University Affordable Learning Solutions Program, and Merlot. This material is based upon work supported by the National Science Foundation under Grant No. 1246120, 1525057, and 1413739.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation nor the US Department of Education.

Have questions or comments? For information about adoptions or adaptations contact info@LibreTexts.org or visit our main website at <https://LibreTexts.org>.

This text was compiled on 06/07/2025

About the Authors

Terry B. Ewell, professor, Department of Music, Towson University Former President, International Double Reed Society

- B. M. University of Washington; Bassoon Performance, magna cum lauda
- M. A. University of Washington, Music Theory
- Ph.D. University of Washington, Music Theory

Terry Ewell is Professor of online instruction and bassoon at Towson University Department of Music. In his 30+ years as a professional musician he has received recognition as a performer, teacher, scholar, and administrator.

Catherine Schmidt-Jones has been an independent instrumental music teacher since 1984 and has been publishing online open music education resources since 2002. She recently completed her Ph.D. in education at the University of Illinois at Urbana-Champaign. Her research interests include online open education, music theory pedagogy, informal music learning, activity theory and online action research methods.

TABLE OF CONTENTS

About the Authors

Licensing

Unit 1: Pitch and Major Scales and Keys

- 1.1: Introduction to Pitch Notation in Music
- 1.2: Clef
- 1.3: Introduction to the Piano Keyboard
- 1.4: Pitch- Sharp, Flat, and Natural Notes
- 1.5: Chromatic and Diatonic Half Steps
- 1.6: Octave Designations in Music
- 1.7: Key Signature
- 1.8: Major Keys and Scales
- 1.9: Scale Degrees of the Diatonic Scale
- 1.10: Enharmonic Spelling
- 1.11: The Circle of Fifths

Unit 2: Rhythm and Meter

- 2.1: Duration- Note Lengths in Written Music
- 2.2: Duration - Rest Length
- 2.3: Dots, Ties, and Borrowed Divisions
- 2.4: Rhythm
- 2.5: Time Signature
- 2.6: Introduction to Subdivisions in Simple Meters
- 2.7: Simple and Compound Time Signatures
- 2.8: Meter in Music
- 2.9: Introduction to Subdivisions in Compound Meters
- 2.10: Pickup Notes and Measures
- 2.11: Tempo

Unit 3: Minor Scales and Keys

- 3.1: Minor Keys and Scales
- 3.2: Learning Major and Minor Scales
- 3.3: Ear Training

Unit 4: Intervals

- 4.1: Intervals and Inversions
- 4.2: Quickly Recognizing Simple Intervals
- 4.3: Consonance and Dissonance

Unit 5: Triads, Chords, Introduction to Roman Numerals

- 5.1: Triads
- 5.2: Naming Triads
- 5.3: Beginning Harmonic Analysis
- 5.4: Seventh Chords and Inversions

[Index](#)

[Glossary](#)

[Detailed Licensing](#)

Licensing

A detailed breakdown of this resource's licensing can be found in [Back Matter/Detailed Licensing](#).

CHAPTER OVERVIEW

Unit 1: Pitch and Major Scales and Keys

- 1.1: Introduction to Pitch Notation in Music
- 1.2: Clef
- 1.3: Introduction to the Piano Keyboard
- 1.4: Pitch- Sharp, Flat, and Natural Notes
- 1.5: Chromatic and Diatonic Half Steps
- 1.6: Octave Designations in Music
- 1.7: Key Signature
- 1.8: Major Keys and Scales
- 1.9: Scale Degrees of the Diatonic Scale
- 1.10: Enharmonic Spelling
- 1.11: The Circle of Fifths

This page titled [Unit 1: Pitch and Major Scales and Keys](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.1: Introduction to Pitch Notation in Music

Music is principally written with symbols specifying pitch and symbols specifying timing. Symbols indicating pitch give instructions on whether sounds are high or low or anywhere in between. Symbols indicating timing provide instructions on when and how long to play or sing a sound. These symbols are combined in ingenious ways for music notation. When you master the fundamentals of music literacy, you will be able to read much of the music performed in the world today. The notation is commonly termed “Western Musical Notation.”

In this module we will present pitch notation. “Pitch” is a word we use for indicating where a note lies in a spectrum or range of musical tones. Musical pitches are designated by an alphabet letter or sometimes by a solfège syllable.

The musical alphabet uses letters A B C D E F G. Common solfège syllables are: Do Re Mi Fa Sol La Ti. In many countries the solfège syllables are employed to designate pitches. For instance, in France, “Do” is the name for “C,” “Re” for “D,” etc. This system of labeling pitches is termed “fixed Do,” since Do always designates the note C. In America we most commonly designate pitches by their alphabet letter name.

The musical alphabet repeats throughout the range or register of music. For instance, notice that the piano keyboard below has a repeating musical alphabet (given below the keyboard in Figure 1):

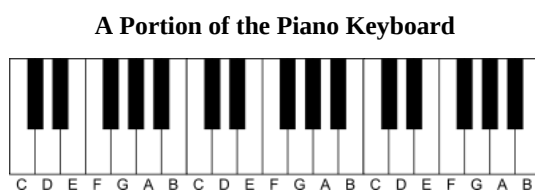


Figure 1.1.1: are modified from Tobias R. – Metoc, <http://en.Wikipedia.org/wiki/File:Klavatur-3-en.svg> (Accessed 01 May 09). It is licensed for public use under the Creative Commons Attribution License.

Pitches furthest on the left are lower sounding. Higher and higher pitches are sounded by moving up the piano keyboard in the right hand direction.

Pitches are represented by “notes” placed on a “staff.” The most common staff in musical notation is one with five lines and four spaces.

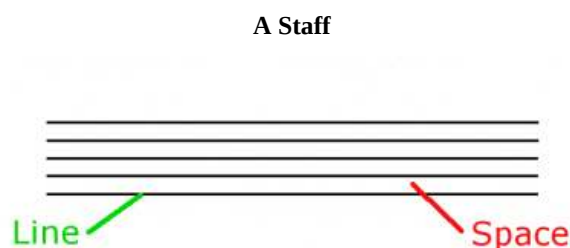


Figure 1.1.2:

The lower part of the staff is for lower notes; the higher portion is for higher notes. The staff by itself, however, doesn’t provide us the information we need to designate the position of a pitch. There are many more pitches in most music than just those provided by these five lines and four spaces. For the wider range of musical pitches we need a group of musical symbols called “clefs.” Some of the clefs used in music notation matched the names given to voices: soprano, mezzo soprano, alto, tenor, bass. For now we will just introduce two of the most common clefs--treble and bass.

The treble clef or G clef designates the staff for higher pitched instruments such as flute, trumpet, or violin. The clef circles around a line that is G, which is the second line from the bottom. The blue letter G doesn’t usually appear in music notation. The red note on the treble staff is a G. The bass or F clef designates a staff reserved for lower pitched instruments such as bassoon, tuba, or cello. The left most portion of the clef starts on the F line--4th line from the bottom. The F line also appears between the two dots to the right of the clef. The red note on the bass staff is an F.

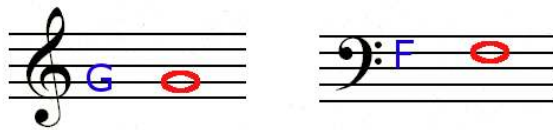


Figure 1.1.3:

The treble and bass staves are often paired in piano music with the "grand staff" or "piano staff." The grand staff features a brace, bar and then the two staves.

The Grand or Piano Staff

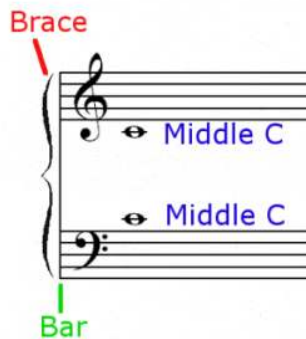


Figure 1.1.4:

Description The grand staff is used for keyboard instruments such as piano, organ, and harpsichord.

Notice the position of "middle C" on the grand staff. It is below the treble staff and above the bass staff. This note is called middle C because it is the C that is located in the middle of the piano keyboard.

This video gives a further demonstration of the location of middle C and introduces the piano keyboard:

Introduction to the piano keyboard (11 minutes) [RealPlayer \[link\]](#) | [Windows Media](#) | [iPod or QuickTime Player \[link\]](#) (mp4)

You will also notice that a short line segment appears in the middle of the note in Figure 4. This short line is called a "ledger line." These added lines are a bit similar to ladders. They are extensions of the staff, either above or below, so that additional pitches may be given in the music. Figure 5 below gives a high C above the treble staff and a low C below the bass staff.



Figure 1.1.5:

This page titled [1.1: Introduction to Pitch Notation in Music](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.2: Clef

Treble Clef and Bass Clef

The first symbol that appears at the beginning of every music note (A, B, C, D, E, F, or G) is found on each line or space. For example, a **treble clef** symbol tells you that the second line from the bottom (the line that the symbol curls around) is "G". On any staff, the notes are always arranged so that the next letter is always on the next higher line or space. The last note letter, G, is always followed by another A.

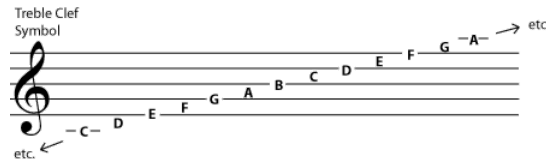


Figure 1.2.1: Treble Clef

A **bass clef** symbol tells you that the second line from the top (the one bracketed by the symbol's dots) is F. The notes are still arranged in ascending order, but they are all in different places than they were in treble clef.

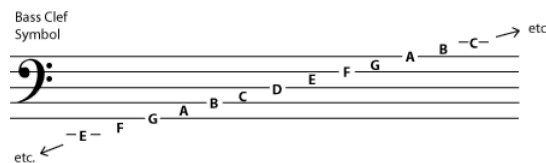


Figure 1.2.2: Bass Clef

Memorizing the Notes in Bass and Treble Clef

One of the first steps in learning to read music in a particular clef is memorizing where the notes are. Many students prefer to memorize the notes and spaces separately. Here are some of the most popular mnemonics used.

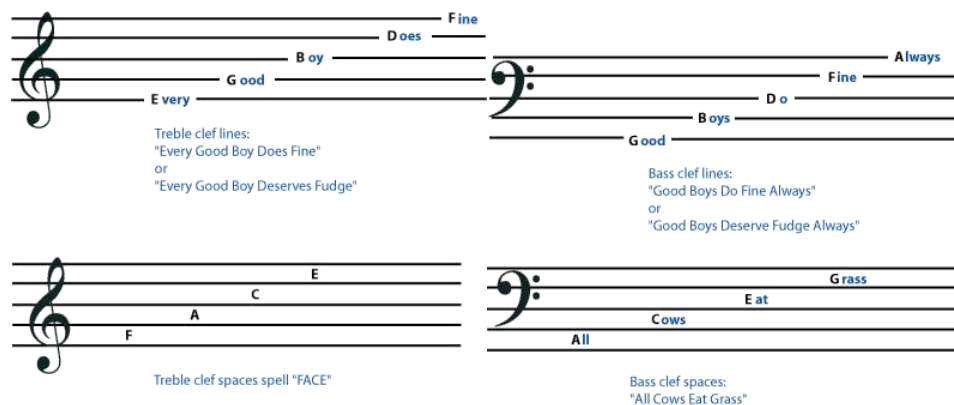


Figure 1.2.3: You can use a word or silly sentence to help you memorize which notes belong on the lines or spaces of a clef. If you don't like these ones, you can make up your own.

Moveable Clefs

Most music these days is written in either bass clef or treble clef, but some music is written in a **C clef**. The C clef is moveable: whatever line it centers on is a middle C.

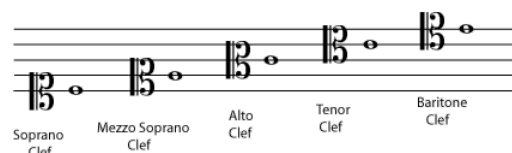


Figure 1.2.4: C Clefs. All of the notes on this staff are middle C.



Figure 1.2.9:
Solution Below



Figure 1.2.10:

Choose a clef in which you need to practice recognizing notes above and below the staff in [Figure](#). Write the clef sign at the beginning of the staff, and then write the correct note names below each note.



Figure 1.2.11:
Solution Below

[Figure](#) shows the answers for treble and bass clef. If you have done another clef, have your teacher check your answers.

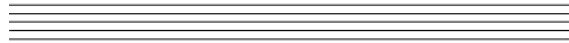


Figure 1.2.12:

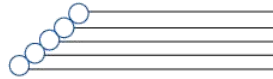
PDF worksheet if you like.

Clef Practice

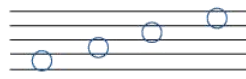
Practice writing your clef symbol on this staff. Write at least eight clef symbols



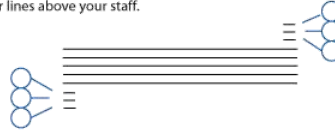
Write the letter names of the lines in your staff:



Write the letter names of the spaces:



Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line. Then write the correct letter name above each note.



Write your clef symbol at the beginning of this line. Then write a note in the staff for each letter below the staff.



C G F D E A B

Figure 1.2.13:

Solution Below

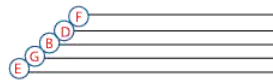
Figure the answers for bass clef. If you are working in a more unusual clef, have your teacher check your answers.

Clef Practice

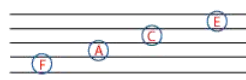
Practice writing your clef symbol on this staff. Write at least eight clef symbols



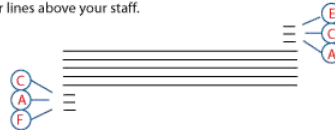
Write the letter names of the lines in your staff:



Write the letter names of the spaces:



Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line. Then write the correct letter name above each note.



F B E A C E G G F D D

Write your clef symbol at the beginning of this line. Then write a note in the staff for each letter below the staff.



C G F D E A B

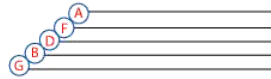
Figure 1.2.14:

Clef Practice

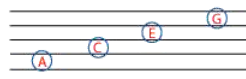
Practice writing your clef symbol on this staff. Write at least eight clef symbols



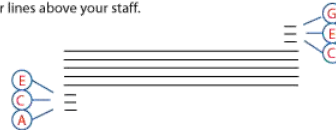
Write the letter names of the lines in your staff:



Write the letter names of the spaces:



Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line.
Then write the correct letter name above each note.



Write your clef symbol at the beginning of this line.
Then write a note in the staff for each letter below the staff.

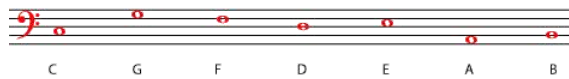


Figure 1.2.15:

This page titled [1.2: Clef](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.3: Introduction to the Piano Keyboard

Knowledge of the layout of the piano keyboard is essential to understanding music notation. Figure 1 provides a picture of part of the piano keyboard:



Figure 1.3.1:

(The graphics of the keyboard in Figure 1 and below are modified from Tobias R. – [Metoc](http://en.Wikipedia.org/wiki/File:Klaviatur-3-en.svg), <http://en.Wikipedia.org/wiki/File:Klaviatur-3-en.svg> [Accessed 01 May 09])

Notice that in Figures 1 and 2 that the piano keyboard has groupings of two and three black keys—twins and triplets.

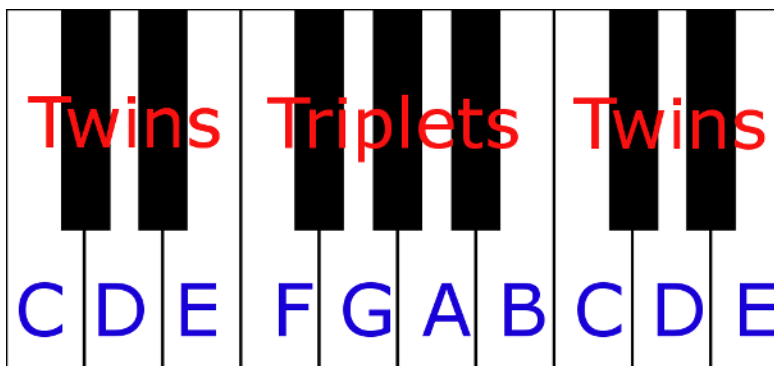


Figure 1.3.2:

The note “C” is always found immediately to the left of the twins of black keys. The musical alphabet (A, B, C, D, E, F, G) repeats throughout the range of the piano keyboard (Figure 1).

The whole steps and half steps are arranged in music notation by referring to the keyboard. Consider these intervals in Figure 3 which are half steps:



Figure 1.3.3:

The music notation in Figure 3 represents these keys on the piano in Figure 4:

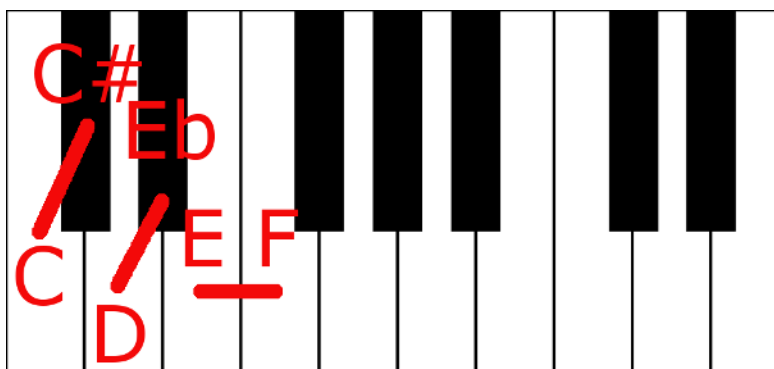


Figure 1.3.4:

Notice that most half step movements are from white to black keys or black to white keys. There are two important exceptions, however, that every music student must memorize. E to F and C to B are half step. These are half step intervals from a white key to a white key.

In Figure 5 the pairs of eighth notes are all whole steps. Whole steps cover the same distance as two half steps moving in the same direction:

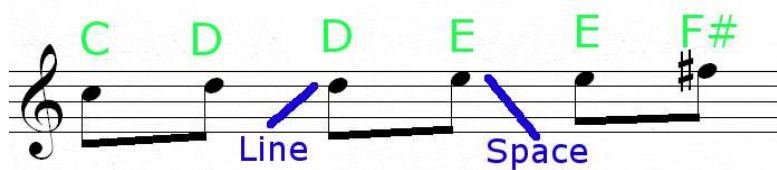


Figure 1.3.5:

Most movements from a line to a space or a space to a line in the music notation result in whole steps. Again, however, the exceptions happen around E and F or B and C.

Movement from C to D on the piano keyboard is a whole step, there is a black key (C# or Db) between the C and D keys (Figure 6):

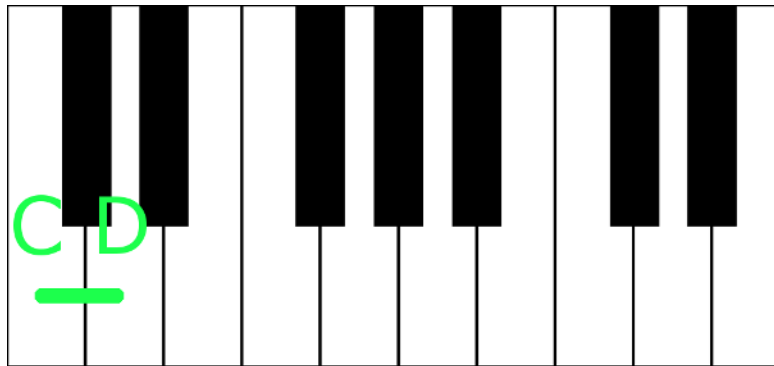


Figure 1.3.6:

Movement from D to E on the piano keyboard is a whole step, there is a black key (D# or Eb) between the D and E keys (Figure 7):

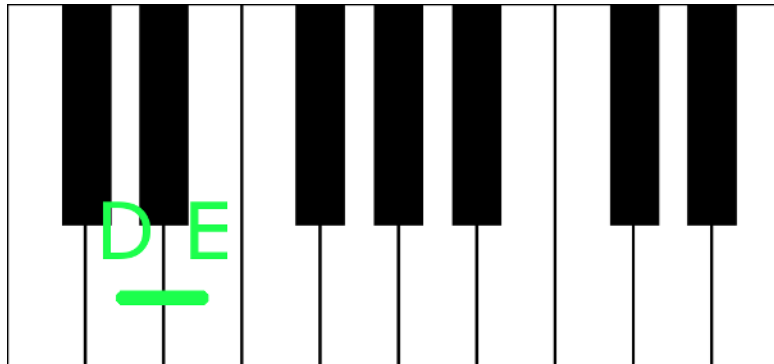


Figure 1.3.7:

Movement from E to F, however, is not a whole step. These are adjacent keys. Instead a whole step is from E to F#.

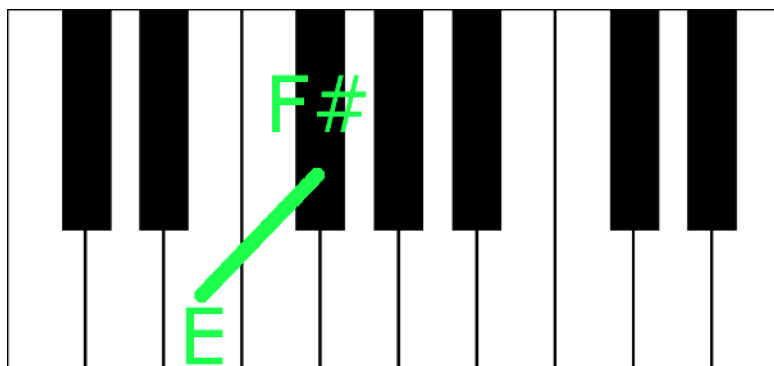


Figure 1.3.8:

Not all keyboards instruments have the same arrangement of white and black notes. For further information on keyboard instruments and an introduction to the piano keyboard see:

Introduction to the piano keyboard (11 minutes) [RealPlayer](#) | [Windows Media](#) | [iPod or QuickTime Player \(mp4\)](#)

This page titled [1.3: Introduction to the Piano Keyboard](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.4: Pitch- Sharp, Flat, and Natural Notes

The **pitch** of a note is how high or low it sounds. Pitch depends on the frequency of the fundamental sound wave of the note. The higher the frequency of a sound wave, and the shorter its wavelength, the higher its pitch sounds. But musicians usually don't want to talk about wavelengths and frequencies. Instead, they just give the different pitches different letter names: A, B, C, D, E, F, and G. These seven letters name all the **natural** notes (on a keyboard, that's all the white keys) within one octave. (When you get to the eighth natural note, you start the next octave on another A.)

