

Reading Music: Common Notation

By:

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Online:

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C O N N E X I O N S

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Chapter 1

Pitch

1.1 The Staff¹

People were talking long before they invented writing. People were also making music long before anyone wrote any music down. Some musicians still play "by ear" (without written music), and some music traditions rely more on improvisation and/or "by ear" learning. But written music is very useful, for many of the same reasons that written words are useful. Music is easier to study and share if it is written down. Western music² specializes in long, complex pieces for large groups of musicians singing or playing parts exactly as a composer intended. Without written music, this would be too difficult. Many different types of music notation have been invented, and some, such as tablature³, are still in use. By far the most widespread way to write music, however, is on a **staff**. In fact, this type of written music is so ubiquitous that it is called **common notation**.

1.1.1 The Staff

The **staff** (plural **staves**) is written as five horizontal parallel lines. Most of the notes (Section 2.1) of the music are placed on one of these lines or in a space in between lines. Extra **ledger lines** may be added to show a note that is too high or too low to be on the staff. Vertical **bar lines** divide the staff into short sections called **measures** or **bars**. A **double bar line**, either heavy or light, is used to mark the ends of larger sections of music, including the very end of a piece, which is marked by a heavy double bar.

¹This content is available online at <<http://cnx.org/content/m10880/2.9/>>.

²"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

³"Reading Guitar Tablature" <<http://cnx.org/content/m11905/latest/>>

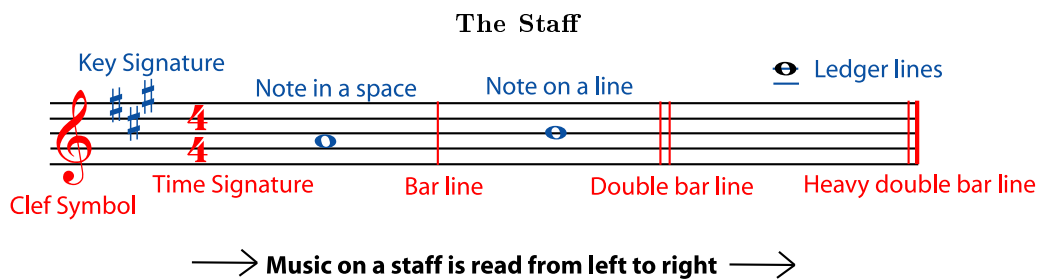


Figure 1.1: The five horizontal lines are the lines of the staff. In between the lines are the spaces. If a note is above or below the staff, ledger lines are added to show how far above or below. Shorter vertical lines are bar lines. The most important symbols on the staff, the clef symbol, key signature and time signature, appear at the beginning of the staff.

Many different kinds of symbols can appear on, above, and below the staff. The notes (Section 2.1) and rests (Section 2.2) are the actual written music. A note stands for a sound; a rest stands for a silence. Other symbols on the staff, like the clef (Section 1.2) symbol, the key signature (Section 1.4), and the time signature (Section 2.3), tell you important information about the notes and measures. Symbols that appear above and below the music may tell you how fast it goes (tempo (Section 2.6) markings), how loud it should be (dynamic (Section 3.1) markings), where to go next (repeats (Section 2.7), for example) and even give directions for how to perform particular notes (accents (p. 59), for example).

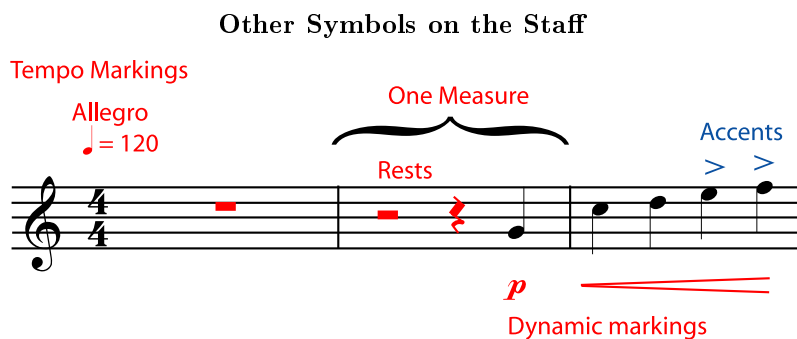


Figure 1.2: The bar lines divide the staff into short sections called bars or measures. The notes (sounds) and rests (silences) are the written music. Many other symbols may appear on, above, or below the staff, giving directions for how to play the music.