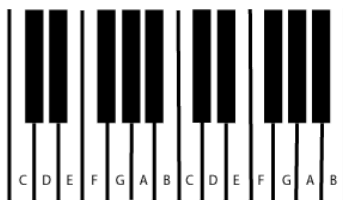


Figure 1.4.1: : The natural notes name the white keys on a keyboard.

But in Western music there are twelve notes in each octave that are in common use. How do you name the other five notes (on a keyboard, the black keys)?

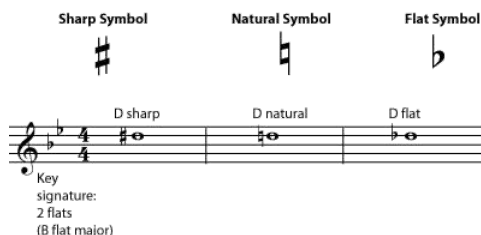


Figure 1.4.2: : Sharp, flat, and natural signs can appear either in the key signature, or right in front of the note that they change.

A **sharp sign** means "the note that is one half step higher than the natural note". A **flat sign** means "the note that is one half step lower than the natural note". Some of the natural notes are only one half step apart, but most of them are a whole step apart. When they are a whole step apart, the note in between them can only be named using a flat or a sharp.

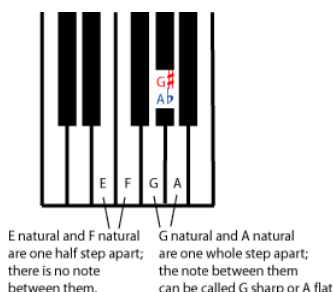


Figure 1.4.3:

Notice that, using flats and sharps, any pitch can be given more than one note name. For example, the G sharp and the A flat are played on the same key on the keyboard; they sound the same. You can also name and write the F natural as "E sharp"; F natural is the note that is a half step higher than E natural, which is the definition of E sharp. Notes that have different names but sound the same are called enharmonic notes.

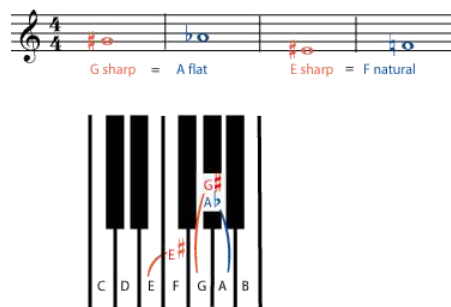


Figure 1.4.4: : G sharp and A flat sound the same. E sharp and F natural sound the same.

Sharp and flat signs can be used in two ways: they can be part of a key signature, or they can mark accidentals. For example, if most of the C's in a piece of music are going to be sharp, then a sharp sign is put in the "C" space at the beginning of the staff, in the key signature. If only a few of the C's are going to be sharp, then those C's are marked individually with a sharp sign right in front of them. Pitches that are not in the key signature are called **accidentals**.

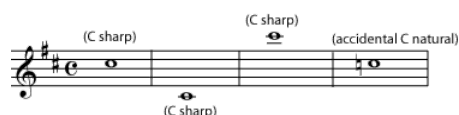


Figure 1.4.5: : When a sharp sign appears in the C space in the key signature, all C's are sharp unless marked as accidentals.

A note can also be double sharp or double flat. A **double sharp** is two half steps (one whole step) higher than the natural note; a **double flat** is two half steps (a whole step) lower. Triple, quadruple, etc. sharps and flats are rare, but follow the same pattern: every sharp or flat raises or lowers the pitch one more half step.

Using double or triple sharps or flats may seem to be making things more difficult than they need to be. Why not call the note "A natural" instead of "G double sharp"? The answer is that, although A natural and G double sharp are the same pitch, they don't have the same function within a particular chord or a particular key. For musicians who understand some music theory (and that includes most performers, not just composers and music teachers), calling a note "G double sharp" gives important and useful information about how that note functions in the chord and in the progression of the harmony.

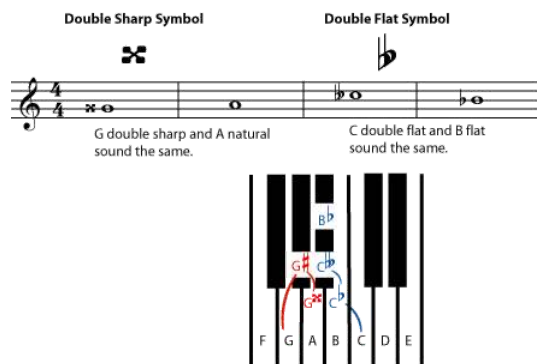


Figure 1.4.6: : Double sharps raise the pitch by two half steps (one whole step). Double flats lower the pitch by two half steps (one whole step).

This page titled [1.4: Pitch- Sharp, Flat, and Natural Notes](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.5: Chromatic and Diatonic Half Steps

Music notation contains two types of half steps: chromatic and diatonic. Chromatic half steps contain the same alphabet letters. For instance, C and C#, Eb and E, and G and G# are all pairs of chromatic half steps. Diatonic half steps also contain half step motions but use adjacent letters in the musical alphabet. E and F, F# and G, and A and Bb are pairs of diatonic half steps.

Study the figure below. Which are chromatic half steps and which are diatonic half steps?

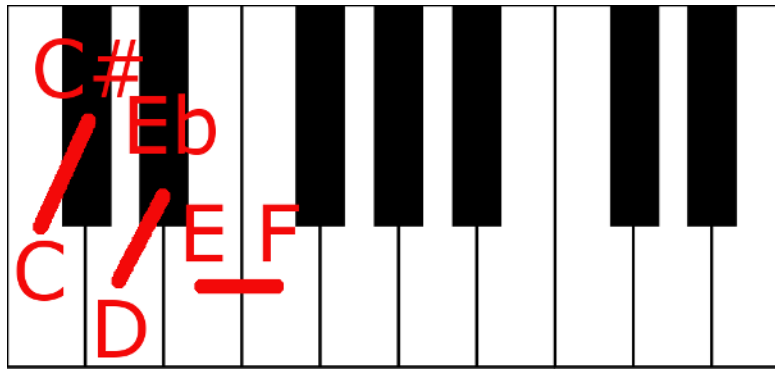


Figure 1.5.1:

Answer: C to C# is a chromatic half step. D to Eb and E to F are diatonic half steps.

Here are some examples of chromatic half steps in music notation. Notice that half steps can ascend or descend.

Ascending (C to C#, chromatic half step):



Figure 1.5.2:

Ascending (Bb to B natural, chromatic half step):



Figure 1.5.3:

Descending (D to Db, chromatic half step):



Figure 1.5.4:

Likewise diatonic half steps can ascend or descend.

Ascending (A# to B, diatonic half step):



Figure 1.5.5:

Ascending (B to C, diatonic half step):

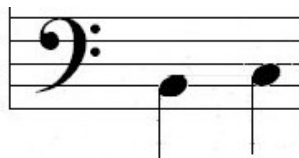


Figure 1.5.6:

Descending (E to D#, diatonic half step):



Figure 1.5.7:

This page titled [1.5: Chromatic and Diatonic Half Steps](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.6: Octave Designations in Music

There are many ways in which to designate pitches by text. In this module we introduce a system of identification developed by the Acoustical Society of America. The lowest C on the piano keyboard is C1. The next C above that is designated C2, the C above that is C3, and so forth. The pitches above each C receive the octave designation of the C they are above as given below on the piano keyboard:



Figure 1.6.1: are modified from Tobias R. – Metoc, en.Wikipedia.org/wiki/File:Klaviatur-3-en.svg (Accessed 01 May 09). It is licensed for public use under the Creative Commons Attribution License.

Here are octave designations with notation:

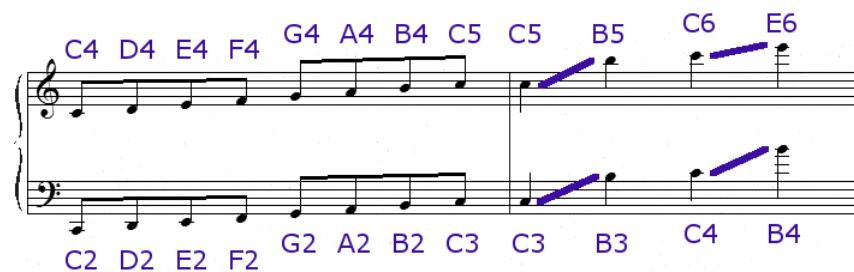


Figure 1.6.2:

For a video on octave designations see:

Octave Designations (2 minutes) [RealPlayer](#) | [Windows Media](#) | [iPod or QuickTime Player](#) | [youtube](#)

This page titled [1.6: Octave Designations in Music](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.7: Key Signature

The key signature appears right after the clef symbol on the staff. In common notation, **clef and key signature are the only symbols that normally appear on every staff. They appear so often because they are such important symbols; they tell you what note is found on each line and space of the staff.** This can change from one piece of music to another, so the musician must know the clef and key signature in order to read the music correctly; in a way, the written music is a coded message, with each note standing for a sound with a particular pitch, and the clef and key signature are the key that tell you how to decode this particular message. (For an explanation of why things are done this way, please see how to read music.)

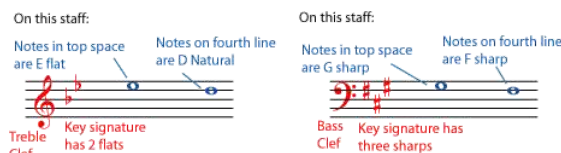


Figure 1.7.1:

The clef tells you the letter name of the note - for example, the top line on a bass clef staff is always some kind of A; but you need the key signature to tell you what kind of A. It may have either some sharp symbols on particular lines or spaces, or some flat symbols, again on particular lines or spaces. If there are no flats or sharps listed after the clef symbol, then the key signature is "all notes are natural".

The **key signature** is a list of all the sharps and flats in the key that the music is in. **When a sharp (or flat) appears on a line or space in the key signature, all the notes on that line or space are sharp (or flat), and all other notes with the same letter names in other octaves are also sharp (or flat).**



Figure 1.7.2: : This key signature has a flat on the "B" line, so all of these B's are flat.

The sharps or flats always appear in the same order in all key signatures. This is the same order in which they are added as keys get sharper or flatter. For example, if a key (G major or E minor) has only one sharp, it will be F sharp, so F sharp is always the first sharp listed in a sharp key signature. The keys that have two sharps (D major and B minor) have F sharp and C sharp, so C sharp is always the second sharp in a key signature, and so on. **The order of sharps is: F sharp, C sharp, G sharp, D sharp, A sharp, E sharp, B sharp. The order of flats is the reverse of the order of sharps: B flat, E flat, A flat, D flat, G flat, C flat, F flat.** So the keys with only one flat (F major and D minor) have a B flat; the keys with two flats (B flat major and G minor) have B flat and E flat; and so on. The order of flats and sharps, like the order of the keys themselves, follows a circle of fifths.

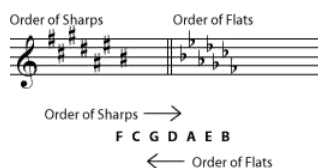


Figure 1.7.3:

If you do not know the name of the key of a piece of music, the key signature can help you find out. Assume for a moment that you are in a major key. If the key contains sharps, the name of the key is one half step higher than the last sharp in the key signature. If the key contains flats, the name of the key signature is the name of the second-to-last flat in the key signature.

Figure demonstrates quick ways to name the (major) key simply by looking at the key signature. In flat keys, the second-to-last flat names the key. In sharp keys, the note that names the key is one half step above the final sharp.

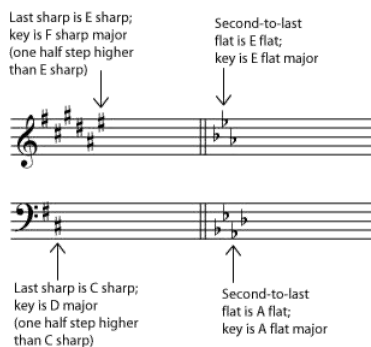


Figure 1.7.4:

The only major keys that these rules do not work for are C major (no flats or sharps) and F major (one flat). It is easiest just to memorize the key signatures for these two very common keys. If you want a rule that also works for the key of F major, remember that the second-to-last flat is always a perfect fourth higher than (or a perfect fifth lower than) the final flat. So you can also say that the name of the key signature is a perfect fourth lower than the name of the final flat.



Figure 1.7.5: : The key of C major has no sharps or flats. F major has one flat.

If the music is in a minor key, it will be in the relative minor of the major key for that key signature. You may be able to tell just from listening (see Major Keys and Scales) whether the music is in a major or minor key. If not, the best clue is to look at the final chord. That chord (and often the final note of the melody, also) will usually name the key.

Write the key signatures asked for in [Figure](#) and name the major keys that they represent.



Figure 1.7.6:

Solution Below



Figure 1.7.7:

This page titled [1.7: Key Signature](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.8: Major Keys and Scales

The simple, sing-along, nursery rhymes and folk songs we learn as children; the "catchy" tunes used in advertising jingles; the cheerful, toe-tapping pop and rock we dance to; the uplifting sounds of a symphony: most music in a major key has a bright sound that people often describe as cheerful, inspiring, exciting, or just plain fun.

How are these moods produced? Music in a particular **key** tends to use only some of the many possible notes available; these notes are listed in the **scale** associated with that key. In major keys, the notes of the scale are often used to build "bright"-sounding major chords. They also give a strong feeling of having a tonal center, a note or chord that feels like "home", or "the resting place", in that key. The "bright"-sounding major chords and the strong feeling of tonality are what give major keys their happy, pleasant moods. This contrasts with the moods usually suggested by music that uses minor keys, scales, and chords. Although it also has a strong tonal center (the Western tradition of tonal harmony is based on major and minor keys and scales), music in a minor key is more likely to sound sad, ominous, or mysterious. In fact, most musicians, and even many non-musicians, can distinguish major and minor keys just by listening to the music.

? Exercise 1.8.1

Listen to these excerpts. Three are in a major key and two in a minor key. Can you tell which is which simply by listening?

- 1.
- 2.
- 3.
- 4.
- 5.

Answer

1. Major
2. Major
3. Minor
4. Major
5. Minor

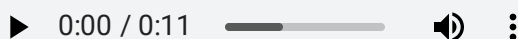
📌 Note

If you must determine whether a piece of music is major or minor, and cannot tell just by listening, you may have to do some simple harmonic analysis in order to decide.

Tonal Center

A scale starts with the note that names the key. This note is the **tonal center** of that key, the note where music in that key feels "at rest". It is also called the **tonic**, and it's the "do" in "do-re-mi". For example, music in the key of A major almost always ends on an A major chord, the chord built on the note A. It often also begins on that chord, returns to that chord often, and features a melody and a bass line that also return to the note A often enough that listeners will know where the tonal center of the music is, even if they don't realize that they know it. (For more information about the tonic chord and its relationship to other chords in a key, please see Beginning Harmonic Analysis.)

Listen to these examples. They will be downloads that you can play. Can you hear that they do not feel "done" until the final tonic is played?



Example A

Example B

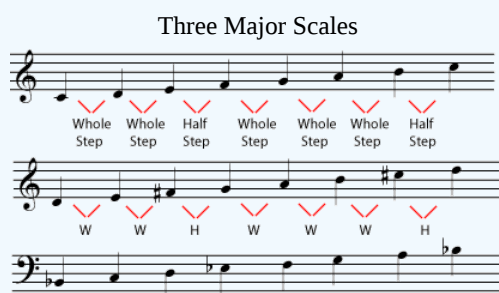
Major Scales

To find the rest of the notes in a major key, start at the tonic and go up following this pattern: **whole step, whole step, half step, whole step, whole step, whole step, half step**. This will take you to the tonic one octave higher than where you began, and includes all the notes in the key in that octave.

These major scales all follow the same pattern of whole steps and half steps. They have different sets of notes because the pattern starts on different notes.

? Exercise 1.8.2

These major scales all follow the same pattern of whole steps and half steps. They have different sets of notes because the pattern starts on different notes.



All major scales have the same pattern of half steps and whole steps, beginning on the note that names the scale - the tonic.

Listen to the difference between the D major, and [B flat major](#) scales.

For each note below, write a major scale, one octave, ascending (going up), beginning on that note. If you're not sure whether a note should be written as a flat, sharp, or natural, remember that you won't ever skip a line or space, or write two notes of the scale on the same line or space. If you need help keeping track of half steps, use a keyboard, a picture of a keyboard, a written chromatic scale, or the chromatic scale fingerings for your instrument. If you need more information about half steps and whole steps, see [Half Steps and Whole Steps](#).

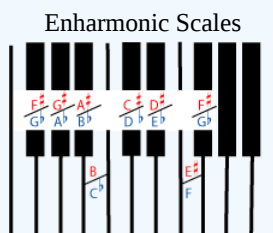
If you need staff paper for this exercise, you can print out this [staff paper](#) PDF file.



Answer



Notice that although they look completely different, the scales of F sharp major and G flat major (numbers 5 and 6) sound exactly the same when played, on a piano as shown in equal temperament tuning. If this surprises you, please read more about enharmonic scales.



Using this figure of a keyboard, or the fingerings from your own instrument, notice that the notes for the F sharp major scale and the G flat major scale in Figure, although spelled differently, will sound the same.

In the examples above, the sharps and flats are written next to the notes. In common notation, the sharps and flats **that belong in the key** will be written at the beginning of each staff, in the **key signature**. For more practice identifying keys and writing key signatures, please see Key Signature. For more information about how keys are related to each other, please see The Circle of Fifths.

Do key signatures make music more complicated than it needs to be? Is there an easier way? Join the discussion at Opening Measures.

Music in Different Major Keys

What difference does key make? Since the major scales all follow the same pattern, they all sound very much alike. Here is the tune "Row, Row, Row Your Boat", written in G major and also in D major.



The image displays two musical staves, each containing two measures of music. The first staff is labeled 'Major: G' and the second 'Major: D'. Both staves are in 6/8 time and feature a key signature of one sharp (F#). The notation includes various note values (quarter, eighth, and sixteenth notes) and rests, with some notes marked with fingerings (1, 2, 3, 4). The melody is identical in both staves, demonstrating how the same tune can be written in different major keys.

The same tune looks very different when written in two different major keys.

Listen to this tune in D major. The music may look quite different, but the only difference when you listen is that one sounds higher than the other. So why bother with different keys at all? Before equal temperament became the standard tuning system, major keys sounded more different from each other than they do now. Even now, there are subtle differences between the sound of a piece in one key or another, mostly because of differences in the timbre of various notes on the instruments or voices involved. But today the most common reason to choose a particular key is simply that the music is easiest to sing or play in that key. (Please see Transposition for more about choosing keys.)

This page titled [1.8: Major Keys and Scales](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.9: Scale Degrees of the Diatonic Scale

Scale Degrees

In music we discuss the seven steps of diatonic scales in two different ways. Sometimes we reference the scale steps with numbers:



Figure 1

In this C major scale, for instance, scale degree 4 is an F. The 8th scale degree is the same note name as the 1st scale degree.

Secondly, each scale degree also has a unique name, one that will be often applied to harmonies built on the scale degree. Before we introduce all the scale degrees in the order they appear in the diatonic scale, let's first explain how the scale degrees are related.



Figure 2

The note name of each scale (here C major) or the first scale degree is called the “tonic.” This is the central note in the tonal scale or key. The next most important note is termed “dominant” for the large role (dominant role) it plays in tonal compositions. Many compositions end with chords built upon the dominant and tonic of the key. Notice that the dominant is located on the 5th scale degree—on the fifth alphabet letter of the scale:



Figure 3

The subdominant (lower dominant) mirrors the dominant. It is below the tonic by five scale steps. “Subdominant” is below the tonic just as “submarines” are below the surface of the ocean. Count out the five steps so you verify that the subdominant is five steps below the tonic. (C, B, A, G, F)

The mediant and submediant are also arranged in mirror images around the tonic:

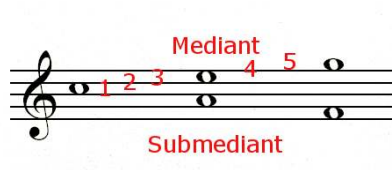


Figure 4

“Mediant” means middle. Thus, the mediant is in the middle of the tonic and dominant, on the 3rd scale step. The submediant is in the middle of the tonic and subdominant.

The last two scale degrees, 2 and 7 are arranged around the tonic. The “supertonic” is above the tonic on the second scale degree. The “leading tone” is an important scale step that leads to the tonic both melodically and harmonically. You will learn more about this important scale step in your later studies.

Here are the names of the scale degrees on the C major scale:



Figure 5

This page titled [1.9: Scale Degrees of the Diatonic Scale](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.10: Enharmonic Spelling

Enharmonic Notes

In common notation, any note can be sharp, flat, or natural. A sharp symbol raises the pitch (of a natural note) by one half step; a flat symbol lowers it by one half step.

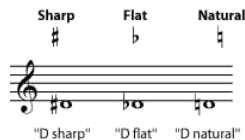


Figure 1

Why do we bother with these symbols? There are twelve pitches available within any octave. We could give each of those twelve pitches its own name (A, B, C, D, E, F, G, H, I, J, K, and L) and its own line or space on a staff. But that would actually be fairly inefficient, because most music is in a particular key. And music that is in a major or minor key will tend to use only seven of those twelve notes. So music is easier to read if it has only lines, spaces, and notes for the seven pitches it is (mostly) going to use, plus a way to write the occasional notes that are not in the key.

This is basically what common notation does. There are only seven note names (A, B, C, D, E, F, G), and each line or space on a staff will correspond with one of those note names. To get all twelve pitches using only the seven note names, we allow any of these notes to be sharp, flat, or natural. [Look](#) at the notes on a keyboard.

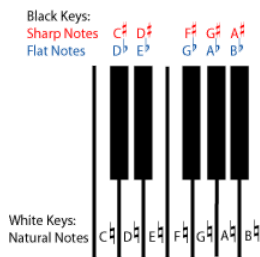


Figure 2: Seven of the twelve possible notes in each octave are "natural" notes.

Because most of the natural notes are two half steps apart, there are plenty of pitches that you can only get by naming them with either a flat or a sharp (on the keyboard, the "black key" notes). For example, the note in between D natural and E natural can be named either D sharp or E flat. These two names look very different on the staff, but they are going to sound exactly the same, since you play both of them by pressing the same black key on the piano.



Figure 3: D sharp and E flat look very different when written in common notation, but they sound exactly the same when played on a piano.

This is an example of **enharmonic spelling**. Two notes are **enharmonic** if they sound the same on a piano but are named and written differently.

Name the other enharmonic notes that are listed above the black keys on the keyboard in PDF file

But these are not the only possible enharmonic notes. Any note can be flat or sharp, so you can have, for example, an E sharp. Looking at the below.) Not only will they look different when written on a staff, but they will have different functions within a key and different relationships with the other notes of a piece of music. So a composer may very well prefer to write an E sharp, because that makes the note's place in the harmonies of a piece more clear to the performer. (Please see Triads, Beyond Triads, and Harmonic Analysis for more on how individual notes fit into chords and harmonic progressions.)

In fact, this need (to make each note's place in the harmony very clear) is so important that double sharps and double flats have been invented to help do it. A double sharp is two half steps (one whole step) higher than the natural note. A double flat is two half steps lower than the natural note. Double sharps and flats are fairly rare, and triple and quadruple flats even rarer, but all are allowed.

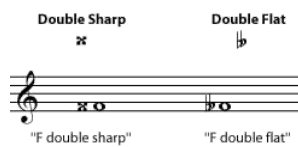


Figure 4

? Exercise 1.10.1

Give at least one enharmonic spelling for the following notes. Try to give more than one. (Look at the [keyboard](#) again if you need to.)

1. E natural
2. B natural
3. C natural
4. G natural
5. A natural

Answer

1. F flat; D double sharp
2. C flat; A double sharp
3. B sharp; D double flat
4. F double sharp; A double flat
5. G double sharp; B double flat

Enharmonic Keys and Scales

Keys and scales can also be enharmonic. Major keys, for example, always follow the same pattern of half steps and whole steps. (See Major Keys and Scales. Minor keys also all follow the same pattern, different from the major scale pattern; see Minor Keys.) So whether you start a major scale on an E flat, or start it on a D sharp, you will be following the same pattern, playing the same piano keys as you go up the scale. But the notes of the two scales will have different names, the scales will look very different when written, and musicians may think of them as being different. For example, most instrumentalists would find it easier to play in E flat than in D sharp. In some cases, an E flat major scale may even sound slightly different from a D sharp major scale. (See [below](#).)



Figure 5: The E flat major and D sharp major scales sound the same on the piano, although they look very different. If this surprises you, look again at the [piano keyboard](#) and find the notes that you would play for each scale.

Since the scales are the same, D sharp major and E flat major are also **enharmonic keys**. Again, their key signatures will look very different, but music in D sharp will not be any higher or lower than music in E flat.

Enharmonic Keys

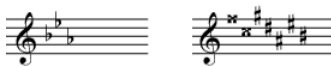


Figure 6: The key signatures for E flat and D sharp look very different, but would sound the same on a keyboard.

? Exercise 1.10.2

Give an enharmonic name and key signature for the keys given in key signatures yet, pick the easiest enharmonic spelling for the key name, and the easiest enharmonic spelling for every note in the key signature. Writing out the scales may help, too.)

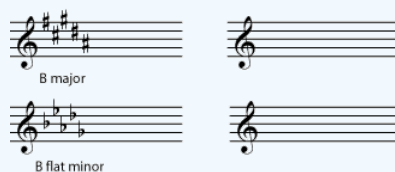


Figure 7

Answer

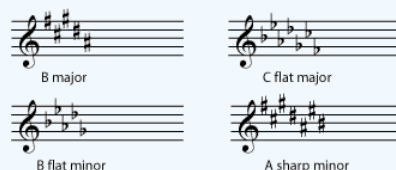


Figure 1.10.8:

Enharmonic Intervals and Chords

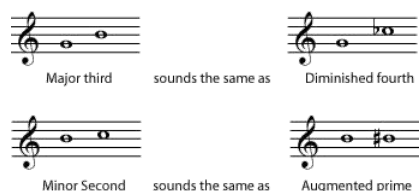


Figure 9

Chords and intervals also can have enharmonic spellings. Again, it is important to name a chord or interval as it has been spelled, in order to understand how it fits into the rest of the music. A C sharp major chord means something different in the key of D than a D flat major chord does. And an interval of a diminished fourth means something different than an interval of a major third, even though they would be played using the same keys on a piano. (For practice naming intervals, see Interval. For practice naming chords, see Naming Triads and Beyond Triads. For an introduction to how chords function in a harmony, see Beginning Harmonic Analysis.)

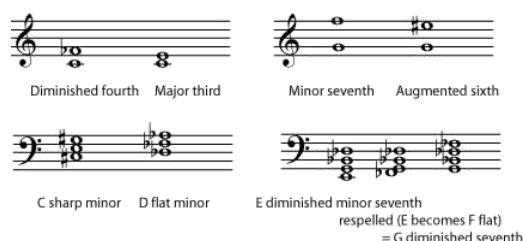


Figure 10

Enharmonic Spellings and Equal Temperament

All of the above discussion assumes that all notes are tuned in equal temperament. Equal temperament has become the "official" tuning system for Western music. It is easy to use in pianos and other instruments that are difficult to retune (organ, harp, and xylophone, to name just a few), precisely because enharmonic notes sound exactly the same. But voices and instruments that can fine-tune quickly (for example violins, clarinets, and trombones) often move away from equal temperament. They sometimes drift, consciously or unconsciously, towards just intonation, which is more closely based on the harmonic series. When this happens, enharmonically spelled notes, scales, intervals, and chords, may not only be theoretically different. They may also actually be slightly different pitches. The differences between, say, a D sharp and an E flat, when this happens, are very small, but may be large enough to be noticeable. Many Non-western music traditions also do not use equal temperament. **Sharps and flats used to notate music in these traditions should not be assumed to mean a change in pitch equal to an equal-temperament half-step.** For definitions and discussions of equal temperament, just intonation, and other tuning systems, please see Tuning Systems.

This page titled [1.10: Enharmonic Spelling](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

1.11: The Circle of Fifths

Related Keys

The circle of fifths is a way to arrange keys to show how closely they are related to each other.

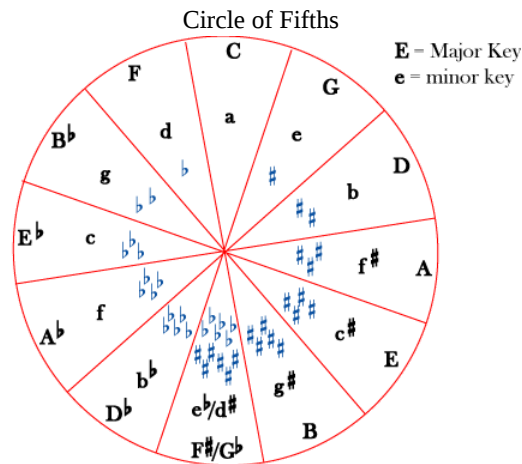


Figure 1: The major key for each key signature is shown as a capital letter; the minor key as a small letter. In theory, one could continue around the circle adding flats or sharps (so that B major is also C flat major, with seven flats, E major is also F flat major, with 6 flats and a double flat, and so on), but in practice such key signatures are very rare.

Keys are not considered closely related to each other if they are near each other in the chromatic scale (or on a keyboard). What makes two keys "closely related" is having similar key signatures. So the most closely related key to C major, for example, is A minor, since they have the same key signature (no sharps and no flats). This puts them in the same "slice" of the circle. The next most closely related keys to C major would be G major (or E minor), with one sharp, and F major (or D minor), with only one flat. The keys that are most distant from C major, with six sharps or six flats, are on the opposite side of the circle.

The circle of fifths gets its name from the fact that as you go from one section of the circle to the next, you are going up or down by an interval of a perfect fifth. If you go up a perfect fifth (clockwise in the circle), you get the key that has one more sharp or one less flat; if you go down a perfect fifth (counterclockwise), you get the key that has one more flat or one less sharp. Since going down by a perfect fifth is the same as going up by a perfect fourth, the counterclockwise direction is sometimes referred to as a "circle of fourths". (Please review inverted intervals if this is confusing.)

Note

The key of D major has two sharps. Using the circle of fifths, we find that the most closely related major keys (one in each direction) are G major, with only one sharp, and A major, with three sharps. The relative minors of all of these keys (B minor, E minor, and F sharp minor) are also closely related to D major.

? Exercise 1.11.1

What are the keys most closely related to E flat major? To A minor?

Answer

E flat major (3 flats):

- B flat major (2 flats)
- A flat major (4 flats)
- C minor (3 flats)
- G minor (2 flats)
- F minor (4 flats)

A minor (no sharps or flats):

- E minor (1 sharp)
- D minor (1 flat)
- C major (no sharps or flats)
- G major (1 sharp)
- F major (1 flat)

? Exercise 1.11.2

Name the major and minor keys for each key signature.

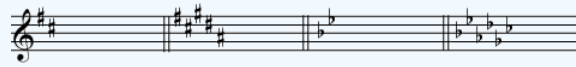


Figure 2

Answer



Figure 1.11.3:

Key Signatures

If you do not know the order of the sharps and flats, you can also use the circle of fifths to find these. The first sharp in a key signature is always F sharp; the second sharp in a key signature is always (a perfect fifth away) C sharp; the third is always G sharp, and so on, all the way to B sharp.

The first flat in a key signature is always B flat (the same as the last sharp); the second is always E flat, and so on, all the way to F flat. Notice that, just as with the key signatures, you add sharps or subtract flats as you go clockwise around the circle, and add flats or subtract sharps as you go counterclockwise.

Adding Sharps and Flats to the Key Signature

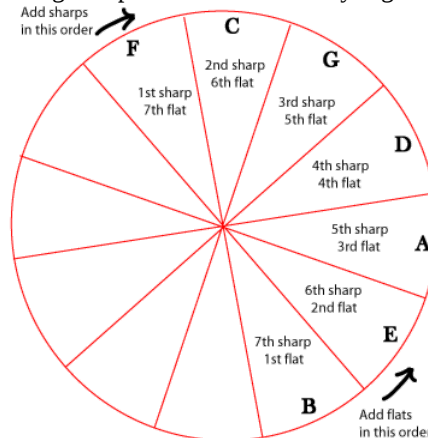


Figure 4: Each sharp and flat that is added to a key signature is also a perfect fifth away from the last sharp or flat that was added.

? Exercise 1.11.3

Figure shows that they are F sharp and C sharp. After D major, name the next four sharp keys, and name the sharp that is added with each key.

Answer

- A major adds G sharp
- E major adds D sharp

- B major adds A sharp
- F sharp major adds E sharp



Figure 5

? Exercise 1.11.4

E minor is the first sharp minor key; the first sharp added in both major and minor keys is always F sharp. Name the next three sharp minor keys, and the sharp that is added in each key.

Answer

- B minor adds C sharp
- F sharp minor adds G sharp
- C sharp minor adds D sharp



Figure 1.11.6:

? Exercise 1.11.5

After B flat major, name the next four flat keys, and name the flat that is added with each key.

Answer

- E flat major adds A flat
- A flat major adds D flat
- D flat major adds G flat
- G flat major adds C flat



Figure 1.11.7:

This page titled [1.11: The Circle of Fifths](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

CHAPTER OVERVIEW

Unit 2: Rhythm and Meter

- 2.1: Duration- Note Lengths in Written Music
- 2.2: Duration - Rest Length
- 2.3: Dots, Ties, and Borrowed Divisions
- 2.4: Rhythm
- 2.5: Time Signature
- 2.6: Introduction to Subdivisions in Simple Meters
- 2.7: Simple and Compound Time Signatures
- 2.8: Meter in Music
- 2.9: Introduction to Subdivisions in Compound Meters
- 2.10: Pickup Notes and Measures
- 2.11: Tempo

This page titled [Unit 2: Rhythm and Meter](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.1: Duration- Note Lengths in Written Music

The Shape of a Note

In standard notation, a single musical sound is written as a **note**. The two most important things a written piece of music needs to tell you about a note are its pitch - how high or low it is - and its **duration** - how long it lasts.

To find out the pitch of a written note, you look at the clef and the key signature, then see what line or space the note is on. The higher a note sits on the staff, the higher it sounds. To find out the duration of the written note, you look at the tempo and the time signature and then see what the note looks like.

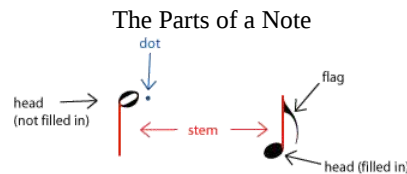


Figure 1: All of the parts of a written note affect how long it lasts.

The pitch of the note depends only on what line or space the **head** of the note is on. (Please see pitch, clef and key signature for more information.) If the note does not have a head (see Figure), that means that it does not have one definite pitch.

Notes Without Heads

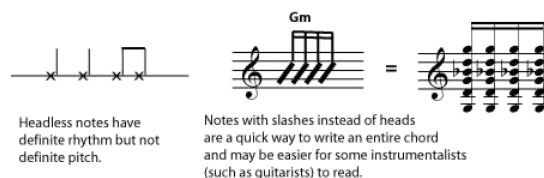


Figure 2: If a note does not have head, it does not have one definite pitch. Such a note may be a pitchless sound, like a drum beat or a hand clap, or it may be an entire chord rather than a single note.

The head of the note may be filled in (black), or not. The note may also have (or not) a stem, one or more flags, beams connecting it to other notes, or one or more dots following the head of the note. All of these things affect how much time the note is given in the music.

Note

A dot that is someplace other than next to the head of the note **does not affect the rhythm**. Other dots are articulation marks. They may affect the actual length of the note (the amount of time it sounds), but do not affect the amount of time it must be given. (The extra time when the note could be sounding, but isn't, becomes an unwritten rest.) If this is confusing, please see the explanation in articulation.

The Length of a Note

Most Common Note Lengths

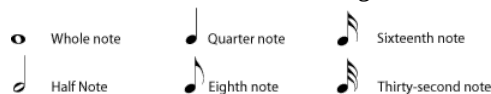


Figure 3

The simplest-looking note, with no stems or flags, is a **whole note**. All other note lengths are defined by how long they last compared to a whole note. A note that lasts half as long as a whole note is a **half note**. A note that lasts a quarter as long as a whole note is a **quarter note**. The pattern continues with **eighth notes**, **sixteenth notes**, **thirty-second notes**, **sixty-fourth notes**, and so on, each type of note being half the length of the previous type. (There are no such thing as third notes, sixth notes, tenth notes, etc.; see Dots, Ties, and Borrowed Divisions to find out how notes of unusual lengths are written.)

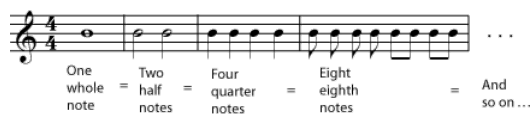


Figure 4: Note lengths work just like fractions in arithmetic: two half notes or four quarter notes last the same amount of time as one whole note. Flags are often replaced by beams that connect the notes into easy-to-read groups.

You may have noticed that some of the eighth notes in Figure don't have flags; instead they have a **beam** connecting them to another eighth note. If flagged notes are next to each other, their flags can be replaced by beams that connect the notes into easy-to-read groups. The beams may connect notes that are all in the same beat, or, in some vocal music, they may connect notes that are sung on the same text syllable. Each note will have the same number of beams as it would have flags.

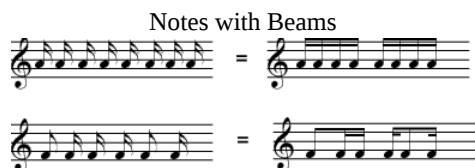


Figure 5: The notes connected with beams are easier to read quickly than the flagged notes. Notice that each note has the same number of beams as it would have flags, even if it is connected to a different type of note. The notes are often (but not always) connected so that each beamed group gets one beat. This makes the notes easier to read quickly.

You may have also noticed that the note lengths sound like fractions in arithmetic. In fact they work very much like fractions: two half notes will be equal to (last as long as) one whole note; four eighth notes will be the same length as one half note; and so on. (For classroom activities relating music to fractions, see Fractions, Multiples, Beats, and Measures.)

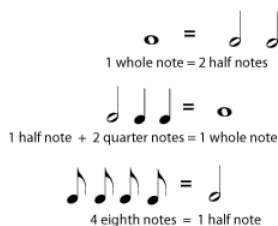


Figure 6

? Exercise 2.1.1

Draw the missing notes and fill in the blanks to make each side the same duration (length of time).

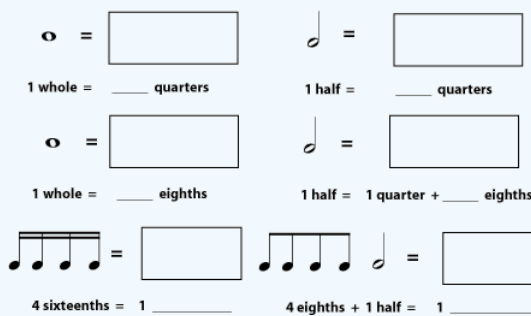


Figure 7

Answer

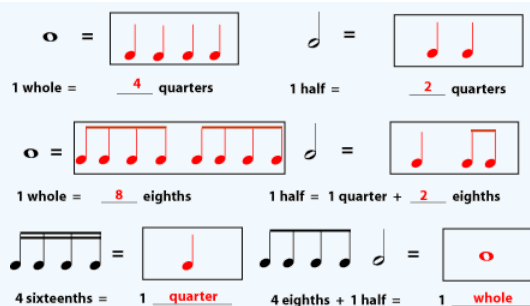


Figure 2.1.8:

So how long does each of these notes actually last? That depends on a couple of things. A written note lasts for a certain amount of time measured in beats. To find out exactly how many beats it takes, you must know the time signature. And to find out how long a beat is, you need to know the tempo.

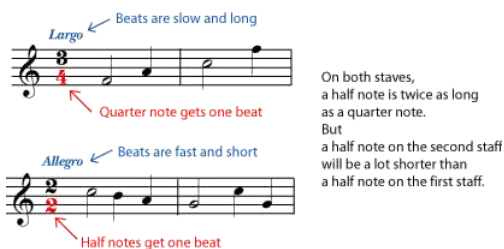


Figure 9: In any particular section of a piece of music, a half note is always twice as long as a quarter note. But how long each note actually lasts depends on the time signature and the tempo.

More about Stems

Whether a stem points up or down does not affect the note length at all. There are two basic ideas that lead to the rules for stem direction. One is that the music should be as easy as possible to read and understand. The other is that the notes should tend to be "in the staff" as much as reasonably possible.

Basic Stem Direction Rules

1. **Single Notes** - Notes below the middle line of the staff should be stem up. Notes on or above the middle line should be stem down.
2. **Notes sharing a stem (block chords)** - Generally, the stem direction will be the direction for the note that is furthest away from the middle line of the staff
3. **Notes sharing a beam** - Again, generally you will want to use the stem direction of the note farthest from the center of the staff, to keep the beam near the staff.
4. **Different rhythms being played at the same time by the same player** - Clarity requires that you write one rhythm with stems up and the other stems down.
5. **Two parts for different performers written on the same staff** - If the parts have the same rhythm, they may be written as block chords. If they do not, the stems for one part (the "high" part or "first" part) will point up and the stems for the other part will point down. This rule is especially important when the two parts cross; otherwise there is no way for the performers to know that the "low" part should be reading the high note at that spot.

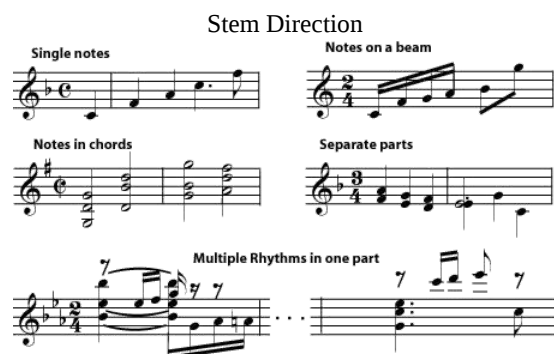


Figure 10: Keep stems and beams in or near the staff, but also use stem direction to clarify rhythms and parts when necessary.

This page titled [2.1: Duration- Note Lengths in Written Music](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.2: Duration - Rest Length

Page by: Catherine Schmidt-Jones

Summary:

In standard music notation, rests of different lengths have different shapes.

A **rest** stands for a silence in music. For each kind of note, there is a written rest of the same length.

The Most Common Rests



Figure 2.2.: 1.

For each note on the first line, write a rest of the same length on the second line. The first measure is done for you.



Figure 2.2.2: .

Solution Below

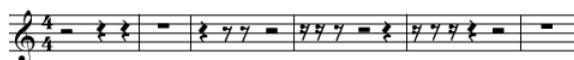


Figure 2.2.3: .

Rests don't necessarily mean that there is silence in the music at that point; only that that part is silent. Often, on a staff with multiple parts, a rest must be used as a placeholder for one of the parts, even if a single person is playing both parts. When the rhythms are complex, this is necessary to make the rhythm in each part clear.



Figure 2.2.4: : When multiple simultaneous rhythms are written on the same staff, rests may be used to clarify individual rhythms, even if another rhythm contains notes at that point.

The normal rule in common notation is that, for any line of music, the notes and rests in each measure must "add up" to exactly the amount in the time signature, no more and no less. For example, in 3/4 time, a measure can have any combination of notes and rests that is the same length as three quarter notes. There is only one common exception to this rule. As a simplifying shorthand, a completely silent measure can simply have a whole rest. In this case, "whole rest" does not necessarily mean "rest for the same length of time as a whole note"; it means "rest for the entire measure".



Figure 2.2.5: : A whole rest may be used to indicate a completely silent measure, no matter what the actual length of the measure will be.

This page titled [2.2: Duration - Rest Length](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.3: Dots, Ties, and Borrowed Divisions

A half note is half the length of a whole note; a quarter note is half the length of a half note; an eighth note is half the length of a quarter note, and so on. (See Duration:Note Length.) The same goes for rests. (See Duration: Rest Length.) But what if you want a note (or rest) length that isn't half of another note (or rest) length?

Dotted Notes

One way to get a different length is by dotting the note or rest. A **dotted note** is one-and-a-half times the length of the same note without the dot. In other words, the note keeps its original length and adds another half of that original length because of the dot. So a dotted half note, for example, would last as long as a half note plus a quarter note, or three quarters of a whole note.

$$\begin{aligned} \text{O} \cdot &= \text{O} + \text{J} \\ \text{J} \cdot &= \text{J} + \text{J} \\ \text{J} \cdot &= \text{J} + \text{J} \end{aligned}$$

Figure 1: The dot acts as if it is adding another note half the length of the original note. A dotted quarter note, for example, would be the length of a quarter plus an eighth, because an eighth note is half the length of a quarter note.

? Exercise 2.3.1

Make groups of equal length on each side, by putting a dotted note or rest in the box.

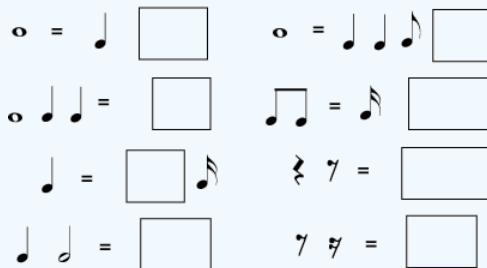


Figure 2

Answer

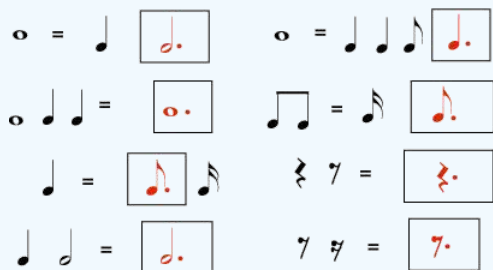


Figure 3

A note may have more than one dot. Each dot adds half the length that the dot before it added. For example, the first dot after a half note adds a quarter note length; the second dot would add an eighth note length.