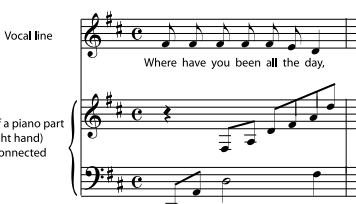
1.1.2 Groups of staves

Staves are read from left to right. Beginning at the top of the page, they are read one staff at a time unless they are connected. If staves should be played at the same time (by the same person or by different people), they will be connected at least by a long vertical line at the left hand side. They may also be connected by their bar lines. Staves played by similar instruments or voices, or staves that should be played by the same

person (for example, the right hand and left hand of a piano part) may be grouped together by braces or brackets at the beginning of each line.

Groups of Staves

Vocal line



The two staves of a piano part (left hand and right hand) are usually also connected by a brace.

Staves that are to be played at the same time are connected at least by a line at the left end. They may also be connected at each bar line.

(a)



(b)

Figure 1.3: (b) When many staves are to be played at the same time, as in this orchestral score, the lines for similar instruments - all the violins, for example, or all the strings - may be marked with braces or brackets.

1.2 Clef⁴

1.2.1 Treble Clef and Bass Clef

The first symbol that appears at the beginning of every music staff (Section 1.1) is a **clef symbol**. It is very important because it tells you which note (Section 2.1) (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.

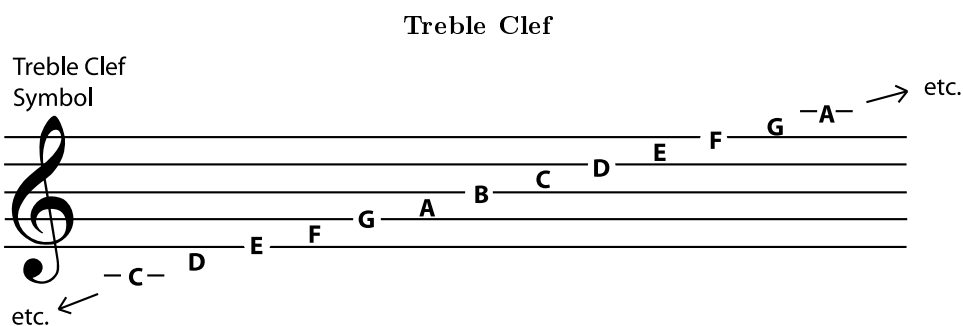


Figure 1.4

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.

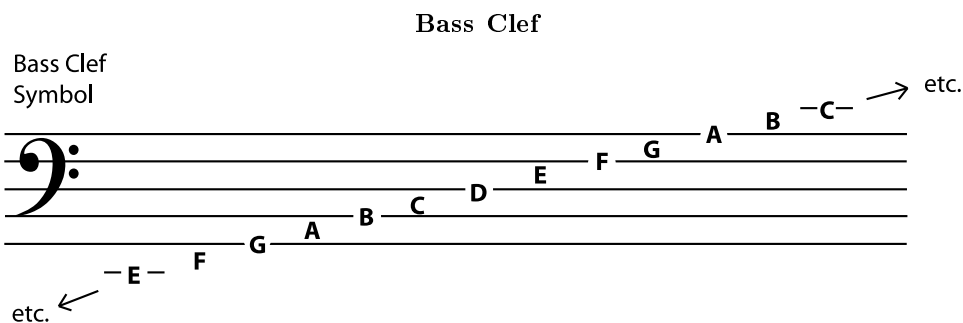
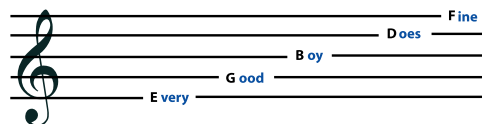


Figure 1.5

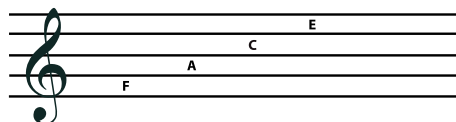
⁴This content is available online at <http://cnx.org/content/m10941/2.15/>.

1.2.2 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.

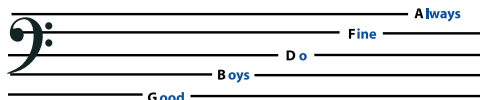


Treble clef lines:
 "Every Good Boy Does Fine"
 or
 "Every Good Boy Deserves Fudge"

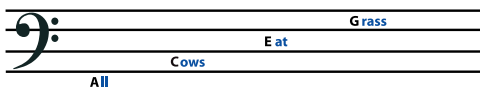


Treble clef spaces spell "FACE"

(a)



Bass clef lines:
 "Good Boys Do Fine Always"
 or
 "Good Boys Deserve Fudge Always"



Bass clef spaces:
 "All Cows Eat Grass"

(b)

Figure 1.6: 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.

1.2.3 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 C⁵.