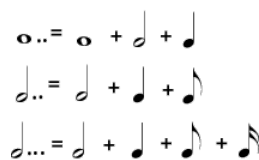


Figure 4: When a note has more than one dot, each dot is worth half of the dot before it.

Tied Notes

A dotted half lasts as long as a half note plus a quarter note. The same length may be written as a half note and a quarter note tied together. **Tied notes** are written with a curved line connecting two notes that are on the same line or the same space in the staff. Notes of any length may be tied together, and more than two notes may be tied together. **The sound they stand for will be a single note that is the length of all the tied notes added together.** This is another way to make a great variety of note lengths. Tied notes are also the only way to write a sound that starts in one measure and ends in a different measure.

Ties may look like slurs, but they are not the same; a slur connects to notes with different pitches and is a type of articulation.



Figure 5: When these eight notes are played as written, only five distinct notes are heard: one note the length of two whole notes; then a dotted half note; then another note the same length as the dotted half note; then a quarter note; then a note the same length as a whole note plus a quarter note.

Borrowed Divisions

Dots and ties give you much freedom to write notes of varying lengths, but so far you must build your notes from halves of other notes. If you want to divide a note length into anything other than halves or halves of halves - if you want to divide a beat into thirds or fifths, for example - you must write the number of the division over the notes. These unusual subdivisions are called **borrowed divisions** because they sound as if they have been borrowed from a completely different meter. They can be difficult to perform correctly and are avoided in music for beginners. The only one that is commonly used is **triplets**, which divide a note length into equal thirds.

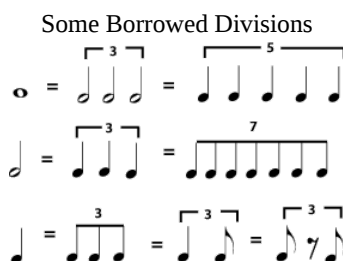


Figure 6: Any common note length can be divided into an unusual number of equal-length notes and rests, for example by dividing a whole note into three instead of two "half" notes. The notes are labeled with the appropriate number. If there might be any question as to which notes are involved in the borrowed division, a bracket is placed above them. Triplets are by far the most common borrowed division.

Borrowed Duplets



Figure 7: In a compound meter, which normally divides a beat into three, the borrowed division may divide the beat into two, as in a simple meter. You may also see duplets in swing music.

Notes in jazzy-sounding music that has a "swing" beat are often assumed to be triplet rhythms, even when they look like regular divisions; for example, two written eighth notes (or a dotted quarter-sixteenth) might sound like a triplet quarter-eighth rhythm. In jazz and other popular music styles, a tempo notation that says **swing** usually means that all rhythms should be played as triplets. **Straight** means to play the rhythms as written.

Some jazz musicians prefer to think of a swing rhythm as more of a heavy accent on the second eighth, rather than as a triplet rhythm, particularly when the tempo is fast. This distinction is not important for students of music theory, but jazz students will

want to work hard on using both rhythm and articulation to produce a convincing "swing".

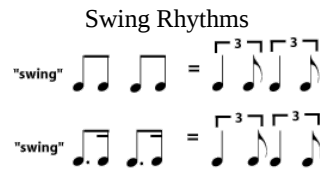


Figure 8: Jazz or blues with a "**swing**" **rhythm** often assumes that all divisions are triplets. The swung triplets may be written as triplets, or they may simply be written as "straight" eighth notes or dotted eighth-sixteenths. If rhythms are not written as triplets, the tempo marking usually includes an indication to "swing", or it may simply be implied by the style and genre of the music.

This page titled [2.3: Dots, Ties, and Borrowed Divisions](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.4: Rhythm

Rhythm, melody, harmony, timbre, and texture are the essential aspects of a musical performance. They are often called the basic elements of music. The main purpose of music theory is to describe various pieces of music in terms of their similarities and differences in these elements, and music is usually grouped into genres based on similarities in all or most elements. It's useful, therefore, to be familiar with the terms commonly used to describe each element. Because harmony is the most highly developed aspect of Western music, music theory tends to focus almost exclusively on melody and harmony. Music does not have to have harmony, however, and some music doesn't even have melody. So perhaps the other three elements can be considered the most basic components of music.

Music cannot happen without time. The placement of the sounds in time is the rhythm of a piece of music. Because music must be heard over a period of time, rhythm is one of the most basic elements of music. In some pieces of music, the rhythm is simply a "placement in time" that cannot be assigned a beat or meter, but most rhythm terms concern more familiar types of music with a steady beat. See [Meter](#) for more on how such music is organized, and [Duration and Time Signature](#) for more on how to read and write rhythms. See [Simple Rhythm Activities](#) for easy ways to encourage children to explore rhythm.

Rhythm Terms

- **Rhythm** - The term "rhythm" has more than one meaning. It can mean the basic, repetitive pulse of the music, or a rhythmic pattern that is repeated throughout the music (as in "feel the rhythm"). It can also refer to the pattern in time of a single small group of notes (as in "play this rhythm for me").
 - **Beat** - Beat also has more than one meaning, but always refers to music with a steady pulse. It may refer to the pulse itself (as in "play this note on beat two of the measure"). **On the beat** or **on the downbeat** refer to the moment when the pulse is strongest. **Off the beat** is in between pulses, and the **upbeat** is exactly halfway between pulses. **Beat** may also refer to a specific repetitive rhythmic pattern that maintains the pulse (as in "it has a Latin beat"). Note that once a strong feeling of having a beat is established, it is not necessary for something to happen on every beat; a beat can still be "felt" even if it is not specifically heard.
 - **Measure or bar** - Beats are grouped into measures or bars. The first beat is usually the strongest, and in most music, most of the bars have the same number of beats. This sets up an underlying pattern in the pulse of the music: for example, strong-weak-strong-weak-strong-weak, or strong-weak-weak-strong-weak-weak. (See [Meter](#).)
 - **Rhythm Section** - The rhythm section of a band is the group of instruments that usually provide the background rhythm and chords. The rhythm section almost always includes a percussionist (usually on a drum set) and a bass player (usually playing a plucked string bass of some kind). It may also include a piano and/or other keyboard players, more percussionists, and one or more guitar players or other strummed or plucked strings. Vocalists, wind instruments, and bowed strings are usually not part of the rhythm section.
 - **Syncopation** - Syncopation occurs when a strong note happens either on a weak beat or off the beat. See [Syncopation](#).
-

This page titled [2.4: Rhythm](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.5: Time Signature

In common notation, the **time signature** appears at the beginning of a piece of music, right after the key signature. Unlike the key signature, which is on every staff, the time signature will not appear again in the music unless the meter changes. The meter of a piece is a repetitive rhythmic pulse that underlies the music. The time signature is the symbol that tells you what meter is being used in a piece of music and what types of note) are being used to write it out.

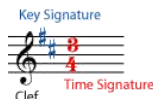


Figure 1: The time signature appears at the beginning of the piece of music, right after the clef symbol and key signature.

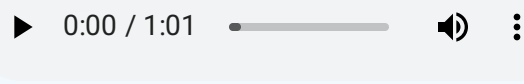
Beats and Measures

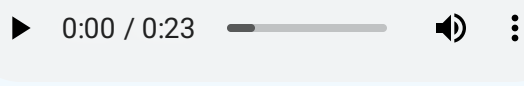
Music happens over a period of time, so a very common way to organize music is to divide that time into short periods of the same length, using audible pulses called **beats**. Each pulse is **a beat**, and the regular, predictable pulse of a piece of music is **the beat**. The beat is created when the musicians do things (like hit a drum, strum a guitar, or start singing a word) at very regular intervals. This creates an audible, predictable pulse that helps the musicians to coordinate what they are doing so that they sound good together. The predictability and audibility of the beat also allows others to join in. As soon as listeners can "feel the beat," they can clap hands, snap fingers, tap their feet, nod their heads, march, dance, or sing along "in time" with the music (in other words, coordinated with the musicians). Anything that happens during the audible pulse (a clap or drum hit, for example), as well as anything that starts during a pulse (such as a sung word, or a note on a flute or violin) is said to be **on the beat**. Of course, things can happen in between the beats, too, but the timing for those is also coordinated using the beats; for example, a note might begin at exactly the halfway point between two beats.

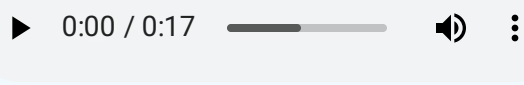
Not all music has beats and a time signature. In music with a **free** rhythm or meter, there is no time signature, and no regular pulse to the music; the musicians are free to play or sing a note at whatever time they feel is best. Other pieces may have a written time signature, to help the musicians keep track of time, but the musical events in the piece do not give it an audible beat.

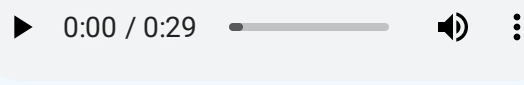
Learning Objectives

Listen to excerpts A, B, C and D. Can you clap your hands, tap your feet, or otherwise move "to the beat"? Is there a piece in which it is easier or harder to feel the beat?

Example A: 

Example B: 

Example C: 

Example D: 

When music is organized into beats, it makes sense to write it down that way. In common notation, the composer assigns a particular kind of note to be one beat long. For example, if "a quarter note gets a beat," then playing many quarter notes in a row would mean playing a new note on every beat. The quarter note is most likely to play this role, but any type of note can get the "this is one beat" designation.

In most metered music, some of the beats are stronger (louder, more powerful, more noticeable, or busier), than others, and there is a regular pattern of stronger and weaker beats, for example, strong-weak-weak-strong-weak-weak, or strong-weak-strong-weak. So the beats are organized even further by grouping them into **bars**, or **measures**. (The two words mean the same thing.) For example, for music with a beat pattern of strong-weak-weak-strong-weak-weak, or 1-2-3-1-2-3, a measure would have three beats in it. The **time signature** tells you two things: how many beats there are in each measure, and what type of note gets a beat.

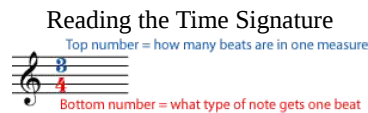


Figure 2: This time signature means that there are three quarter notes (or any combination of notes that equals three quarter notes) in every measure. A piece with this time signature would be "in three four time" or just "in three four".

? Exercise 2.5.1

Listen again to the music in the **Learning Objective**. Instead of clapping, count each beat. Decide whether the music has 2, 3, or 4 beats per measure. In other words, does it feel more natural to count 1-2-1-2, 1-2-3-1-2-3, or 1-2-3-4-1-2-3-4?

Answer

- A has a very strong, quick 1-2-3 beat.
- B is in a slow (easy) 2. You may feel it in a fast 4.
- C is in a stately 4.
- D is in 3, but the beat may be harder to feel than in A because the rhythms are more complex and the performer is taking some liberties with the tempo.

Reading Time Signatures

Most time signatures contain two numbers. The top number tells you how many beats there are in a measure. The bottom number tells you what kind of note gets a beat.

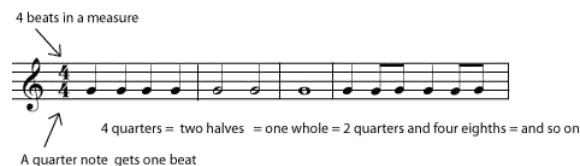


Figure 3: In "four four" time, there are four beats in a measure and a quarter note gets a beat. In order to keep the meter going steadily, every measure must have a combination of notes and rests that is equivalent to four quarter notes.

You may have noticed that the time signature looks a little like a fraction in arithmetic. Filling up measures feels a little like finding equivalent fractions, too. In "four four time", for example, there are four beats in a measure and a quarter note gets one beat. So four quarter notes would fill up one measure. But so would any other combination of notes and rests that equals four quarters: one whole, two halves, one half plus two quarters, a half note and a half rest, and so on.

If the time signature is three eight, any combination of notes that adds up to three eighths will fill a measure. Remember that a dot is worth an extra half of the note it follows. Figure.



Figure 4: If the time signature is three eight, a measure may be filled with any combination of notes and rests that adds up to three eight.

? Exercise 2.5.1

Write each of the time signatures below (with a clef symbol) at the beginning of a staff. Write at least four measures of music in each time signature. Fill each measure with a different combination of note lengths. Use at least one dotted note on each staff. If you need some staff paper, you can download this [PDF file](#).

1. Two four time

2. Three eight time
3. Six four time

Answer

There are an enormous number of possible note combinations for any time signature. That's one of the things that makes music interesting. Here are some possibilities. If you are not sure that yours are correct, check with your music instructor.



Figure 5: These are only a few of the many, many possible note combinations that could be used in these time signatures.

A few time signatures don't have to be written as numbers. Four four time is used so much that it is often called **common time**, written as a bold "C". When both fours are "cut" in half to twos, you have **cut time**, written as a "C" cut by a vertical slash.

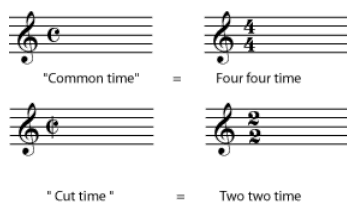


Figure 6

Counting and Conducting

You may have already noticed that a measure in four four time looks the same as a measure in two two. After all, in arithmetic, four quarters adds up to the same thing as two halves. For that matter, why not call the time signature "one one" or "eight eight"?

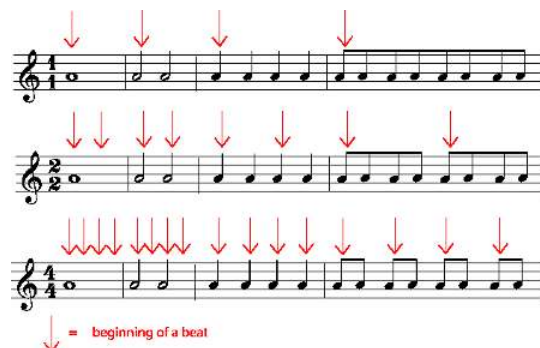


Figure 7: Measures in all of these meters look the same, but feel different. The difference is how many downbeats there are in a measure.

Or why not write two two as two four, giving quarter notes the beat instead of half notes? The music would look very different, but it would sound the same, as long as you made the beats the same speed. The music in each of the staves in this.



Figure 8: The music in each of these staves should sound exactly alike.

So why is one time signature chosen rather than another? The composer will normally choose a time signature that makes the music easy to read and also easy to count and conduct. Does the music feel like it has four beats in every measure, or does it go by so quickly that you only have time to tap your foot twice in a measure?

A common exception to this rule of thumb is six eight time, and the other time signatures (for example nine eight and twelve eight) that are used to write compound meters. A piece in six eight might have six beats in every measure, with an eighth note getting a beat. But it is more likely that the conductor (or a tapping foot) will give only two beats per measure, with a dotted quarter (or three eighth notes) getting one beat. In the same way, three eight may only have one beat per measure; nine eight, three beats per measure; and twelve eight, four beats per measure. Why the exceptions? Since beats normally get divided into halves and quarters, this is the easiest way for composers to write beats that are divided into thirds.

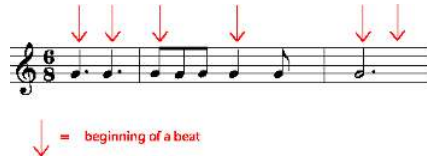


Figure 9: In six eight time, a dotted quarter usually gets one beat. This is the easiest way to write beats that are evenly divided into three rather than two.

This page titled [2.5: Time Signature](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.6: Introduction to Subdivisions in Simple Meters

In general, we more accurately gauge shorter periods than longer periods of time. For instance, the difference between the length of whole notes performed at a quarter note = 60 and then at 66 would be difficult to discern. However, we can easily discern the difference between sixteenth notes performed at those speeds, four to a quarter-note beat. Our ability to perceive smaller increments of time can help us with the larger time spans. By accumulating many smaller time spans we can accurately measure or perceive the larger ones.

“Subdivision” or “subdividing” refers to dividing the beat, most often silently, into smaller units. Technically speaking divisions are note values that divide beats (in 4/4 and 6/8 they are eighth notes) and subdivisions are note values that further divide divisions (in 4/4 and 6/8 they are sixteenth notes). Informally, however, most performing musicians use the term subdivision to describe counting note values smaller than the beat. Usually these note values are eighth or sixteenth notes. The ability to subdivide while performing music ensures rhythmic accuracy and is an important skill that all musicians need to develop.

Simple meters (2/4, 3/4, 4/4 etc.) generally feature subdivisions of the beat in four parts. In the figure below please notice that the sixteenth notes form subdivisions of all of the larger value notes:

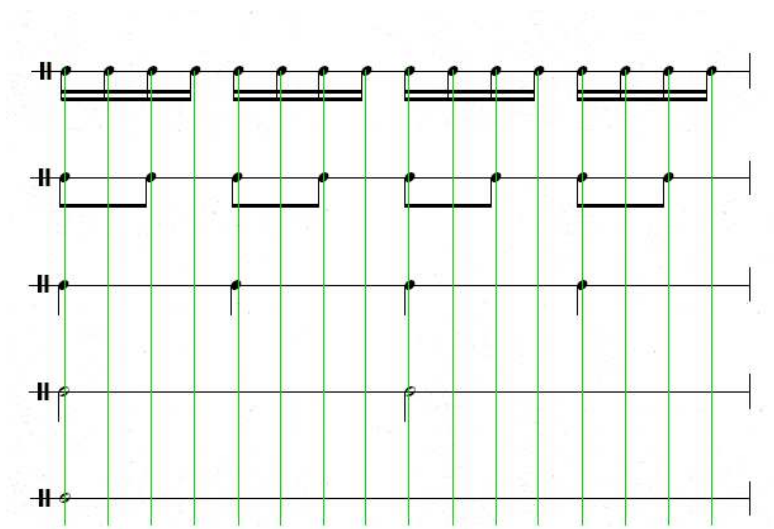


Figure 2.6.1:

Below is an example with subdivisions: the upper part is aligned with sixteenth note subdivisions in the lower part:

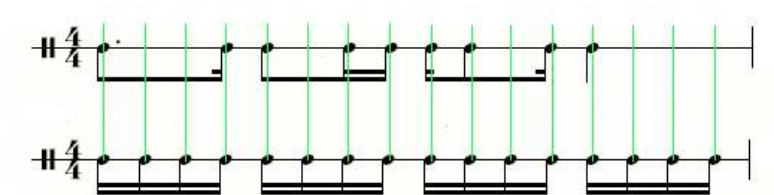
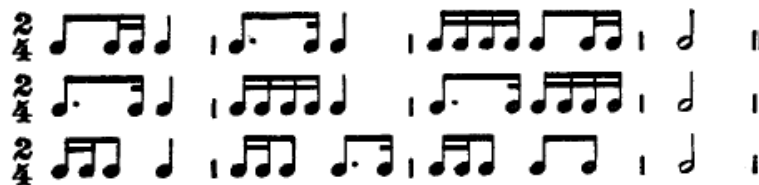


Figure 2.6.2:

The first step to internalizing the subdivisions is to beat out a steady pattern of sixteenth notes while playing a melody line. For instance, while tapping 16th notes with a hand or foot try singing or saying the upper part with “ta” or “la” for each note. This may take a little bit of practice.

Try tapping out eighth notes while performing these simple patterns:

When you have mastered the above examples with eighth notes, try subdivisions of sixteenth notes. Here are some further examples to practice with sixteenth note subdivisions:



Consider the following figure with notes placed rhythmically placed spatially along the staff line:



If we add eighth note pulses we obtain:



The sixteenth notes at numbers 1 and 2 appear rhythmically accurate; at least they are positioned so that they don't intersect the eighth note lines. However, if we subdivide the example with sixteenth notes (presented in the green and blue lines) we notice that the rhythmic placement at number 2 is not accurate:

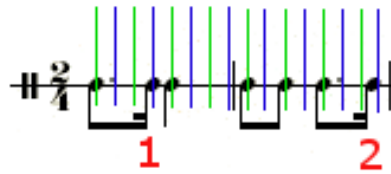


Figure 2.6.7:

The sixteenth at number 1 coincides with the sixteenth note pulse (blue line) but the sixteenth at number 2 clearly is not centered with the appropriate sixteenth note pulse. The slight rhythmic sloppiness is hardly noticeable with eighth note divisions but becomes quite obvious with the sixteenth note subdivisions.

Thus, the smaller and more frequent the rhythmic subdivisions, the more accurately the rhythms can be scrutinized. For this reason, musicians with the highest degree of rhythmic accuracy have the greatest mastery of very rapid subdivisions.

The rule of thumb is to pick the smallest value of subdivision you can internally hear when you perform.

This page titled [2.6: Introduction to Subdivisions in Simple Meters](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.7: Simple and Compound Time Signatures

Simple and Compound Time Signatures

Simple Time Signatures

Type	Common		Uncommon	
Simple Duple	2 2	2 4	2 8	2 16
Simple Triple	3 2	3 4	3 8	3 16
Simple Quadruple	4 2	4 4	4 8	4 16

Figure 2.7.1:

In simple time signatures the top number represents the number of beats per measure. The bottom number indicates the type of note equal to one beat. The division of the beat is the lower number multiplied by 2. Thus, the division of the beat is grouped by twos.

Example: 4 – There are 4 beats in each measure.
4 – A quarter note equals one beat. Division of the beat is two eighth notes.

Figure 2.7.2:

Compound Time Signatures

Type	Common		
Compound Duple	6 4	6 8	6 16
Compound Triple	9 4	9 8	9 16
Compound Quadruple	12 4	12 8	12 16

Figure 2.7.3:

In compound time signatures the top number divided by 3 represents the number of beats per measure. The bottom number indicates the type of note that divides the beat. The division of the beat is grouped by threes.

Example: 9 – There are 3 beats per measure.
16 – Three sixteenth notes equals 1 beat.

Figure 2.7.4:

Hearing simple and compound time signatures

Listen carefully for the pulse or beat of the music. Do you hear divisions of two or three? A simple test is to try saying "apple" or "pineapple" to each beat. "Apple" has two syllables and will fit simple meters. "Pineapple"--having three syllables--naturally fits compound meters.

Protons created by Laurel A. Ewell and used with her permission.

This page titled [2.7: Simple and Compound Time Signatures](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.8: Meter in Music

What is Meter?

The **meter** of a piece of music is the arrangement of its rhythms in a repetitive pattern of strong and weak beats. This does not necessarily mean that the rhythms themselves are repetitive, but they do strongly suggest a repeated pattern of pulses. It is on these pulses, the beat of the music, that you tap your foot, clap your hands, dance, etc.

Some music does not have a meter. Ancient music, such as Gregorian chants; new music, such as some experimental twentieth-century art music; and Non-Western music, such as some native American flute music, may not have a strong, repetitive pattern of beats. Other types of music, such as traditional Western African drumming, may have very complex meters that can be difficult for the beginner to identify.

But most Western music has simple, repetitive patterns of beats. This makes **meter** a very useful way to organize the music. Common notation, for example, divides the written music into small groups of beats called measures, or bars. The lines dividing each measure from the next help the musician reading the music to keep track of the rhythms. A piece (or section of the piece) is assigned a time signature that tells the performer how many beats to expect in each measure, and what type of note should get one beat. (For more on reading time signatures, please see Time Signature.)

Conducting also depends on the meter of the piece; conductors use different conducting patterns for the different meters. These patterns emphasize the differences between the stronger and weaker beats to help the performers keep track of where they are in the music.

But the conducting patterns depend only on the pattern of strong and weak beats. In other words, they only depend on "how many beats there are in a measure", not "what type of note gets a beat". So even though the time signature is often called the "meter" of a piece, one can talk about meter without worrying about the time signature or even being able to read music. (Teachers, note that this means that children can be introduced to the concept of meter long before they are reading music. See Meter Activities for some suggestions.)

Classifying Meters

Meters can be classified by counting the number of beats from one strong beat to the next. For example, if the meter of the music feels like "strong-weak-strong-weak", it is in **duple** meter. "strong-weak-weak-strong-weak-weak" is **triple** meter, and "strong-weak-weak-weak" is **quadruple**. (Most people don't bother classifying the more unusual meters, such as those with five beats in a measure.)

Meters can also be classified as either simple or compound. In a **simple** meter, each beat is basically divided into halves. In **compound** meters, each beat is divided into thirds.

A **borrowed division** occurs whenever the basic meter of a piece is interrupted by some beats that sound like they are "borrowed" from a different meter. One of the most common examples of this is the use of triplets to add some compound meter to a piece that is mostly in a simple meter. (See Dots, Ties, and Borrowed Divisions to see what borrowed divisions look like in common notation.)

Recognizing Meters

To learn to recognize meter, remember that (in most Western music) the beats and the subdivisions of beats are all equal and even. So you are basically listening for a running, even pulse underlying the rhythms of the music. For example, if it makes sense to count along with the music "ONE-and-Two-and-ONE-and-Two-and" (with all the syllables very evenly spaced) then you probably have a simple duple meter. But if it's more comfortable to count "ONE-and-a-Two-and-a-ONE-and-a-Two-and-a", it's probably compound duple meter. (Make sure numbers always come on a pulse, and "one" always on the strongest pulse.)

This may take some practice if you're not used to it, but it can be useful practice for anyone who is learning about music. To help you get started, the figure below sums up the most-used meters. To help give you an idea of what each meter should feel like, here are some animations (with sound) of duple compound, triple compound, quadruple compound meters. You may also want to listen

▶ 0:00 / 0:39 — 🔊 ⋮

to some examples of music that is in simple triple, compound duple, and

compound triple meters.

Meters			
Meter	Count	Example Time Signature	
Duple Simple	1 & 2 &	2	4
Triple Simple	1 & 2 & 3 &	3	4
Quadruple Simple	1 & 2 & 3 & 4 &	4	4
Duple Compound	1 & a 2 & a	6	8
Triple Compound	1 & a 2 & a 3 & a	9	8
Quadruple Compound	1 & a 2 & a 3 & a 4 & a	12	8

Figure 1: Remember that meter is not the same as time signature; the time signatures given here are just examples. For example, 2/2 and 2/8 are also simple duple meters.

This page titled [2.8: Meter in Music](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.9: Introduction to Subdivisions in Compound Meters

Introduction to Subdivisions in Compound Meters

Subdivisions in compound meters (6/8, 9/8, 12/8 etc.) generally feature divisions of three eighth notes to each beat or pulse. Naturally each eighth note may then be divided with sixteenth notes:

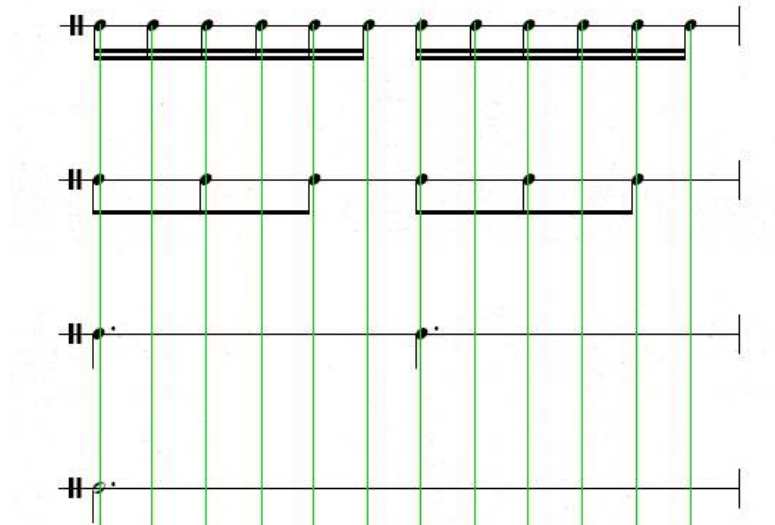


Figure 2.9.1:

First perform the following by tapping eighth notes while singing the melody with “Ta” or “La” or playing it on your instrument.

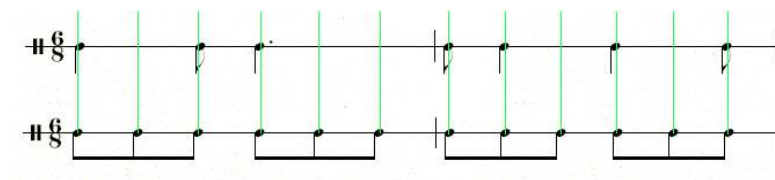


Figure 2.9.2:

Once you have mastered that exercise, try to “hear” the tapping internally. Play the upper line while hearing the tapping.

Try this example in 6/8 with sixteenth note subdivisions:

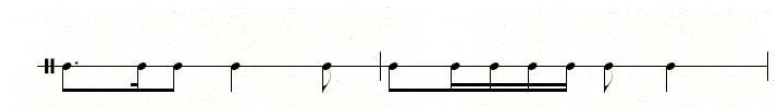


Figure 2.9.3:

A good rule of thumb is to subdivide with the smallest note value possible. If the example above was performed at a slow tempo, eighth note = 60, then subdivisions with 32nd notes would be quite possible and would help to ensure proper note values. At a tempo of dotted quarter note = 100, sixteenth note subdivisions would be preferred. This new tempo would be too rapid to subdivide easily with 32nd notes.

Here are some further examples to subdivide with sixteenth notes (Wedge, p. 165):

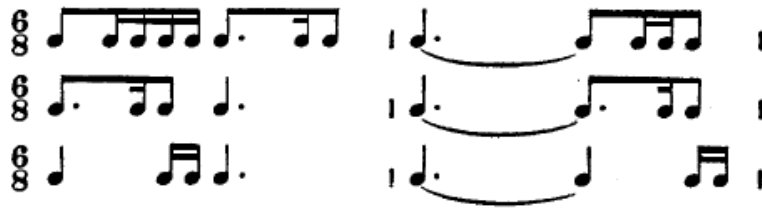


Figure 2.9.4:

This page titled [2.9: Introduction to Subdivisions in Compound Meters](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.10: Pickup Notes and Measures

Pickup Measures

Normally, all the measures of a piece of music must have exactly the number of beats indicated in the time signature. The beats may be filled with any combination of notes or rests (with duration values also dictated by the time signature), but they must combine to make exactly the right number of beats. If a measure or group of measures has more or fewer beats, the time signature must change.

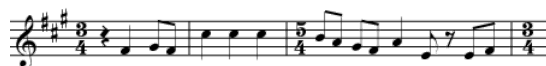


Figure 1: Normally, a composer who wants to put more or fewer beats in a measure must change the time signature, as in this example from Mussorgsky's *Boris Godunov*.

There is one common exception to this rule. (There are also some less common exceptions not discussed here.) Often, a piece of music does not begin on the strongest downbeat. Instead, the strong beat that people like to count as "one" (the beginning of a measure), happens on the second or third note, or even later. In this case, the first measure may be a full measure that begins with some rests. But often the first measure is simply not a full measure. This shortened first measure is called a **pickup measure**.

If there is a pickup measure, the final measure of the piece should be shortened by the length of the pickup measure (although this rule is sometimes ignored in less formal written music). For example, if the meter of the piece has four beats, and the pickup measure has one beat, then the final measure should have only three beats. (Of course, any combination of notes and rests can be used, as long as the total in the first and final measures equals one full measure.)



Figure 2: If a piece begins with a pickup measure, the final measure of the piece is shortened by the length of the pickup measure.

Pickup Notes

Any phrase of music (not just the first one) may begin someplace other than on a strong downbeat. All the notes before the first strong downbeat of any phrase are the **pickup notes** to that phrase.

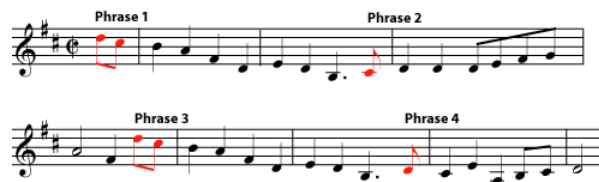


Figure 3: Any phrase may begin with pickup notes. Each of these four phrases begins with one or two pickup notes. (You may listen to the tune [here](#); can you hear that the pickup notes lead to the stronger downbeat?)

A piece that is using pickup measures or pickup notes may also sometimes place a double bar (with or without repeat signs) inside a measure, in order to make it clear which phrase and which section of the music the pickup notes belong to. If this happens (which is a bit rare, because it can be confusing to read), there is still a single bar line where it should be, at the end of the measure.

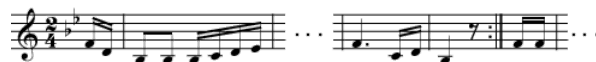


Figure 4: At the ends of sections of the music, a measure may be interrupted by a double bar that places the pickup notes in the correct section and assures that repeats have the correct number of beats. When this happens, the bar line will still appear at the end of the completed measure. This notation can be confusing, though, and in some music the pickups and repeats are written in a way that avoids these broken-up measures.

This page titled [2.10: Pickup Notes and Measures](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

2.11: Tempo

The **tempo** of a piece of music is its speed. There are two ways to specify a tempo. Metronome markings are absolute and specific. Other tempo markings are verbal descriptions which are more relative and subjective. Both types of markings usually appear above the staff, at the beginning of the piece, and then at any spot where the tempo changes. Markings that ask the player to deviate slightly from the main tempo, such as *ritardando* may appear either above or below the staff.

Metronome Markings

Metronome markings are given in beats per minute. They can be estimated using a clock with a second hand, but the easiest way to find them is with a **metronome**, which is a tool that can give a beat-per-minute tempo as a clicking sound or a pulse of light. Figure shows some examples of metronome markings.

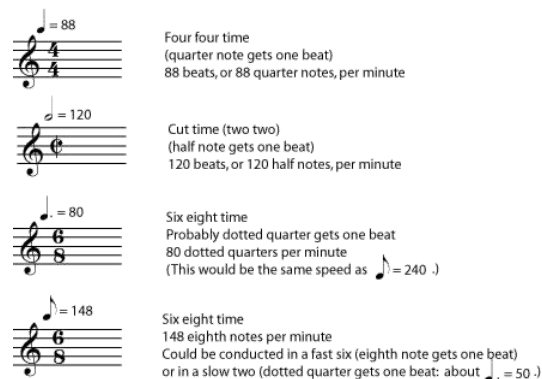


Figure 1

Metronomes often come with other tempo indications written on them, but this is misleading. For example, a metronome may have allegro marked at 120 beats per minute and andante marked at 80 beats per minute. Allegro should certainly be quite a bit faster than andante, but it may not be exactly 120 beats per minute.

Tempo Terms

A tempo marking that is a word or phrase gives you the composer's idea of **how fast the music should feel**. How fast a piece of music feels depends on several different things, including the texture and complexity of the music, how often the beat gets divided into faster notes, and how fast the beats themselves are (the metronome marking). Also, the same tempo marking can mean quite different things to different composers; if a metronome marking is not available, the performer should use a knowledge of the music's style and genre, and musical common sense, to decide on the proper tempo. When possible, listening to a professional play the piece can help with tempo decisions, but it is also reasonable for different performers to prefer slightly different tempos for the same piece.

Traditionally, tempo instructions are given in Italian.

Some Common Tempo Markings

- **Grave** - very slow and solemn (pronounced "GRAH-vay")
- **Largo** - slow and broad ("LAR-go")
- **Larghetto** - not quite as slow as largo ("lar-GET-oh")
- **Adagio** - slow ("uh-DAH-jee-oh")
- **Lento** - slow ("LEN-toe")
- **Andante** - literally "walking", a medium slow tempo ("on-DON-tay")
- **Moderato** - moderate, or medium ("MOD-er-AH-toe")
- **Allegretto** - Not as fast as allegro ("AL-luh-GRET-oh")
- **Allegro** - fast ("uh-LAY-grow")
- **Vivo, or Vivace** - lively and brisk ("VEE-voh")
- **Presto** - very fast ("PRESS-toe")
- **Prestissimo** - very, very fast ("press-TEE-see-moe")

These terms, along with a little more Italian, will help you decipher most tempo instructions.

More useful Italian

- **(un) poco** - a little ("oon POH-koe")
- **molto** - a lot ("MOLE-toe")
- **piu** - more ("pew")
- **meno** - less ("MAY-no")
- **mosso** - literally "moved"; motion or movement ("MOE-so")

? Exercise 2.11.1

Check to see how comfortable you are with Italian tempo markings by translating the following.

1. un poco allegro
2. molto meno mosso
3. piu vivo
4. molto adagio
5. poco piu mosso

Answer

1. a little fast
2. much less motion = much slower
3. more lively = faster
4. very slow
5. a little more motion = a little faster

Of course, tempo instructions don't have to be given in Italian. Much folk, popular, and modern music, gives instructions in English or in the composer's language. Tempo indications such as "Not too fast", "With energy", "Calmly", or "March tempo" give a good idea of how fast the music should feel.

Gradual Tempo Changes

If the tempo of a piece of music suddenly changes into a completely different tempo, there will be a new tempo given, usually marked in the same way (metronome tempo, Italian term, etc.) as the original tempo. Gradual changes in the basic tempo are also common in music, though, and these have their own set of terms. These terms often appear below the staff, although writing them above the staff is also allowed. These terms can also appear with [modifiers](#) like molto or un poco. You may notice that there are quite a few terms for slowing down. Again, the use of these terms will vary from one composer to the next; unless beginning and ending tempo markings are included, the performer must simply use good musical judgement to decide how much to slow down in a particular ritardando or rallentando.

Gradual Tempo Changes

- **accelerando** - (abbreviated accel.) accelerating; getting faster
- **ritardando** - (abbrev. rit.) slowing down
- **ritenuto** - (abbrev. riten.) slower
- **rallentando** - (abbrev. rall.) gradually slower
- **rubato** - don't be too strict with the rhythm; while keeping the basic tempo, allow the music to gently speed up and relax in ways that emphasize the phrasing
- **poco a poco** - little by little; gradually
- **Tempo I** - ("tempo one" or "tempo primo") back to the original tempo (this instruction usually appears above the staff)

This page titled [2.11: Tempo](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

CHAPTER OVERVIEW

Unit 3: Minor Scales and Keys

[3.1: Minor Keys and Scales](#)

[3.2: Learning Major and Minor Scales](#)

[3.3: Ear Training](#)

This page titled [Unit 3: Minor Scales and Keys](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell](#) & [Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

3.1: Minor Keys and Scales

Music in a Minor Key

Each major key uses a different set of notes (its major scale). In each major scale, however, the notes are arranged in the same major scale pattern and build the same types of chords that have the same relationships with each other. (See *Beginning Harmonic Analysis* for more on this.) So music that is in, for example, C major, will not sound significantly different from music that is in, say, D major. But music that is in D minor will have a different quality, because the notes in the minor scale follow a different pattern and so have different relationships with each other. Music in minor keys has a different sound and emotional feel, and develops differently harmonically. So you can't, for example, transpose a piece from C major to D minor (or even to C minor) without changing it a great deal. Music that is in a minor key is sometimes described as sounding more solemn, sad, mysterious, or ominous than music that is in a major key. To hear some simple examples in both major and minor keys, see *Major Keys and Scales*.

Minor Scales

Minor scales sound different from major scales because they are based on a different pattern of intervals. Just as it did in major scales, starting the minor scale pattern on a different note will give you a different key signature, a different set of sharps or flats. The scale that is created by playing all the notes in a minor key signature is a **natural minor scale**. To create a natural minor scale, start on the tonic note and go up the scale using the interval pattern: **whole step, half step, whole step, whole step, half step, whole step, whole step**.

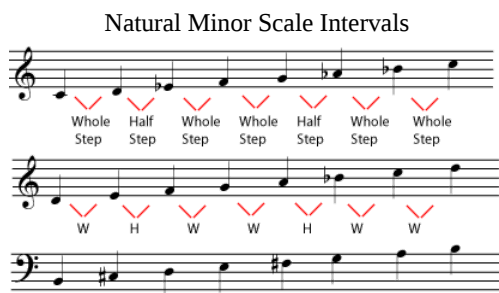


Figure 1

[Listen](#) to these minor scales.

? Exercise 3.1.1

For each note below, write a natural minor scale, one octave, ascending (going up) beginning on that note. If you need staff paper, you may print the [staff paper](#) PDF file.



Figure 2

Answer



Figure 3

Relative Minor and Major Keys

Each minor key shares a key signature with a major key. A minor key is called the **relative minor** of the major key that has the same key signature. Even though they have the same key signature, a minor key and its **relative major** sound very different. They have different tonal centers, and each will feature melodies, harmonies, and chord progressions built around their (different) tonal centers. In fact, certain strategic accidentals are very useful in helping establish a strong tonal center in a minor key. These useful accidentals are featured in the harmonic minor scales.

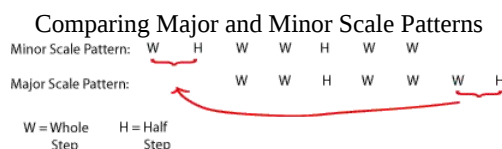


Figure 4: The interval patterns for major and natural minor scales are basically the same pattern starting at different points.

It is easy to predict where the relative minor of a major key can be found. Notice that the pattern for minor scales overlaps the pattern for major scales. In other words, they are the same pattern starting in a different place. (If the patterns were very different, minor key signatures would not be the same as major key signatures.) The pattern for the minor scale starts a half step plus a whole step lower than the major scale pattern, so **a relative minor is always three half steps lower than its relative major**. For example, C minor has the same key signature as E flat major, since E flat is a minor third higher than C.

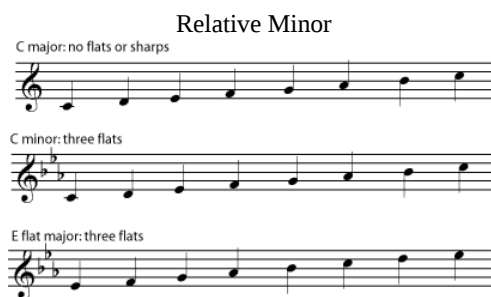


Figure 5: The C major and C minor scales start on the same note, but have different key signatures. C minor and E flat major start on different notes, but have the same key signature. C minor is the **relative minor** of E flat major.

? Exercise 3.1.1

What are the relative majors of the minor keys in **Figure 3**?

Answer

1. A minor: C major
2. G minor: B flat major

3. B flat minor: D flat major
4. E minor: G major
5. F minor: A flat major
6. F sharp minor: A major

Harmonic and Melodic Minor Scales

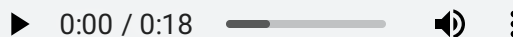
Do key signatures make music more complicated than it needs to be? Is there an easier way? Join the discussion at Opening Measures.

All of the scales above are **natural minor scales**. They contain only the notes in the minor key signature. There are two other kinds of minor scales that are commonly used, both of which include notes that are not in the key signature. The **harmonic minor scale** **raises the seventh note of the scale by one half step, whether you are going up or down the scale**. Harmonies in minor keys often use this raised seventh tone in order to make the music feel more strongly centered on the tonic. (Please see Beginning Harmonic Analysis for more about this.) In the **melodic minor scale**, **the sixth and seventh notes of the scale are each raised by one half step when going up the scale, but return to the natural minor when going down the scale**. Melodies in minor keys often use this particular pattern of accidentals, so instrumentalists find it useful to practice melodic minor scales.

Comparing Types of Minor Scales



Figure 6



Listen to the differences between the harmonic minor, and minor scales.

melodic

? Exercise 3.1.1

Rewrite each scale from **Figure 3** as an ascending harmonic minor scale.

Answer

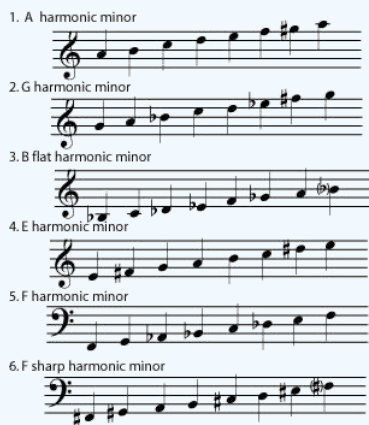


Figure 7

? Exercise 3.1.1

Rewrite each scale from **Figure 3** as an ascending and descending melodic minor scale.

Answer



Figure 8

Jazz and "Dorian Minor"

Major and minor scales are traditionally the basis for Western Music, but jazz theory also recognizes other scales, based on the medieval church modes, which are very useful for improvisation. One of the most useful of these is the scale based on the dorian mode, which is often called the **dorian minor**, since it has a basically minor sound. Like any minor scale, dorian minor may start on any note, but like dorian mode, it is often illustrated as natural notes beginning on d.



Figure 9: The "dorian minor" can be written as a scale of natural notes starting on d. Any scale with this interval pattern can be called a "dorian minor scale".

Comparing this scale to the natural minor scale makes it easy to see why the dorian mode sounds minor; only one note is different.