⁵"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/#p2bb>>

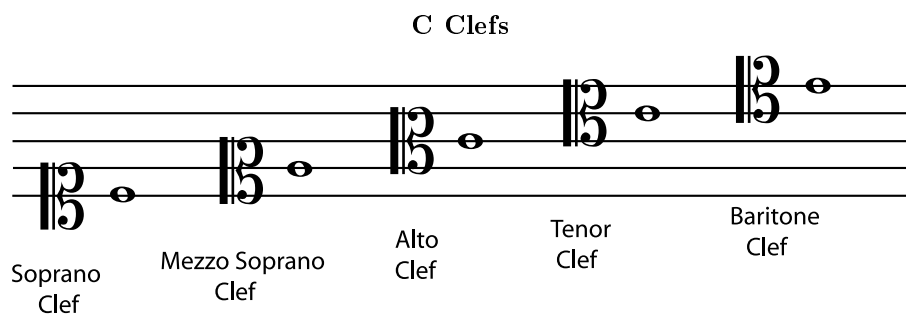


Figure 1.7: All of the notes on this staff are middle C.

The bass and treble clefs were also once moveable, but it is now very rare to see them anywhere but in their standard positions. If you do see a treble or bass clef symbol in an unusual place, remember: treble clef is a **G clef**; its spiral curls around a G. Bass clef is an **F clef**; its two dots center around an F.

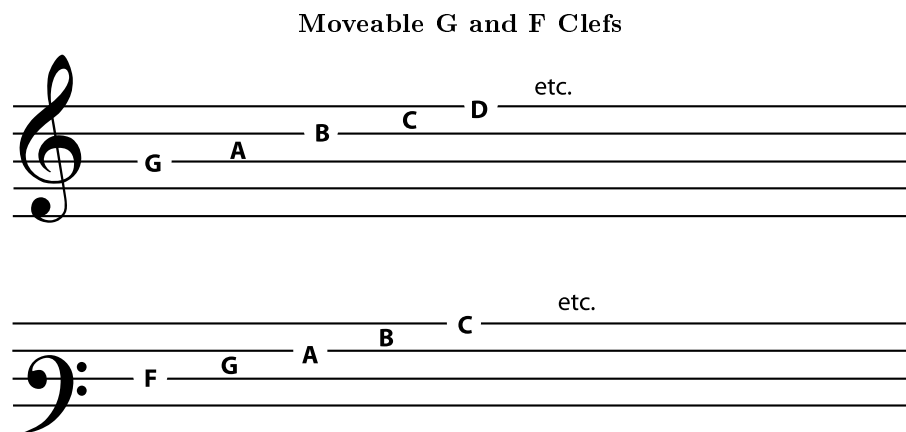


Figure 1.8: It is rare these days to see the G and F clefs in these nonstandard positions.

Much more common is the use of a treble clef that is meant to be read one octave below the written pitch. Since many people are uncomfortable reading bass clef, someone writing music that is meant to sound in the region of the bass clef may decide to write it in the treble clef so that it is easy to read. A very small "8" at the bottom of the treble clef symbol means that the notes should sound one octave lower than they are written.

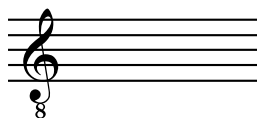


Figure 1.9: A small "8" at the bottom of a treble clef means that the notes should sound one octave lower than written.

1.2.4 Why use different clefs?

Music is easier to read and write if most of the notes fall on the staff and few ledger lines (p. 1) have to be used.

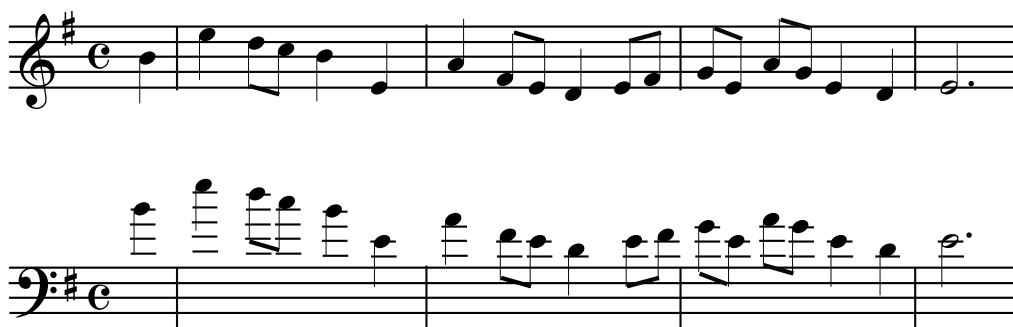


Figure 1.10: These scores show the same notes written in treble and in bass clef. The staff with fewer ledger lines is easier to read and write.