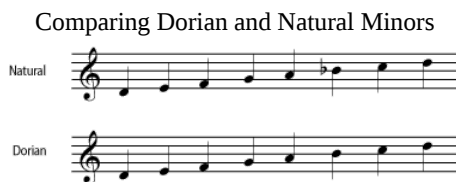


Figure 10

You may find it helpful to notice that the "relative major" of the Dorian begins one whole step lower. (So, for example, D Dorian has the same key signature as C major.) In fact, the reason that Dorian is so useful in jazz is that it is the scale used for improvising while a ii chord is being played (for example, while a d minor chord is played in the key of C major), a chord which is very common in jazz. (See Beginning Harmonic Analysis for more about how chords are classified within a key.) The student who is interested in modal jazz will eventually become acquainted with all of the **modal scales**. Each of these is named for the medieval church mode which has the same interval pattern, and each can be used with a different chord within the key. Dorian is included here only to explain the common jazz reference to the "dorian minor" and to give notice to students that the jazz approach to scales can be quite different from the traditional classical approach.

Comparison of Dorian and Minor Scales



Figure 11: You may also find it useful to compare the dorian with the minor scales from [Figure](#). Notice in particular the relationship of the altered notes in the harmonic, melodic, and dorian minors.

This page titled [3.1: Minor Keys and Scales](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

3.2: Learning Major and Minor Scales

Mastering your major and minor scales is a foundational requirement for music theory and music performance. You can greatly assist your mastery of scales by devoting time to them every day. The more types of memory you engage, the better your retention and internalization of the scales. Here is a brief presentation of ways in which you can learn and memorize scales:

Kinetic and Visual Memory

Many musicians learn their scales first on their instruments. For instance, I first learned scales and arpeggios on piano. Later when I studied bassoon I practiced them on that instrument as well. The controlled finger motions I learned with each scale were similar to mastering a dance or gymnastic routine. With more and more practice, I became a “micro athlete” who could progressively reproduce the routine (the scale) with greater accuracy and speed. I made use of **kinetic memory**—the finger patterns were thoroughly memorized.

Playing scales on piano has the added benefit of encouraging **visual memory**. Watching fingers move over the landscape of white and black keys also reinforces the scale patterns. Even if you are not a pianist, you will enhance your memory of scales by practicing them at a keyboard. The keyboard is a great tool for visualizing scales.

Cognitive Memory

Cognitive memory and theoretical understanding overlap as categories, but it will be helpful to separate them here for the moment. Remember memorizing your multiplication tables? Rote memorization is also effective for learning your key signatures. Music majors need to rapidly recognize all key signatures and this speed only comes with memorization.

You should be able to immediately do the following:

- 1) Reproduce the order of sharps and flats. (F#, C#, G#, etc.; Bb, Eb, Ab, etc.)
- 2) Recognize or reproduce the number of sharps and flats for every key. For instance, you should be able to state quickly that Ab major has four flats, B major has five sharps.
- 3) Upon seeing a scale written out with accidentals (no key signature), you should immediately know the key.

The tonic (note name) of the relative minor key is a minor third (three half steps) below the tonic of the major key. A minor scale is termed a “relative minor” when it shares a key signature with its relative major. I find it simplest to identify the minor keys by their relationship to the major keys. Of course, I have memorized the more common minor key signatures simply through repeated usage. However, I use the relationship of the minor third for rapid recognition of the minor keys.



Figure 1: Examples of Relative Major and Minor

Figure 1 supplies the major and minor tonics of the given key signatures. The first example with two sharps has D as the tonic of the major scale and B as tonic of the minor scale. The two notes are separated by three half steps (D to C#, C# to C, C to B). You can also find the major to minor relationship by counting down three scale steps including the first note: D-C#-B. Try verifying the major to minor relationship in the other two examples by counting down by half steps and by scale steps.

Why are key signatures important for memorizing scales? If you know your key signatures, then the scale members will be obvious. For instance, if a major key signature with two sharps is given, the D major scale is required. One does not need to guess whether D major has G# in the scale, for instance. Every scale member is determined by means of the key signature.

The three common forms of the minor scales can then be remembered in relation to the key signature. You should be able to rapidly reproduce all the minor scales by memorizing the rules given below. The natural minor honors the key signature. It is “natural” since it does not alter the key signature. Below is an example of the A minor scale, a scale which has no sharps or flats in the key signature.



Figure 2: Natural minor scale in A.

The harmonic minor raises the seventh scale degree both ascending and descending. It is “harmonic” since the raised seventh allows for a dominant chord. A dominant chord in A minor would be E-G#-B.



Figure 3: Harmonic minor scale in A.

The harmonic minor, with the augmented 2nd (A2) interval, however, presents awkward melodic patterns both ascending and descending. The augmented 2nd interval which contains three half steps is difficult to sing. This leads us to our last common configuration of the minor scale. The melodic minor raises the sixth and seventh scale degrees when ascending but then reverts to the natural minor descending. It is “melodic” since the scale moves in a smooth, step wise fashion ascending to the tonic (here A4) and descending from the tonic.



Figure 4: Melodic minor scale in A.

Theoretical Understanding

This section presents scale construction by means of tetrachords. One easy method of remembering the order of intervals in the major scale is to divide the scale into two tetrachords, that is, two groupings of four notes. Figure 1 provides a major scale starting on C.



Figure 5: Major scale in C with tetrachords.

The two tetrachords in the major scale are under the green lines, separated by a bar line. Notice that the interval sequence is the same for the lower and upper tetrachord of the major scale. Each tetrachord has a whole, whole, and half step. Let’s term this sequence of whole and half steps (W, W, H) the “major tetrachord.”

Also notice that the two tetrachords are connected by a whole step (the lowest “W” in the figure). The tetrachords in the major scale as well as those in the minor scales are all connected by a whole step.

Minor scale construction is more complicated since there are three common forms of the scale. The natural minor features a lower tetrachord common to all the minor scales. We will call this sequence of whole and half steps (W, H, W) the “minor tetrachord.” Study the following figures paying careful attention to the upper tetrachords in each minor scale:

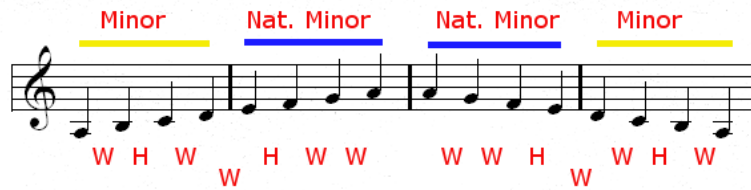


Figure 6: Natural minor scale in A with tetrachords.



Figure 7: Harmonic minor scale in A with tetrachords.



Figure 8: Melodic Minor Scale in A with tetrachords.

In summary, if you learn the four tetrachords you will be able to construct the major and three minor scales. All the tetrachords are connected by a whole step.

Major scale: lower major tetrachord (W, W, H), upper major tetrachord

Melodic minor scale: lower minor tetrachord (W, H, W), upper natural minor tetrachord (H, W, W)

Harmonic minor scale: lower minor tetrachord, upper harmonic minor tetrachord (H, A, H)

Melodic minor scale ascending: lower minor tetrachord, upper major tetrachord

Melodic minor scale descending: upper natural minor tetrachord, lower minor tetrachord

Conclusion

Familiarizing yourself with all of these ways of knowing major and minor scales will help you to master your scales. You will find that one or two methods work best. Whichever method you choose, however, you must develop rapid recognition of your scales and key signatures. This will take months of practice, so why not start working right now?

This page titled [3.2: Learning Major and Minor Scales](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

3.3: Ear Training

What is Ear Training?

When musicians talk about **ear**, they don't mean the sense organ itself so much as the brain's ability to perceive, distinguish, and understand what the ear has heard. The term **ear training** refers to teaching musicians to recognize information about notes and chords just by hearing them.

A few people have what is called **perfect pitch** or **absolute pitch**. These people, when they hear music, can tell you exactly what they are hearing: the G above middle C, for example, or the first inversion of an F minor chord. A few musicians with particularly perceptive ears can even tell you that a piano is tuned a few cents higher than the one that they play at home. This is an unusual skill that even most trained musicians do not have, and research seems to suggest that if you don't have it at a very early age, you cannot develop it. (For more on this subject, you may want to look up Robert Jourdain's *Music, the Brain, and Ecstasy: How Music Captures our Imagination*.)

However, most musicians can be trained to recognize **relative pitch**. In other words, if you play two notes, they can tell you that one of them is a major third higher than the other. If you play four chords in a row, they can tell you that you played a tonic-subdominant-dominant seventh-tonic (I-IV-V7-I) chord progression.

Fortunately, having relative pitch is good enough, and for many musicians may even be more useful than perfect pitch, because of the way Western music is conceived. Since all major keys are so similar, a piece in a major key will sound almost exactly the same whether you play it in C major or D major. The thing that matters is not what note you start on, but how all the notes are related to each other and to the "home" note (the tonic) of the key. If someone really wants the piece to be in a different key (because it's easier to sing or play in that key, or just because they want it to sound higher or lower), the whole thing can be transposed, but the only difference that would make (in the sound) is that the entire piece will sound higher or lower. Most listeners would not even notice the difference, unless you played it in both keys, one right after the other.

Note

All minor keys are also heard by most listeners as interchangeable, but there are important differences between major keys and minor keys. In fact, the differences in sound between a major key and a minor key is one of the first differences that a musician should be able to hear. If you would like to see whether your "ear" can recognize the difference between major and minor keys, please try the listening exercise in Major Keys and Scales.

So, you often don't need to know exactly what notes or chords are being played. Simply having an ear well-trained in "relative pitch" is extremely useful in many ways. Guitar and piano players can figure out chord progressions just by listening to them, and then play the progressions in their favorite keys. Other instrumentalists can play a favorite tune without a written copy of it, just by knowing what the interval to the next note must be. Composers and music arrangers can jot down a piece of music without having to "pick it out" on an instrument to find the notes and chords they want. And of course, ear training is crucial to any musician who wants to play jazz or any type of improvisation. Given a well-trained "ear", any musical idea that you "hear" in your head, you can play. And ear training is also crucial for those interested in music theory, musicology, or just being able to write down a tune accurately.

As with all other musical skills, there are many different levels and kinds of proficiency. One musician may be very good at "playing by ear", but may not even read music and cannot name intervals or write the music down. Another may be very good at "taking dictation" (writing down the music they hear), and yet feel unable to do jazz improvisation. As always, the key is to practice the particular skills that you want to develop.

Ear Training Skills

Tuning

This is the most basic ear training skill, crucial to being able to play music that people will want to hear.

Suggestions

- At the beginner level, work with a skilled musician who can teach you how to tune your instrument and help you identify and fix tuning problems.

- Play with other musicians often. (Playing along with recordings does not teach good tuning skills.) Don't just tune at the beginning of rehearsals and performances. Listen at all times and be ready to retune any note whenever necessary.
- Spend as much time as necessary tuning whenever you play. Do not (knowingly) practice while out of tune; if you do, it will slow down your ear training tremendously. Whenever possible, until you are good at tuning, get someone else to help you tune every time you play.
- Practice tuning quickly and accurately. Learn any alternate fingerings and other "tricks" available on your instrument for fine-tuning each note as you play.

Playing Chords By Ear

For instruments that play chordal accompaniments, this is an incredibly useful skill.

Suggestions

- You do not have to learn to read music to be able to do this, but it is very helpful to know a little bit about music theory so that you can predict which chords are most likely to happen in a song. Try starting with Beginning Harmonic Analysis.
- Really listen to the chord progressions to the songs you do know. What do they sound like? Play the same progressions in different keys and listen to how that does and also does not change the sound of the progression. Change the bass notes of the chords to see how that changes the sound of the progression to your ears. Change fingerings and chord voicings, and again listen carefully to how that changes the sound to your ears.
- Practice figuring out the chords to familiar songs (that you don't know the chords to). For songs that you do know the chords to, try playing them in an unfamiliar key, or see if you can change or add chords to make a new harmony that still fits the melody.
- A teacher who understands harmony can help tremendously with this particular skill. Even if you don't normally take lessons, you might want to consider having a series of lessons on this. Find a teacher who is willing and able to teach you specifically about harmony and typical chord progressions.

Playing Tunes by Ear

This is fun to be able to do, makes it easy to increase your repertoire, and is an important step in being able to improvise.

Suggestions

- Just do it! The best way to learn this skill is to spend some of your practice time trying to play tunes you know and like.
- Once you start getting good at this, see how quickly you can get a new tune down. How few mistakes can you make the first time you try it? Can you "recover" quickly from a mistake by making it sound like a bit of improvisation?
- If you play a melody instrument (one that plays only one note at a time), there are different bits of information that help you recognize what the next note will be: how far it is from the note you are on (see Interval), where it is in the key (see Beginning Harmonic Analysis) or where it is in the chord (see Triads). These three things are all related to each other, of course - and a musician with a well-trained ear will be aware of all of them, at least subconsciously - but you may find at first that one works better for you than the others. You may want to experiment: is it easier for you to think of the next note as being a perfect fourth higher than the note you are on, or as being the root of the chord, or as being the fifth note in the scale of the key?
- As of this writing, petersax-online had many exercises graded from simple to more difficult to help the beginner practice playing what you hear.

Improvisation

This is **the** skill you need for jazz. Blues, rock, and many Non-Western traditions also use improvisation.

Suggestions

- Know your scales and arpeggios. A good improviser, given the name of a chord, can quickly play not only the notes of the chord but also the scale implied by the chord. Any decent book on playing jazz, or any teacher familiar with jazz, will introduce the student to these chords and scales.
- There are now many book/CD combinations available to help the beginning improviser in many different genres and on many different instruments. A good book of this type will give the student a chance to improvise on many familiar tunes, and some also introduce the music theory involved. At the time of this writing, one source of a large variety of such books was jazzbooks.com.
- The exercises at the petersax site mentioned above would also be useful for the beginning improviser.

- Listen to jazz often. Listen to the improvisers you admire, and if a particular solo really appeals to you, listen to it many times, find the notes on your instrument, and then try writing it down as accurately as you can. Many famous improvisors, when interviewed, mention how useful it was to them to learn from other soloists by **transcribing** their solos in this way.
- Figure out how to play your favorite jazz (or blues or rock) **licks** (short motives that show up in many pieces in the same genre) on your instrument. Practice stringing them together in ways that make sense to you, but are different from what you've heard. Add your own variations.
- Find a teacher who is familiar with the type of improvisation you want to learn, join a jazz band, and/or get together with other musicians who also want to practise improvisation and take turns playing background/rhythm for each other.

Recognizing Intervals and Writing Music Down

This is the skill that allowed Beethoven to continue composing masterpieces even after he became deaf. If you are interested in composing, arranging, music theory, musicology, or just being able to write down a tune quickly and accurately, you'll want to be able to make that quick connection between what you hear and written music.

Suggestions

- Before you can do this, you must know your major and minor keys and scales and your Intervals. You may also want to understand Transposition, since you may find it easier to work in some keys than in others.
- As of this writing, Teoria Musical was a free ear training website that worked well, and the commercial site TrainEar included a free online version.
- Once again, practice is the best way to become good at this. Start with tunes that you know well, but don't know what the (written) notes are. Listen to them in your head (or play a recording) while trying to write them down. Then play what you have written, noticing where you were correct and where you made mistakes. Which intervals are you good at hearing? Which do you have trouble identifying? Do you often mistake one particular interval for another? Do you tend to identify a note by its interval from the previous note or by its place in the chord or in the key? Answering these questions will help you improve more quickly.
- Some people find it easier to learn to recognize intervals if they associate each interval with a familiar tune. (For example, in the familiar song from *The Sound of Music* that begins "Do, a deer, a female deer...", all the intervals in the phrase "a female deer" are major thirds, and every interval in the phrase "someday I'll wish upon a star" in the song "Somewhere Over the Rainbow" is a minor third.) The tune should be very familiar, so when trying to hear a tritone, some people will prefer thinking of the beginning of "The Simpsons" theme; others will prefer the beginning of "Maria" from *West Side Story*. If you think this method will work for you, try playing the interval you are having trouble hearing, and see what tune it reminds you of. As of this writing, [TrainEar](#) included a long list, with links to recordings, or songs that can be associated with various intervals.
- Try searching at YouTube for "Interval song" or "ear training" to find videos that you might find helpful.

This page titled [3.3: Ear Training](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

CHAPTER OVERVIEW

Unit 4: Intervals

[4.1: Intervals and Inversions](#)

[4.2: Quickly Recognizing Simple Intervals](#)

[4.3: Consonance and Dissonance](#)

This page titled [Unit 4: Intervals](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

4.1: Intervals and Inversions

The Distance Between Pitches

The **interval** between two notes is the distance between the two pitches - in other words, how much higher or lower one note is than the other. This concept is so important that it is almost impossible to talk about scales, chords, harmonic progression, cadence, or dissonance without referring to intervals. So if you want to learn music theory, it would be a good idea to spend some time getting comfortable with the concepts below and practicing identifying intervals.

Scientists usually describe the distance between two pitches in terms of the difference between their frequencies. Musicians find it more useful to talk about interval. Intervals can be described using half steps and whole steps. For example, you can say "B natural is a half step below C natural", or "E flat is a step and a half above C natural". But when we talk about larger intervals in the major/minor system, there is a more convenient and descriptive way to name them.

Naming Intervals

The first step in naming the interval is to find the distance between the notes **as they are written on the staff**. Count every line and every space in between the notes, as well as the lines or spaces that the notes are on. This gives you the number for the interval.

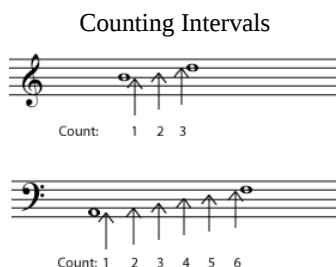


Figure 1: To find the interval, count the lines or spaces that the two notes are on as well as all the lines or spaces in between. The interval between B and D is a third. The interval between A and F is a sixth. Note that, at this stage, key signature, clef, and accidentals do not matter at all.

The **simple intervals** are one octave or smaller.



Figure 2: Simple Intervals

If you like you can listen to each interval as written in prime, third, fifth, seventh, **octave**.

Compound intervals are larger than an octave.

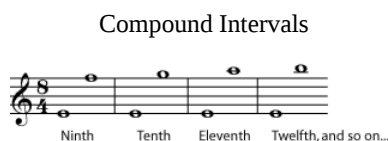


Figure 3

Listen to the compound intervals in ninth, eleventh.

? Exercise 4.1.1

Name the intervals.



Figure 4

Answer



Figure 5

? Exercise 4.1.1

Write a note that will give the named interval.



Figure 6

Answer



Figure 7

Classifying Intervals

So far, the actual distance, in half-steps, between the two notes has not mattered. But a third made up of three half-steps sounds different from a third made up of four half-steps. And a fifth made up of seven half-steps sounds very different from one of only six half-steps. So in the second step of identifying an interval, clef, key signature, and accidentals become important.



Figure 8: A to C natural and A to C sharp are both thirds, but A to C sharp is a larger interval, with a different sound. The difference between the intervals A to E natural and A to E flat is even more noticeable.

Listen to the differences in the fifths in [Figure](#).

So the second step to naming an interval is to classify it based on the number of half steps in the interval. Familiarity with the chromatic scale is necessary to do this accurately.

Perfect Intervals

Primes, octaves, fourths, and fifths can be **perfect** intervals. These intervals **are never classified as major or minor**, although they can be augmented or diminished (see below).

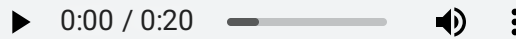
What makes these particular intervals perfect? The physics of sound waves (**acoustics**) shows us that the notes of a perfect interval are very closely related to each other. (For more information on this, see Frequency, Wavelength, and Pitch and Harmonic Series.) Because they are so closely related, they sound particularly good together, a fact that has been noticed since at least the times of classical Greece, and probably even longer. (Both the octave and the perfect fifth have prominent positions in most of the world's musical traditions.) Because they sound so closely related to each other, they have been given the name "perfect" intervals.

Actually, modern equal temperament tuning does not give the harmonic-series-based pure perfect fourths and fifths. For the music-theory purpose of identifying intervals, this does not matter. To learn more about how tuning affects intervals as they are actually played, see Tuning Systems.

A perfect prime is also called a **unison**. It is two notes that are the same pitch. A perfect octave is the "same" note an octave - 12 half-steps - higher or lower. A **perfect 5th** is 7 half-steps. A **perfect fourth** is 5 half-steps.



Figure 9: Perfect Intervals



Listen to the perfect fourth, and

perfect fifth.

Major and Minor Intervals

Seconds, thirds, sixths, and sevenths can be **major intervals** or **minor intervals**. The minor interval is always a half-step smaller than the major interval.

Major and Minor Intervals

- 1 half-step = minor second (m2)
- 2 half-steps = major second (M2)
- 3 half-steps = minor third (m3)
- 4 half-steps = major third (M3)
- 8 half-steps = minor sixth (m6)
- 9 half-steps = major sixth (M6)
- 10 half-steps = minor seventh (m7)
- 11 half-steps = major seventh (M7)

Major and Minor Intervals

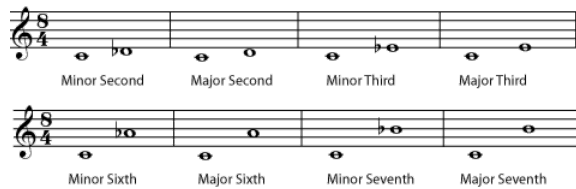


Figure 10

Listen to the major second, major third, major sixth, major seventh.

? Exercise 4.1.1

Give the complete name for each interval.



Figure 11

Answer



Figure 12

? Exercise 4.1.1

Fill in the second note of the interval given.

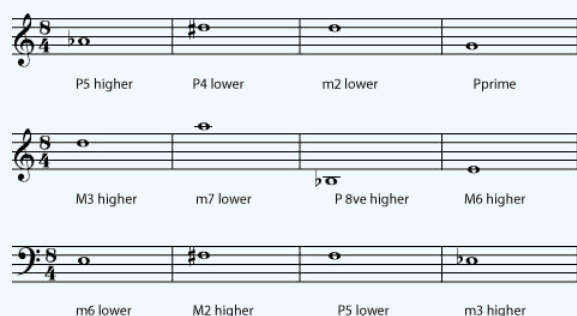


Figure 13

Answer

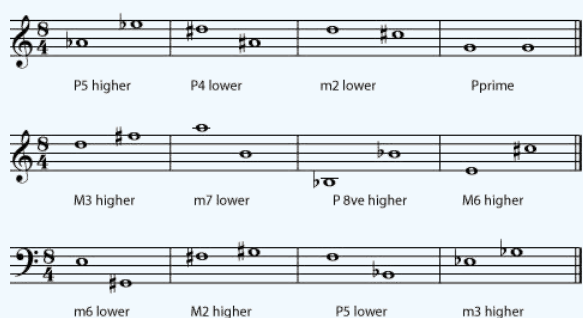


Figure 14

Augmented and Diminished Intervals

If an interval is a half-step larger than a perfect or a major interval, it is called **augmented**. An interval that is a half-step smaller than a perfect or a minor interval is called **diminished**. A double sharp or double flat is sometimes needed to write an augmented or diminished interval correctly. Always remember, though, that it is the actual distance in half steps between the notes that determines the type of interval, not whether the notes are written as natural, sharp, or double-sharp.