The G indicated by the treble clef is the G above middle C⁶, while the F indicated by the bass clef is the F below middle C. (C clef indicates middle C.) So treble clef and bass clef together cover many of the notes that are in the range⁷ of human voices and of most instruments. Voices and instruments with higher ranges usually learn to read treble clef, while voices and instruments with lower ranges usually learn to read bass clef. Instruments with ranges that do not fall comfortably into either bass or treble clef may use a C clef or may be transposing instruments⁸.

⁶"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/#p2bb>>

⁷"Range" <<http://cnx.org/content/m12381/latest/>>

⁸"Transposing Instruments" <<http://cnx.org/content/m10672/latest/>>

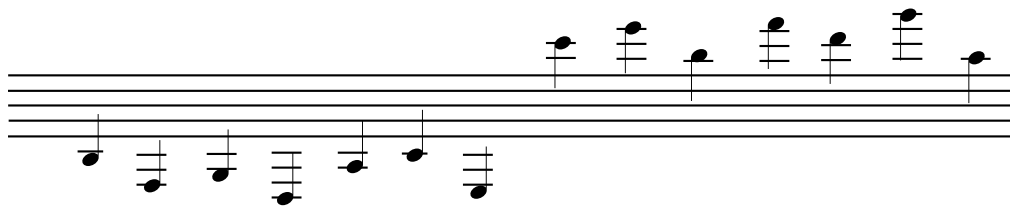


Figure 1.13

Exercise 1.3

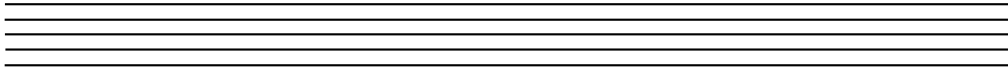
(Solution on p. 25.)

Figure 1.14 gives more exercises to help you memorize whichever clef you are learning. You may print these exercises as a PDF worksheet⁹ if you like.

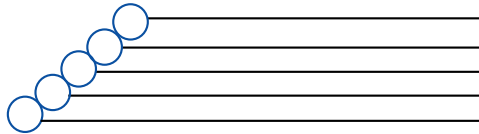
⁹<http://cnx.org/content/m10941/latest/ClefWorksheet.pdf>

Clef Practice

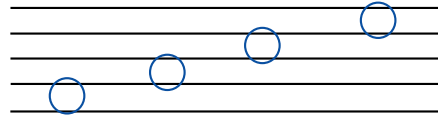
Practice writing your clef symbol on this staff. Write at least eight clef symbols



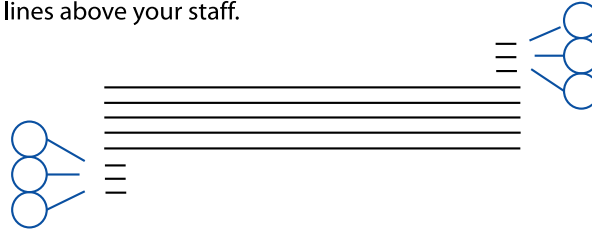
Write the letter names of the lines in your staff:



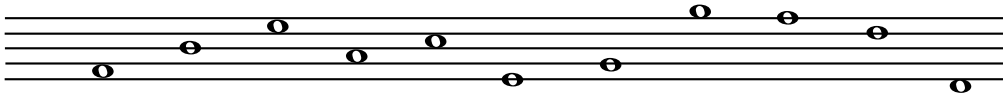
Write the letter names of the spaces:



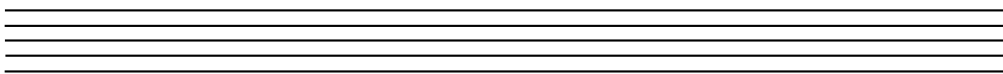
Write the letter names of the three ledger lines below and the three ledger lines above your staff.



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 1.14

1.3 Pitch: Sharp, Flat, and Natural Notes¹⁰

The **pitch** of a note is how high or low it sounds. Pitch depends on the frequency¹¹ of the fundamental¹² sound wave of the note. The higher the frequency of a sound wave, and the shorter its wavelength¹³, 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 octave¹⁴ on another A.)

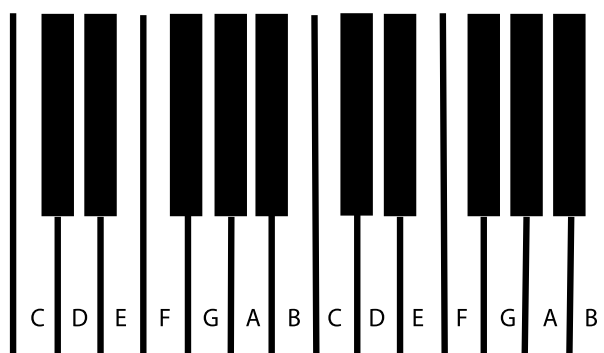


Figure 1.15: The natural notes name the white keys on a keyboard.