Some Diminished and Augmented Intervals

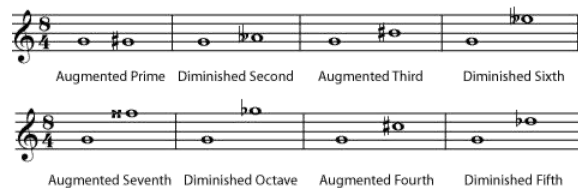


Figure 15

Listen to the diminished second, diminished sixth, diminished octave, diminished fifth. Are you surprised that the augmented fourth and diminished fifth sound the same?

? Exercise 4.1.1

Write a note that will give the named interval.

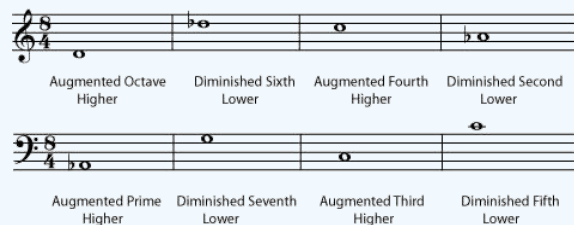


Figure 16

Answer

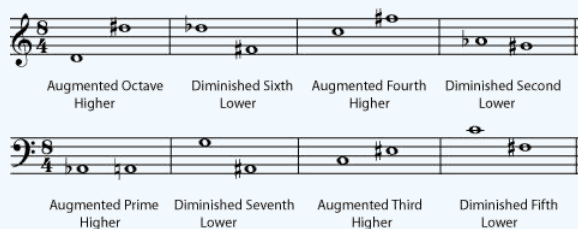


Figure 17

As mentioned above, the diminished fifth and augmented fourth sound the same. Both are six half-steps, or **three whole tones**, so another term for this interval is a **tritone**. In Western Music, this unique interval, which cannot be spelled as a major, minor, or perfect interval, is considered unusually dissonant and unstable (tending to want to resolve to another interval).

You have probably noticed by now that the tritone is not the only interval that can be "spelled" in more than one way. In fact, because of enharmonic spellings, the interval for any two pitches can be written in various ways. A major third could be written as a diminished fourth, for example, or a minor second as an augmented prime. **Always classify the interval as it is written; the composer had a reason for writing it that way.** That reason sometimes has to do with subtle differences in the way different written notes will be interpreted by performers, but it is mostly a matter of placing the notes correctly in the context of the key, the chord, and the evolving harmony. (Please see Beginning Harmonic Analysis for more on that subject.)

Enharmonic Intervals

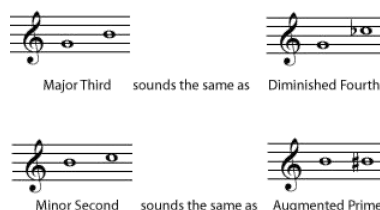


Figure 18: Any interval can be written in a variety of ways using enharmonic spelling. Always classify the interval as it is written.

Inverting Intervals

To **invert** any interval, simply imagine that one of the notes has moved one octave, so that the higher note has become the lower and vice-versa. Because inverting an interval only involves moving one note by an octave (it is still essentially the "same" note in the tonal system), intervals that are **inversions** of each other have a very close relationship in the tonal system.

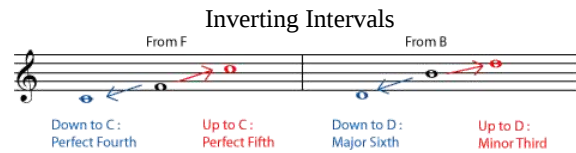


Figure 19

To find the inversion of an interval

1. To name the new interval, subtract the name of the old interval from 9.
2. The inversion of a perfect interval is still perfect.
3. The inversion of a major interval is minor, and of a minor interval is major.
4. The inversion of an augmented interval is diminished and of a diminished interval is augmented.

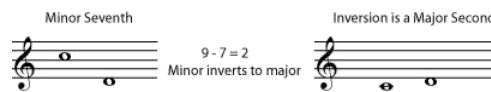


Figure 20

? Exercise 4.1.1

What are the inversions of the following intervals?

1. Augmented third
2. Perfect fifth
3. Diminished fifth
4. Major seventh
5. Minor sixth

Answer

1. Diminished sixth
2. Perfect fourth
3. Augmented fourth
4. Minor second
5. Major third

Summary

Here is a quick summary of the above information, for reference.

The examples given name the note reached if one starts on C, and goes up the named interval.

Number of half steps	Common Spelling	Example, from C	Alternate Spelling	Example, from C	Inversion
0	Perfect Unison (P1)	C	Diminished Second	D double flat	Octave (P8)
1	Minor Second (m2)	D flat	Augmented Unison	C sharp	Major Seventh (M7)
2	Major Second (M2)	D	Diminished Third	E double flat	Minor Seventh (m7)
3	Minor Third (m3)	E flat	Augmented Second	D sharp	Major Sixth (M6)
4	Major Third (M3)	E	Diminished Fourth	F flat	Minor Sixth (m6)

5	Perfect Fourth (P4)	F	Augmented Third	E sharp	Perfect Fifth (P5)
6	Tritone (TT)	F sharp or G flat	Augmented Fourth or Diminished Fifth	F sharp or G flat	Tritone (TT)
7	Perfect Fifth (P5)	G	Diminished Sixth	A double flat	Perfect Fourth (P4)
8	Minor Sixth (m6)	A flat	Augmented Fifth	G sharp	Major Third (M3)
9	Major Sixth (M6)	A	Diminished Seventh	B double flat	Minor Third (m3)
10	Minor Seventh (m7)	B flat	Augmented Sixth	A sharp	Major Second (M2)
11	Major Seventh (M7)	B	Diminished Octave	C' flat	Minor Second (m2)
12	Perfect Octave (P8)	C'	Augmented Seventh	B sharp	Perfect Unison (P1)

Summary Notes: Perfect Intervals

- A perfect prime is often called a unison. It is two notes of the same pitch.
- A perfect octave is often simply called an octave. It is the next "note with the same name".
- Perfect intervals - unison, fourth, fifth, and octave - are never called major or minor

Summary Notes: Augmented and Diminished Intervals

- An augmented interval is one half step larger than the perfect or major interval.
- A diminished interval is one half step smaller than the perfect or minor interval.

Summary Notes: Inversions of Intervals

- To find the inversion's number name, subtract the interval number name from 9.
- Inversions of perfect intervals are perfect.
- Inversions of major intervals are minor, and inversions of minor intervals are major.
- Inversions of augmented intervals are diminished, and inversions of diminished intervals are augmented.

This page titled [4.1: Intervals and Inversions](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

4.2: Quickly Recognizing Simple Intervals

Musicians need to be able to quickly recognize intervals in printed music. Counting intervals by half steps is often too slow, particularly with intervals greater than thirds. This module introduces a method that can greatly increase facility with interval recognition.

(This module assumes that you understand how to assign interval numbers and quality. Please see “Interval” by Katherine Schmidt-Jones, module m10867, for further reference)

A thorough knowledge of major scales is central to rapid identification of intervals. The quality of the interval between each scale step and the tonic is either major or perfect (Figure 1)

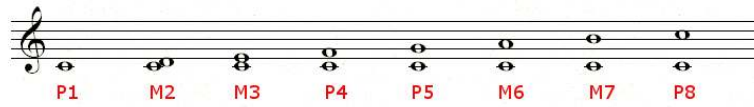


Figure 1

In particular, intervals up to a perfect 5th can be quickly recognized through knowledge of the major scales. Scale steps are used as quick reference points with which to compare the intervals. Let's look at some examples to explain how this works.

In Figure 2, consider the lowest pitch the tonic note of B major. Knowing that B major has a C# in the scale indicates to us that C natural is not a major 2nd above B. Since C is a half step below C# the interval is therefore a minor 2nd.



Figure 2

In Figure 3, a D major scale has two sharps, one of which is F#. Since F natural is half a step below F# it must be a minor third above D.



Figure 3

In Figure 4, A major has F#, C#, and G# but no D#. D natural is a perfect 4th above A; therefore D# must be an augmented 4th above A.



Figure 4

In Figure 5, F major has one flat-Bb. Bb is therefore a perfect fourth above F.



Figure 5

In Figure 6, a B major scale requires an F#. F natural, being half a step lower, is a diminished fifth above B.



Figure 6

Other “Tricks”

I find classifying intervals of sixths or sevenths more problematic with scales. I often double check my answers by inverting the intervals. For instance in Figure 7, it is not easy for me to quickly recognize the interval D# to B, but B to D# can be quickly recognized. Rules of inversion indicate that a major 3rd inverts to a minor 6th.



Figure 7

Likewise the seventh in Figure 8 is easier to recognize as a second:

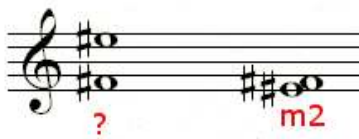


Figure 8

Figure 8 illustrates a further “trick.” Since both notes are preceded by sharps, one can ignore the sharps and consider the interval to be the same as E to F. This is easier to recognize E to F as a minor second than E# to F#. One may do the same operation if both notes bear flats; consider the interval without the flats present.

This page titled [4.2: Quickly Recognizing Simple Intervals](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

4.3: Consonance and Dissonance

Notes that sound good together when played at the same time are called **consonant**. Chords built only of consonances sound pleasant and "stable"; you can listen to one for a long time without feeling that the music needs to change to a different chord. Notes that are **dissonant** can sound harsh or unpleasant when played at the same time. Or they may simply feel "unstable"; if you hear a chord with a dissonance in it, you may feel that the music is pulling you towards the chord that **resolves** the dissonance. Obviously, what seems pleasant or unpleasant is partly a matter of opinion. This discussion only covers consonance and dissonance in Western music.

For activities that introduce these concepts to young students, please see Consonance and Dissonance Activities.

Of course, if there are problems with tuning, the notes will not sound good together, but this is not what consonance and dissonance are about. (Please note, though, that the choice of tuning system can greatly affect which intervals sound consonant and which sound dissonant! Please see Tuning Systems for more about this.)

Consonance and dissonance refer to intervals and chords. The **interval** between two notes is the number of half steps between them, and all intervals have a name that musicians commonly use, like major third (which is 4 half steps), perfect fifth (7 half steps), or octave. (See Interval to learn how to determine and name the interval between any two notes.)

An interval is measured between two notes. When there are more than two notes sounding at the same time, that's a **chord**. (See Triads, Naming Triads, and Beyond Triads for some basics on chords.) Of course, you can still talk about the interval between any two of the notes in a chord.

The simple intervals that are considered to be consonant are the major third, perfect fifth, major sixth, and the

▶ 0:00 / 0:03 ————— 🔊 ⋮

octave.

Consonant Intervals



Minor Third Major Third Perfect Fourth Perfect Fifth Minor Sixth Major Sixth Octave

Figure 1

In modern Western Music, all of these intervals are considered to be pleasing to the ear. Chords that contain only these intervals are considered to be "stable", restful chords that don't need to be [resolved](#). When we hear them, we don't feel a need for them to go to other chords.

The intervals that are considered to be dissonant are the major second, the major seventh, and particularly the

▶ 0:00 / 0:03 ————— 🔊 ⋮

tritone



Minor Second Major Second Tritone Minor Seventh Major Seventh

Figure 2

Dissonant Intervals

These intervals are all considered to be somewhat unpleasant or tension-producing. In tonal music, chords containing dissonances are considered "unstable"; when we hear them, we expect them to move on to a more stable chord. Moving from a dissonance to the consonance that is expected to follow it is called **resolution**, or **resolving** the dissonance. The pattern of tension and release created by resolved dissonances is part of what makes a piece of music exciting and interesting. Music that contains no dissonances

can tend to seem simplistic or boring. On the other hand, music that contains a lot of dissonances that are never resolved (for example, much of twentieth-century "classical" or "art" music) can be difficult for some people to listen to, because of the unreleased tension.

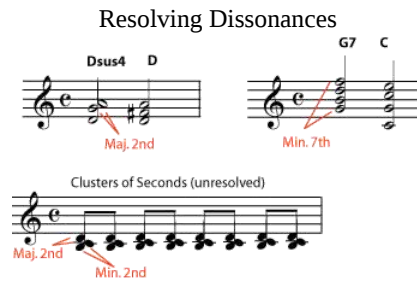
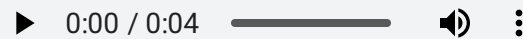


Figure 3: In most music a dissonance will resolve; it will be followed by a consonant chord that it naturally leads to, for example a



D suspended fourth resolves to a D major chord. A series of unresolved dissonances, on the other hand, can produce a sense of unresolved tension.

Why are some note combinations consonant and some dissonant? Preferences for certain sounds is partly cultural; that's one of the reasons why the traditional musics of various cultures can sound so different from each other. Even within the tradition of Western music, opinions about what is unpleasantly dissonant have changed a great deal over the centuries. But consonance and dissonance do also have a strong physical basis in nature.

In simplest terms, the sound waves of consonant notes "fit" together much better than the sound waves of dissonant notes. For example, if two notes are an octave apart, there will be exactly two waves of one note for every one wave of the other note. If there are two and a tenth waves or eleven twelfths of a wave of one note for every wave of another note, they don't fit together as well. For much more about the physical basis of consonance and dissonance, see Acoustics for Music Theory, Harmonic Series, and Tuning Systems.

This page titled [4.3: Consonance and Dissonance](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

CHAPTER OVERVIEW

Unit 5: Triads, Chords, Introduction to Roman Numerals

[5.1: Triads](#)

[5.2: Naming Triads](#)

[5.3: Beginning Harmonic Analysis](#)

[5.4: Seventh Chords and Inversions](#)

This page titled [Unit 5: Triads, Chords, Introduction to Roman Numerals](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

5.1: Triads

Harmony in Western music is based on triads. **Triads** are simple three-note chords built of thirds.

Triads in Root Position



Figure 1

The chords in third higher than the root, and the **fifth of the chord** is written a fifth higher than the root (which is also a third higher than the third of the chord). So the simplest way to write a triad is as a stack of thirds, in root position.

The type of interval or chord - major, minor, diminished, etc., is not important when you are determining the position of the chord. To simplify things, all notes in the examples and exercises below are natural, but it would not change their position at all if some notes were sharp or flat. It would, however, change the name of the triad - see Naming Triads.

? Exercise 5.1.1

Write a triad in root position using each root given. If you need some staff paper for exercises you can print this [PDF file](#).



Figure 2

Answer

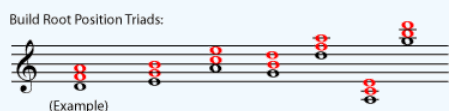


Figure 3

First and Second Inversions

Any other chord that has the same-named notes as a root position chord is considered to be essentially the same chord in a different **position**. In other words, all chords that have only D naturals, F sharps, and A naturals, are considered D major chords.

But if you change the pitch or spelling of any note in the triad, you have changed the chord (see Naming Triads). For example, if the F sharps are written as G flats, or if the A's are sharp instead of natural, you have a different chord, not an inversion of the same chord. If you add notes, you have also changed the name of the chord (see Beyond Triads). **You cannot call one chord the inversion of another if either one of them has a note that does not share a name (for example "F sharp" or "B natural") with a note in the other chord.**

If the third of the chord is the lowest note, the chord is in **first inversion**. If the fifth of the chord is the lowest note, the chord is in **second inversion**. A chord in second inversion may also be called a **six-four chord**, because the intervals in it are a sixth and a fourth.

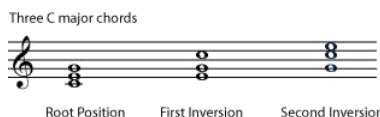


Figure 4

It does not matter how far the higher notes are from the lowest note, or how many of each note there are (at different octaves or on different instruments); all that matters is which note is lowest. (In fact, one of the notes may not even be written, only implied by

the context of the chord in a piece of music. A practiced ear will tell you what the missing note is; we won't worry about that here.) To decide what position a chord is in, move the notes to make a stack of thirds and identify the root.

Notes are G, D, and B. Rewrite as thirds:



G is still the lowest note, so the chord was already in root position.

Figure 5

Notes are a G, 2 C's, and an E. Rewrite G, C, and E as thirds:



Root position has C as its lowest note. Lowest note in original chord is the fifth in root position, so it was in second inversion.

Figure 6

? Exercise 5.1.1

Rewrite each chord in root position, and name the original position of the chord.



Figure 7

Answer

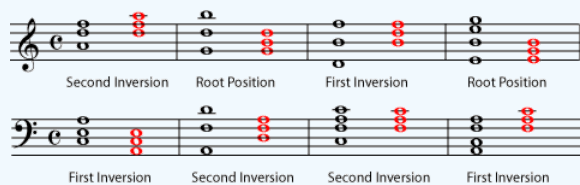
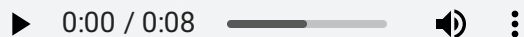


Figure 8

This page titled [5.1: Triads](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

5.2: Naming Triads

The position that a chord is in does make a difference in how it sounds, but it is a fairly small difference.

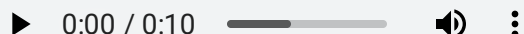


Listen to a G major chord in three different positions.



Figure 1: G major chord in three different positions.

A much bigger difference in the chord's sound comes from the intervals between the root-position notes of the chord. For example, if the B in one of the chords above was changed to a B flat, you would still have a G triad, but the chord would now sound very different. So chords are named according to the intervals between the notes when the chord is in root position.



Listen to four different G chords.



Figure 2: These are also all G chords, but they are four different G chords. The intervals between the notes are different, so the chords sound very different.

Major and Minor Chords

The most commonly used triads form major chords and minor chords. All major chords and minor chords have an interval of a perfect fifth between the root and the fifth of the chord. A perfect fifth (7 half-steps) can be divided into a major third (4 half-steps) plus a minor third (3 half-steps). If the interval between the root and the third of the chord is the major third (with the minor third between the third and the fifth of the chord), the triad is a **major chord**. If the interval between the root and the third of the chord is the minor third (and the major third is between the third and fifth of the chord), then the triad is a **minor chord**. Listen closely to a minor triad.

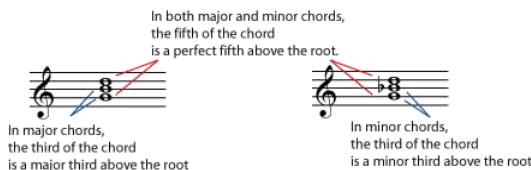


Figure 3

Some Major and Minor Triads

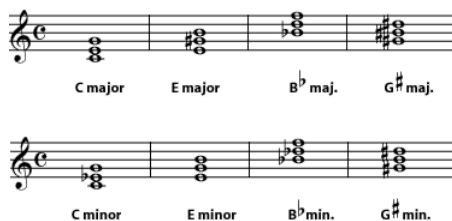


Figure 4

? Exercise 5.2.1

Write the major chord for each root given.

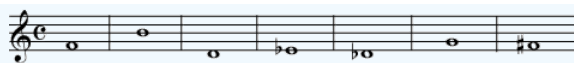


Figure 5

Answer

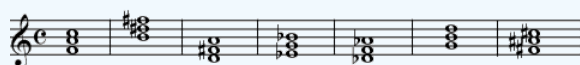


Figure 6

? Exercise 5.2.1

Write the minor chord for each root given.

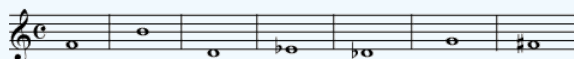


Figure 7

Answer

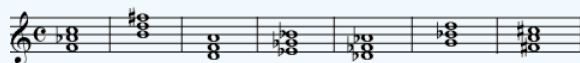


Figure 8

Augmented and Diminished Chords

Because they don't contain a perfect fifth, augmented and diminished chords have an unsettled feeling and are normally used sparingly. An **augmented chord** is built from two major thirds, which adds up to an augmented fifth. A **diminished chord** is built from two minor thirds, which add up to a diminished fifth. Listen closely to an diminished triad.

Some Augmented and Diminished Triads

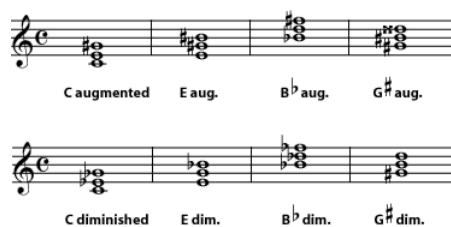


Figure 9

? Exercise 5.2.1

Write the augmented triad for each root given.



Figure 10

Answer



Figure 11

? Exercise 5.2.1

Write the diminished triad for each root given.



Figure 12

Answer

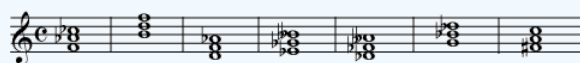


Figure 13

Notice that you can't avoid double sharps or double flats by writing the note on a different space or line. **If you change the spelling of a chord's notes, you have also changed the chord's name.** For example, if, in an augmented G sharp major chord, you rewrite the D double sharp as an E natural, the triad becomes an E augmented chord.



Figure 14: Changing the spelling of any note in a chord also changes the chord's name.

You can put the chord in a different position or add more of the same-named notes at other octaves without changing the name of the chord. But changing the note names or adding different-named notes, will change the name of the chord. Here is a summary of the intervals in triads in root position.

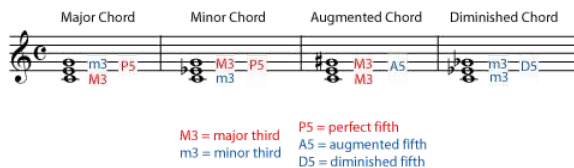


Figure 15

? Exercise 5.2.1

Now see if you can identify these chords that are not necessarily in root position. Rewrite them in root position first if that helps.



Figure 16

Answer

Chords are rewritten in root position.



Figure 17

This page titled [5.2: Naming Triads](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones \(Connections\)](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

5.3: Beginning Harmonic Analysis

Introduction

It sounds like a very technical idea, but basic **harmonic analysis** just means understanding how a chord is related to the key and to the other chords in a piece of music. This can be such useful information that you will find many musicians who have not studied much music theory, and even some who don't read music, but who can tell you what the I ("one") or the V ("five") chord are in a certain key.

Why is it useful to know how chords are related?