But in Western¹⁵ 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)?

¹⁰This content is available online at <<http://cnx.org/content/m10943/2.9/>>.

¹¹"Acoustics for Music Theory": Section Wavelength, Frequency, and Pitch <<http://cnx.org/content/m13246/latest/#s2>>

¹²"Harmonic Series" <<http://cnx.org/content/m11118/latest/#p1c>>

¹³"Acoustics for Music Theory": Section Wavelength, Frequency, and Pitch <<http://cnx.org/content/m13246/latest/#s2>>

¹⁴"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

¹⁵"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

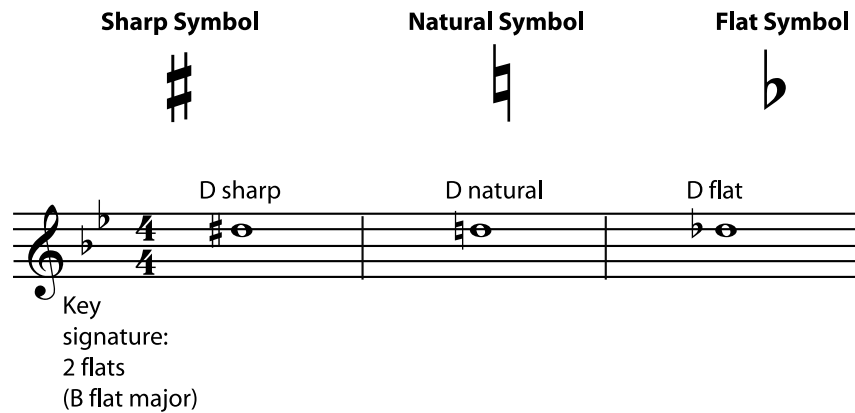


Figure 1.16: Sharp, flat, and natural signs can appear either in the key signature (Section 1.4), or right in front of the note that they change.

A **sharp sign** means "the note that is one half step¹⁶ 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 step¹⁷ apart. When they are a whole step apart, the note in between them can only be named using a flat or a sharp.

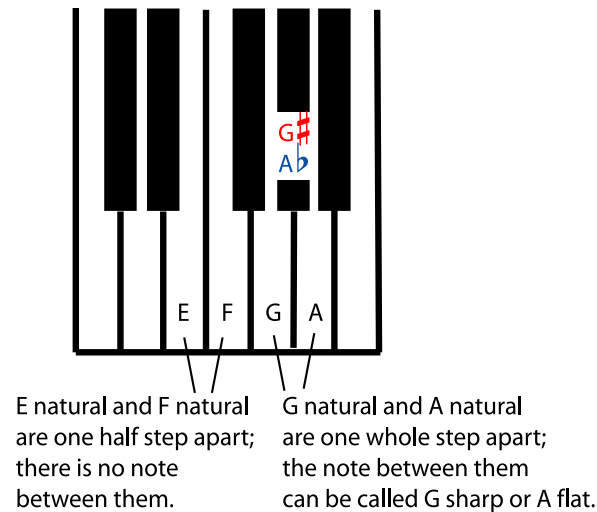


Figure 1.17

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

¹⁶"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

¹⁷"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

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 (Section 1.5) notes.

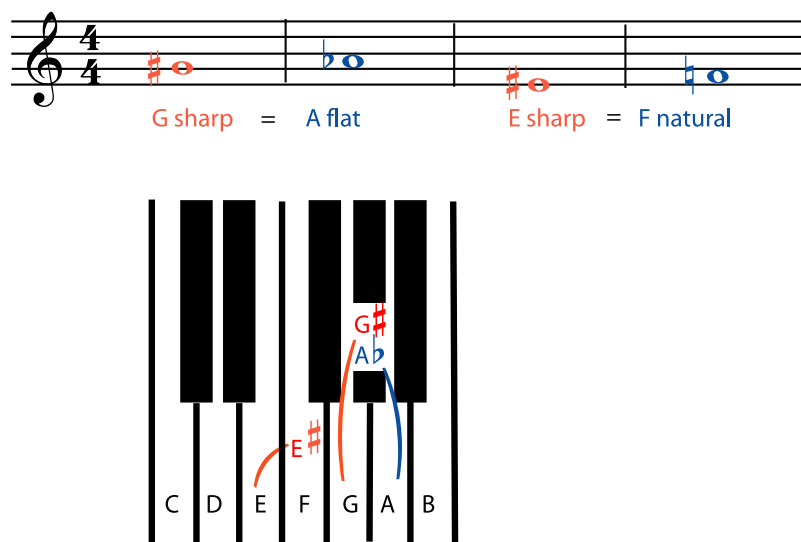


Figure 1.18: G sharp and A flat sound the same. E sharp and F natural sound the same.

Sharp and flat signs can be used in two ways: they can be part of a key signature (Section 1.4), 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 (Section 1.1), 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**.

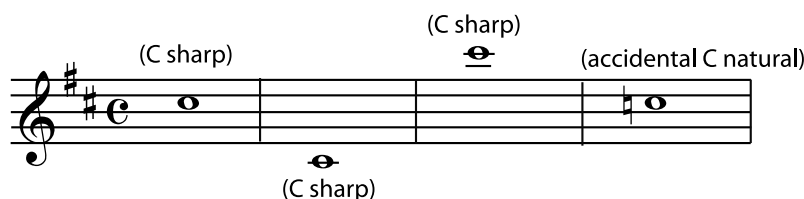


Figure 1.19: When a sharp sign appears in the C space in the key signature, all C's are sharp unless marked as accidentals.

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 chord¹⁸ and in the progression of the harmony¹⁹.

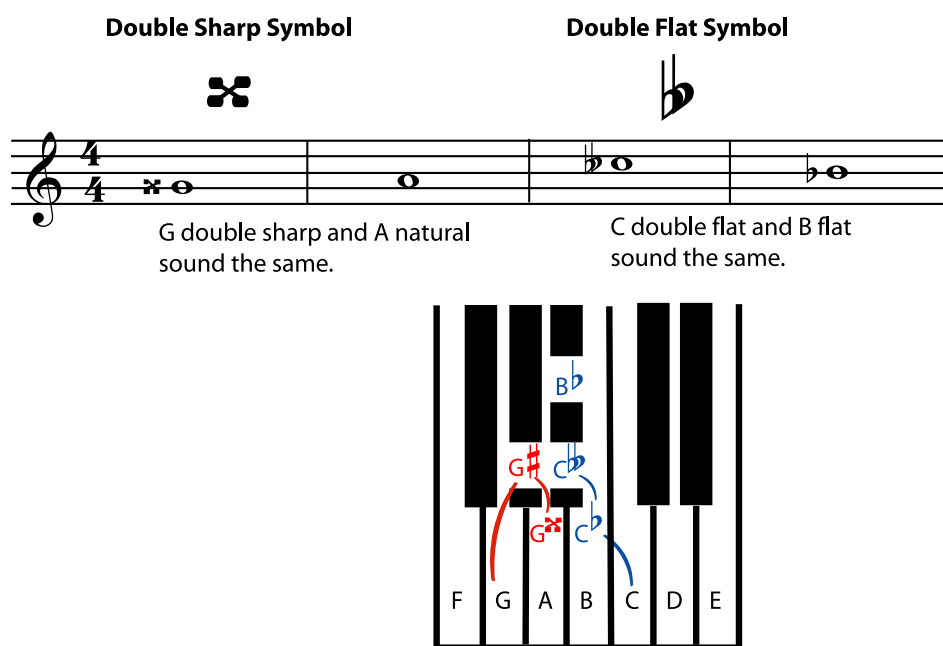


Figure 1.20: Double sharps raise the pitch by two half steps (one whole step). Double flats lower the pitch by two half steps (one whole step).

1.4 Key Signature²⁰

The key signature comes right after the clef (Section 1.2) symbol on the staff (Section 1.1). It may have either some sharp (Section 1.3) symbols on particular lines or spaces, or some flat (Section 1.3) 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".

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 on each line and space of the staff. The clef tells you the letter name of the note (A, B, C, etc.), and the key tells you whether the note is sharp, flat or natural.

¹⁸"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

¹⁹"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

²⁰This content is available online at <<http://cnx.org/content/m10881/2.11/>>.

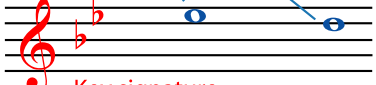
On this staff:

Notes in top space are E flat

Notes on fourth line are D Natural

Treble Clef

Key signature has 2 flats



On this staff:

Notes in top space are G sharp

Notes on fourth line are F sharp

Bass Clef

Key signature has three sharps

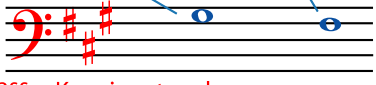


Figure 1.21

The **key signature** is a list of all the sharps and flats in the key²¹ 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).**

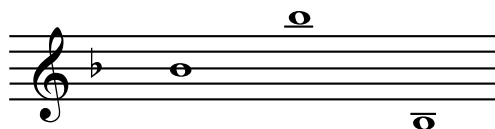


Figure 1.22: This key signature has a flat on the "B" line, so all of these B's are flat.