- Many standard forms (for example, a "twelve bar blues") follow very specific chord progressions, which are often discussed in terms of harmonic relationships.
- If you understand chord relationships, you can transpose any chord progression you know to any key you like.
- If you are searching for chords to go with a particular melody (in a particular key), it is very helpful to know what chords are most likely in that key, and how they might be likely to progress from one to another.
- Improvisation requires an understanding of the chord progression.
- Harmonic analysis is also necessary for anyone who wants to be able to compose reasonable chord progressions or to study and understand the music of the great composers.

Basic Triads in Major Keys

Any chord might show up in any key, but some chords are much more likely than others. The most likely chords to show up in a key are the chords that use only the notes in that key (no accidentals). So these chords have both names and numbers that tell how they fit into the key. (We'll just discuss basic triads for the moment, not seventh chords or other added-note or altered chords.) The chords are numbered using Roman numerals from I to vii.

Chords in the keys of C major and D major

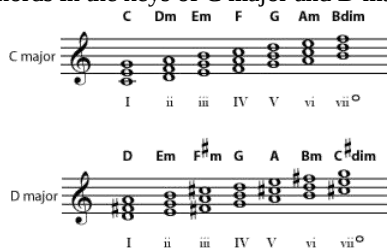


Figure 1: To find all the basic chords in a key, build a simple triad (in the key) on each note of the scale. You'll find that although the chords change from one key to the next, the **pattern** of major and minor chords is always the same.

? Exercise 5.3.1

Write and name the chords in G major and in B flat major. (Hint: Determine the key signature first. Make certain that each chord begins on a note in the major scale and contains only notes in the key signature.) If you need some staff paper, you can print this [PDF file](#)

Answer



Figure 2

You can find all the basic triads that are possible in a key by building one triad, in the key, on each note of the scale (each **scale degree**). One easy way to name all these chords is just to number them: the chord that starts on the first note of the scale is "I", the chord that starts on the next scale degree is "ii", and so on. Roman numerals are used to number the chords. Capital Roman numerals are used for major chords and small Roman numerals for minor chords. The diminished chord is in small Roman numerals followed by a small circle. Because major scales always follow the same pattern, the pattern of major and minor chords is also the same in any major key. The chords built on the first, fourth, and fifth degrees of the scale are always major chords (I, IV, and V). The chords built on the second, third, and sixth degrees of the scale are always minor chords (ii, iii, and vi). The chord built on the seventh degree of the scale is a diminished chord.

Notice that IV in the key of B flat is an E flat major chord, not an E major chord, and vii in the key of G is F sharp diminished, not F diminished. If you can't name the scale notes in a key, you may find it difficult to predict whether a chord should be based on a sharp, flat, or natural note. This is only one reason (out of many) why it is a good idea to memorize all the scales. (See Major Keys and Scales.) However, if you don't plan on memorizing all the scales at this time, you'll find it useful to memorize at least the most important chords (start with I, IV, and V) in your favorite keys.

A Hierarchy of Chords

Even among the chords that naturally occur in a key signature, some are much more likely to be used than others. In most music, the most common chord is I. In Western music, I is the tonal center of the music, the chord that feels like the "home base" of the music. As the other two major chords in the key, IV and V are also likely to be very common. In fact, the most common added-note chord in most types of Western music is a V chord (the minor seventh added (V7). It is so common that this particular flavor of seventh (a major chord with a minor seventh added) is often called a **dominant seventh**, regardless of whether the chord is being used as the V (the dominant) of the key. Whereas the I chord feels most strongly "at home", V7 gives the strongest feeling of "time to head home now". This is very useful for giving music a satisfying ending. Although it is much less common than the V7, the diminished vii chord (often with a diminished seventh added), is considered to be a harmonically unstable chord that strongly wants to resolve to I. Listen to these very short progressions and see how strongly each suggests that you must be in the key of C: F chord to C chord (IV - I); G seventh chord to C chord (V7 - I); Cadence for more on this subject.)

Many folk songs and other simple tunes can be accompanied using only the I, IV and V (or V7) chords of a key, a fact greatly appreciated by many beginning guitar players. Look at some chord progressions from real music.

Some chord progressions

A Common Twelve Bar Blues:

I	I	I	I7
IV7	IV7	I	I
V7	V7	I	I

Verse of "Jingle Bells"

I	I	I	IV
IV	V7	V7	I
I	I	I	IV
IV	V7	V7	I

Chorus of "Bye Bye, Love"

IV	I	IV	I
IV	I	V7	I

Figure 3: Much Western music is harmonically pretty simple, so it can be very useful just to know I, IV, and V in your favorite keys. This figure shows progressions as a list of chords (read left to right as if reading a paragraph), one per measure.

Typically, folk, blues, rock, marches, and Classical-era music is based on relatively straightforward chord progressions, but of course there are plenty of exceptions. Jazz and some pop styles tend to include many chords with added or altered notes. Romantic-era music also tends to use more complex chords in greater variety, and is very likely to use chords that are not in the key.

More Complex Chord Progressions

Chorus of "Love Me Tender"

I	III7	vi	I7
IVM7	iv	I	I
v6	VI7	II7	II7
V7sus4	V7	I	I

Beginning of Liszt's "Liebestraum"

I	III7	V7	II7
ii7	V7	I	I°

Bridge of Ellington's "Solitude"

IVM7	#IV°	I	vi7	I7
IVM7	#IV°	I	VI7	iii7 V7#5

Figure 4: Some music has more complex harmonies. This can include more unusual chords such as major sevenths, and chords with altered notes such as sharp fives. It may also include more basic chords that aren't in the key, such as I diminished and II (major), or even chords based on notes that are not in the key such as a sharp IV chord. (Please see Beyond Triads to review how to read chord symbols.)

Extensive study and practice are needed to be able to identify and understand these more complex progressions. It is not uncommon to find college-level music theory courses that are largely devoted to harmonic analysis and its relationship to musical forms. This course will go no further than to encourage you to develop a basic understanding of what harmonic analysis is about.

Naming Chords Within a Key

So far we have concentrated on identifying chord relationships by number, because this system is commonly used by musicians to talk about every kind of music from classical to jazz to blues. There is another set of names that is commonly used, particularly in classical music, to talk about harmonic relationships. Because numbers are used in music to identify everything from beats to intervals to harmonics to what fingering to use, this naming system is sometimes less confusing.

I	=	Tonic
ii	=	Supertonic
iii	=	Mediant
IV	=	Subdominant
V	=	Dominant
vi	=	Submediant
vii°	=	Subtonic, or Leading Tone

Figure 5

? Exercise 5.3.1

Name the chord.

1. Dominant in C major
2. Subdominant in E major
3. Tonic in G sharp major
4. Mediant in F major
5. Supertonic in D major
6. Submediant in C major
7. Dominant seventh in A major

Answer

1. G major (G)
2. A major (A)
3. G sharp major (G#)
4. A minor (Am)
5. E minor (Em)
6. A minor (Am)
7. E seventh (E7)

? Exercise 5.3.1

The following chord progression is in the key of G major. Identify the relationship of each chord to the key by both name and number. Which chord is not in the key? Which chord in the key has been left out of the progression?

G C Am Em
A D Bm D7
G

Figure 6

Answer

I	IV	ii	vi
G	C	Am	Em
tonic	subdominant	supertonic	submediant
II	V	iii	V7
A	D	Bm	D7
not in key*	dominant	mediant	dominant seventh
I			
G			
tonic			

There is no subtonic in this progression.

*It is A minor (with a C natural), not A major (with a C sharp) that belongs in this key. An A major chord can sound good in the key of G major, however. It is the dominant of the dominant (D major), so playing an A major chord can sometimes make the music feel like it has temporarily moved to the (closely related) key of D major. This type of harmonic complexity helps keep a piece of music interesting.

Figure 7

Minor Keys

Since minor scales follow a different pattern of intervals than major scales, they will produce chord progressions with important differences from major key chord progressions.

? Exercise 5.3.1

Write (triad) chords that occur in the keys of A minor, E minor, and D minor. Remember to begin each triad on a note of the natural minor scale and to include only notes in the scale in each chord. Which chord relationships are major? Which minor? Which diminished?

Answer

The tonic, subdominant, and dominant are minor (i, iv, and v). The mediant, submediant, and subtonic are major (III, VI, and VII). The supertonic (ii) is diminished.



Figure 8

Notice that the actual chords created using the major scale and its relative minor scale are the same. For example, compare the chords in A minor (Figure). The difference is in how the chords are used. As explained chord progression will likely make it clear that C is the tonal center of the piece, for example by featuring the bright-sounding (major) tonic, dominant, and subdominant chords (C major, G major or G7, and F major), particularly in strong cadences that end on a C chord.

If the piece is in A minor, on the other hand, it will be more likely to feature (particularly in cadences) the tonic, dominant, and subdominant of A minor (the A minor, D minor, and E minor chords). These chords are also available in the key of C major, of course, but they typically are not given such a prominent place.

As mentioned above, the "flavor" of sound that is created by a major chord with a minor seventh added, gives a particularly dominant (wanting-to-go-to-the-home-chord) sound, which in turn gives a more strong feeling of tonality to a piece of music. Because of this, many minor pieces change the dominant chord so that it is a dominant seventh (a major chord with a minor seventh), even though that requires using a note that is not in the key.

? Exercise 5.3.1

Look at the chords in Figure 8. What note of each scale would have to be changed in order to make v major? Which other chords would be affected by this change? What would they become, and are these altered chords also likely to be used in the minor key?

Answer

The seventh degree of the scale must be raised by one half step to make the v chord major. If the seventh scale note is raised, the III chord becomes augmented, and the vii chord becomes a diminished chord (based on the sharp vii rather than the vii). The augmented III chord would not be particularly useful in the key, but, as mentioned cadences.



Figure 9

The point of the harmonic minor scale is to familiarize the musician with this common feature of harmony, so that the expected chords become easy to play in every minor key. There are also changes that can be made to the melodic lines of a minor-key piece that also make it more strongly tonal. This involves raising (by one half step) both the sixth and seventh scale notes, but only when the melody is ascending. So the musician who wants to become familiar with melodic patterns in every minor key will practice melodic minor scales, which use different notes for the ascending and descending scale.

You can begin practicing harmonic analysis by practicing identifying whether a piece is in the major key or in its relative minor. Pick any piece of music for which you have the written music, and use the following steps to determine whether the piece is major or minor:

Is it Major or Minor?

- Identify the chords used in the piece, particularly at the very end, and at other important cadences (places where the music comes to a stopping or resting point). This is an important first step that may require practice before you become good at it. Try to start with simple music which either includes the names of the chords, or has simple chords in the accompaniment that will be relatively easy to find and name. If the chords are not named for you and you need to review how to name them just by looking at the written notes, see Naming Triads and Beyond Triads.
- Find the key signature.
- Determine both the major key represented by that key signature, and its relative minor (the minor key that has the same key signature).
- Look at the very end of the piece. Most pieces will end on the tonic chord. If the final chord is the tonic of either the major or minor key for that key signature, you have almost certainly identified the key.
- If the final chord is not the tonic of either the major or the minor key for that key signature, there are two possibilities. One is that the music is not in a major or minor key! Music from other cultures, as well as some jazz, folk, modern, and pre-Baroque

European music are based on other modes or scales. (Please see Modes and Ragas and Scales that aren't Major or Minor for more about this.) If the music sounds at all "exotic" or "unusual", you should suspect that this may be the case.

- If the final chord is not the tonic of either the major or the minor key for that key signature, but you still suspect that it is in a major or minor key (for example, perhaps it has a "repeat and fade" ending which avoids coming to rest on the tonic), you may have to study the rest of the music in order to discern the key. Look for important cadences before the end of the music (to identify I). You may be able to identify, just by listening, when the piece sounds as if it is approaching and landing on its "resting place". Also look for chords that have that "dominant seventh" flavor (to identify V). Look for the specific accidentals that you would expect if the harmonic minor or melodic minor scales were being used. Check to see whether the major or minor chords are emphasized overall. Put together the various clues to reach your final decision, and check it with your music teacher or a musician friend if possible.

Modulation

Sometimes a piece of music temporarily moves into a new key. This is called **modulation**. It is very common in traditional classical music; long symphony and concerto movements almost always spend at least some time in a different key (usually a closely related key such as the dominant or subdominant, or the relative minor or relative major), in order to keep things interesting. Shorter works, even in classical style, are less likely to have complete modulations. Abrupt changes of key can seem unpleasant and jarring. In most styles of music, modulation is accomplished gradually, using a progression of chords that seems to move naturally towards the new key. But implied modulations, in which the tonal center seems to suddenly shift for a short time, can be very common in some shorter works (jazz standards, for example). As in longer works, modulation, with its new set of chords, is a good way to keep a piece interesting. If you find that the chord progression in a piece of music suddenly contains many chords that you would not expect in that key, it may be that the piece has modulated. Lots of accidentals, or even an actual change of key signature, are other clues that the music has modulated.

A new key signature may help you to identify the modulation key. If there is not a change of key signature, remember that the new key is likely to contain whatever accidentals are showing up. It is also likely that many of the chords in the progression will be chords that are common in the new key. Look particularly for tonic chords and dominant sevenths. The new key is likely to be closely related to the original key, but another favorite trick in popular music is to simply move the key up one whole step, for example from C major to D major. Modulations can make harmonic analysis much more challenging, so try to become comfortable analyzing easier pieces before tackling pieces with modulations.

Further Study

Although the concept of harmonic analysis is pretty basic, actually analyzing complex pieces can be a major challenge. This is one of the main fields of study for those who are interested in studying music theory at a more advanced level. One next step for those interested in the subject is to become familiar with all the ways notes may be added to basic triads. (Please see Beyond Triads for an introduction to that subject.) At that point, you may want to spend some time practicing analyzing some simple, familiar pieces. Depending on your interests, you may also want to spend time creating pleasing chord progressions by choosing chords from the correct key that will complement a melody that you know. As of this writing, the site Music Theory for Songwriters featured "chord maps" that help the student predict likely chord progressions.

For more advanced practice, look for music theory books that focus entirely on harmony or that spend plenty of time analyzing harmonies in real music. (Some music history textbooks are in this category.) You will progress more quickly if you can find books that focus on the music genre that you are most interested in (there are books specifically about jazz harmony, for example).

This page titled [5.3: Beginning Harmonic Analysis](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

5.4: Seventh Chords and Inversions

We learned earlier that triads can be created on each scale step or each scale degree. In a similar manner, seventh chords can be created by stacking additional notes a third above the triads. Root position seventh chords when stacked as closely as possible have all notes either on spaces or all on lines. For instance, see the example of seventh chords on scale degrees in C Major (Figure 1):

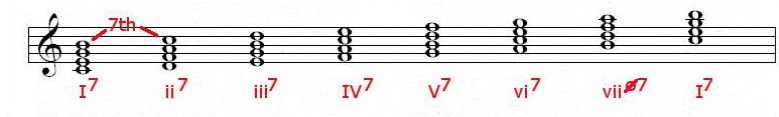


Figure 1

Let's carefully examine the quality of each chord. The triads (lowest three notes) are either major, minor, or diminished when built on the C major scale. The sevenths are either major or minor 7ths (Figure 2):



Figure 2

The first letter in Figure 2 refers to the quality of the triad; the second letter to the quality of the seventh. For instance, in the first chord built on C the triad is major, "M," and the seventh is also major, "M." In the second seventh chord both the triad and seventh are minor, "m."

One seventh chord deserves special attention. The dominant seventh chord is the most prominent seventh chord in common practice music. It is distinct from the other seventh chords since it is the only one possessing a major triad with a minor seventh. The dominant seventh, whether in a major or minor key, is always a major triad with a minor seventh above the root of the chord. Figure 3 supplies a dominant seventh chord built on G:



Figure 3

Inversions of Seventh Chords

Here is an easy way to remember the inversions of seventh chords:

7 – 65 – 43 – 2

Notice the descending pattern of numbers. The root position and three inversions use this order of numbers to label the chords. Figure 4 gives a tonic seventh chord built on C with the root position and inversions:

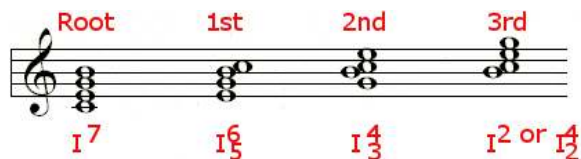


Figure 4

Figure 5 demonstrates how the inversions are obtained. The bass note (C4) in the root position triad is moved up an octave to C5 for the 1st inversion. Similarly the bass notes in the 1st inversion is transposed up an octave for the 2nd inversion, etc.

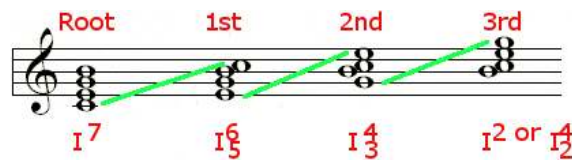


Figure 5

Observe that an alternative way to label the 3rd inversion is 4 over 2.

Recognizing Inversions of Seventh Chords

Take these steps to recognize inversions of seventh chords. 1) stack the chord in closed position (as closely as possible) with the bass as the lowest note. Remove duplicated pitches. 2) find the second in the chord. The root of the chord will be the top note of that second. 3) If the root is the top note the chord is 1st inversion, 2nd from the top—2nd inversion, 3rd from the top—3rd inversion. Figures 6 and 9 supplies examples of the process:



Figure 6

The bass is written first to the right. The redundant (extra) F# is not added to the revised chord.

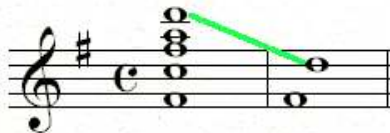


Figure 7

The D is added to the new chord.



Figure 8

The A is added.

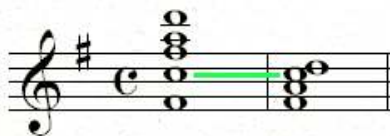


Figure 9

Finally the C is added and all the notes are in the new closed position chord. Notice that the second--the non-third interval--is easy to identify. All the chord tones are on spaces except for the root--D5. This root forms a second with the note below it. Since the root is on the top of the chord, this is a first inversion seventh chord. Here is the harmonic analysis (Figure 10):

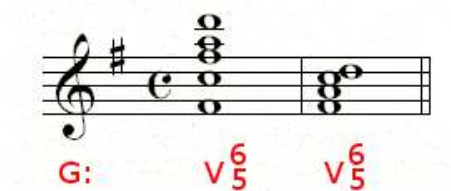


Figure 10

Practice labeling these seventh chords in G major (Answers below)



Figure 11

Answers: G Major: 1. ii7, 2. V7, 3. I65, 4. V43, 5. IV65, 6. V2

This page titled [5.4: Seventh Chords and Inversions](#) is shared under a [CC BY 3.0](#) license and was authored, remixed, and/or curated by [Terry B. Ewell & Catherine Schmidt-Jones](#) ([Connections](#)) via [source content](#) that was edited to the style and standards of the LibreTexts platform.

Index

B

bass clef
[1.2: Clef](#)

C

C clef
[1.2: Clef](#)

chromatic half steps

[1.5: Chromatic and Diatonic Half Steps](#)

clef symbol

[1.2: Clef](#)

D

diatonic half steps

[1.5: Chromatic and Diatonic Half Steps](#)

H

harmonic analysis

[5.3: Beginning Harmonic Analysis](#)

T

treble clef

[1.2: Clef](#)

Detailed Licensing

Overview

Title: [Music Fundamentals \(Ewell and Schmidt-Jones\)](#)

Webpages: 48

All licenses found:

- [CC BY 3.0](#): 87.5% (42 pages)
- [Undeclared](#): 12.5% (6 pages)

By Page

- [Music Fundamentals \(Ewell and Schmidt-Jones\) - CC BY 3.0](#)
 - [Front Matter - CC BY 3.0](#)
 - [TitlePage - Undeclared](#)
 - [InfoPage - CC BY 3.0](#)
 - [About the Authors - Undeclared](#)
 - [Table of Contents - Undeclared](#)
 - [Licensing - Undeclared](#)
 - [Unit 1: Pitch and Major Scales and Keys - CC BY 3.0](#)
 - [1.1: Introduction to Pitch Notation in Music - CC BY 3.0](#)
 - [1.2: Clef - CC BY 3.0](#)
 - [1.3: Introduction to the Piano Keyboard - CC BY 3.0](#)
 - [1.4: Pitch- Sharp, Flat, and Natural Notes - CC BY 3.0](#)
 - [1.5: Chromatic and Diatonic Half Steps - CC BY 3.0](#)
 - [1.6: Octave Designations in Music - CC BY 3.0](#)
 - [1.7: Key Signature - CC BY 3.0](#)
 - [1.8: Major Keys and Scales - CC BY 3.0](#)
 - [1.9: Scale Degrees of the Diatonic Scale - CC BY 3.0](#)
 - [1.10: Enharmonic Spelling - CC BY 3.0](#)
 - [1.11: The Circle of Fifths - CC BY 3.0](#)
 - [Unit 2: Rhythm and Meter - CC BY 3.0](#)
 - [2.1: Duration- Note Lengths in Written Music - CC BY 3.0](#)
 - [2.2: Duration - Rest Length - CC BY 3.0](#)
 - [2.3: Dots, Ties, and Borrowed Divisions - CC BY 3.0](#)
 - [2.4: Rhythm - CC BY 3.0](#)
 - [2.5: Time Signature - CC BY 3.0](#)
 - [2.6: Introduction to Subdivisions in Simple Meters - CC BY 3.0](#)
 - [2.7: Simple and Compound Time Signatures - CC BY 3.0](#)
 - [2.8: Meter in Music - CC BY 3.0](#)
 - [2.9: Introduction to Subdivisions in Compound Meters - CC BY 3.0](#)
 - [2.10: Pickup Notes and Measures - CC BY 3.0](#)
 - [2.11: Tempo - CC BY 3.0](#)
 - [Unit 3: Minor Scales and Keys - CC BY 3.0](#)
 - [3.1: Minor Keys and Scales - CC BY 3.0](#)
 - [3.2: Learning Major and Minor Scales - CC BY 3.0](#)
 - [3.3: Ear Training - CC BY 3.0](#)
 - [Unit 4: Intervals - CC BY 3.0](#)
 - [4.1: Intervals and Inversions - CC BY 3.0](#)
 - [4.2: Quickly Recognizing Simple Intervals - CC BY 3.0](#)
 - [4.3: Consonance and Dissonance - CC BY 3.0](#)
 - [Unit 5: Triads, Chords, Introduction to Roman Numerals - CC BY 3.0](#)
 - [5.1: Triads - CC BY 3.0](#)
 - [5.2: Naming Triads - CC BY 3.0](#)
 - [5.3: Beginning Harmonic Analysis - CC BY 3.0](#)
 - [5.4: Seventh Chords and Inversions - CC BY 3.0](#)
 - [Back Matter - CC BY 3.0](#)
 - [Index - CC BY 3.0](#)
 - [Glossary - Undeclared](#)
 - [Detailed Licensing - Undeclared](#)