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 fifths²².

²¹"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

²²"The Circle of Fifths" <<http://cnx.org/content/m10865/latest/>>

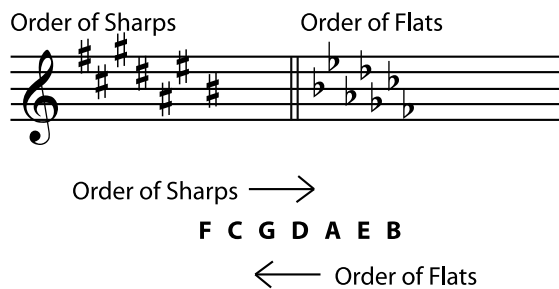


Figure 1.23

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 key²³. If the key contains sharps, the name of the key is one half step²⁴ 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.

Example 1.1

Figure 1.24 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.

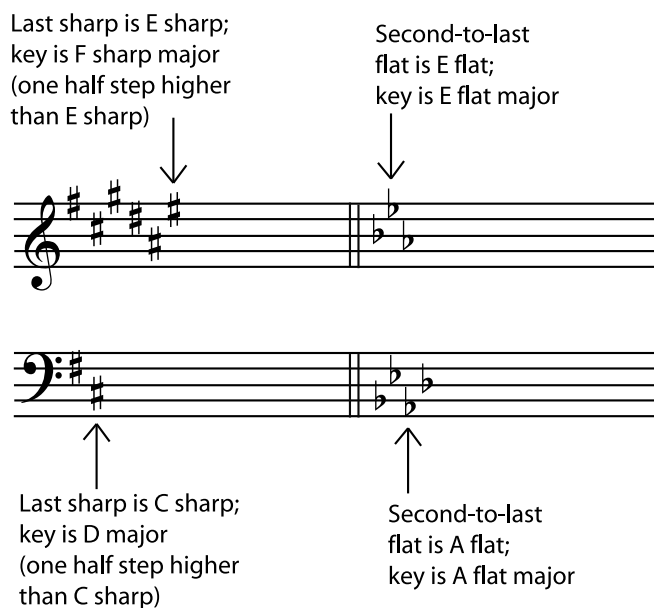


Figure 1.24

The only major keys that these rules do not work for are C major (no flats or sharps) and F major (one flat).

²³"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

²⁴"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

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 fourth²⁵ 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.

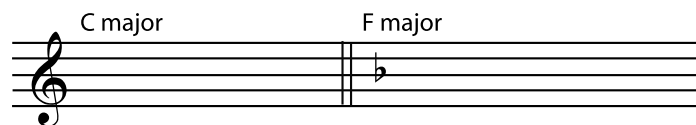


Figure 1.25: The key of C major has no sharps or flats. F major has one flat.

If the music is in a minor key, it will be in the relative minor²⁶ of the major key for that key signature. You may be able to tell just from listening (see Major Keys and Scales²⁷) whether the music is in a major or minor key. If not, the best clue is to look at the final chord²⁸. That chord (and often the final note of the melody, also) will usually name the key.

Exercise 1.4

(Solution on p. 26.)

Write the key signatures asked for in Figure 1.26 and name the major keys that they represent.

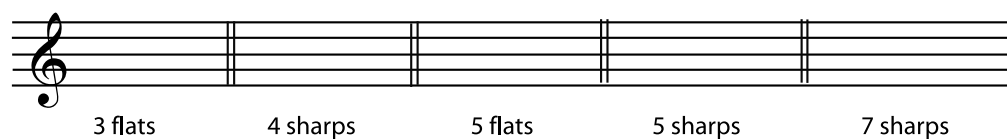


Figure 1.26

1.5 Enharmonic Spelling²⁹

1.5.1 Enharmonic Notes

In common notation (Section 1.1), any note can be sharp, flat, or natural (Section 1.3). A sharp symbol raises the pitch (Section 1.3) (of a natural note) by one half step³⁰; a flat symbol lowers it by one half step.

²⁵"Interval" <<http://cnx.org/content/m10867/latest/#p21b>>

²⁶"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

²⁷"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

²⁸"Harmony": Chords <<http://cnx.org/content/m11654/latest/#10b>>

²⁹This content is available online at <<http://cnx.org/content/m11641/1.9/>>.

³⁰"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

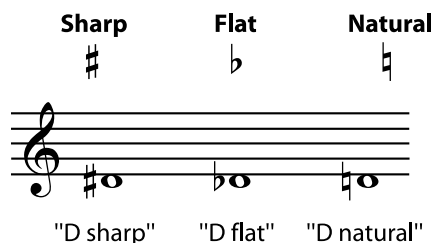
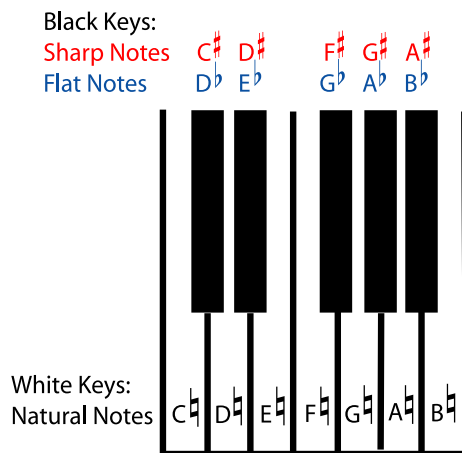


Figure 1.27

Why do we bother with these symbols? There are twelve pitches available within any octave³¹. 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 key³². And music that is in a major³³ or minor³⁴ 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 (Section 1.1) 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 (Figure 1.28) at the notes on a keyboard.

Figure 1.28: Seven of the twelve possible notes in each octave³⁵ 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,

³¹"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

³²"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

³³"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

³⁴"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

³⁵"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

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 1.29: 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.

Exercise 1.5

(Solution on p. 27.)

Name the other enharmonic notes that are listed above the black keys on the keyboard in Figure 1.28. Write them on a treble clef staff. If you need staff paper, you can print out this PDF file³⁶

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 keyboard (Figure 1.28) and remembering that the definition of sharp is "one half step higher than natural", you can see that an E sharp must sound the same as an F natural. Why would you choose to call the note E sharp instead of F natural? Even though they sound the same, E sharp and F natural, as they are actually used in music, are different notes. (They may, in some circumstances, also sound different; see below (Section 1.5.4: Enharmonic Spellings and Equal Temperament).) 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 Triads³⁷, Beyond Triads³⁸, and Harmonic Analysis³⁹ 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 step⁴⁰) 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.

³⁶<http://cnx.org/content/m11641/latest/staffpaper1.pdf>

³⁷"Triads" <<http://cnx.org/content/m10877/latest/>>

³⁸"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

³⁹"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

⁴⁰"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

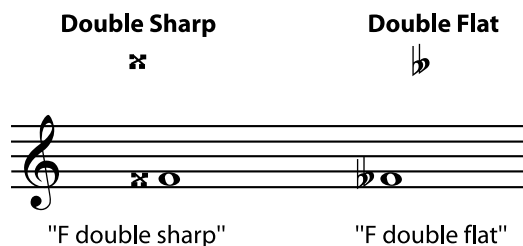


Figure 1.30

Exercise 1.6*(Solution on p. 27.)*

Give at least one enharmonic spelling for the following notes. Try to give more than one. (Look at the keyboard (Figure 1.28) again if you need to.)

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

1.5.2 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 Scales⁴¹. Minor keys also all follow the same pattern, different from the major scale pattern; see Minor Keys⁴².) 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 (Section 1.5.4: Enharmonic Spellings and Equal Temperament).)

⁴¹"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

⁴²"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>



Figure 1.31: 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 (Figure 1.28) 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

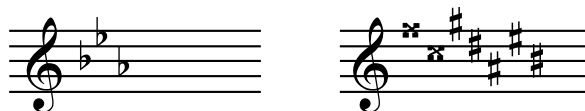


Figure 1.32: The key signatures for E flat and D sharp look very different, but would sound the same on a keyboard.

Exercise 1.7

(Solution on p. 27.)

Give an enharmonic name and key signature for the keys given in Figure 1.33. (If you are not well-versed in key signatures (Section 1.4) 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.)

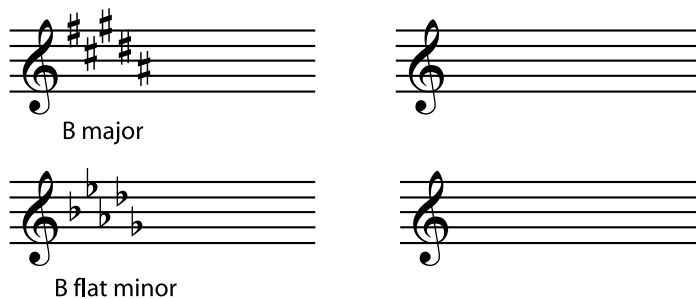


Figure 1.33

1.5.3 Enharmonic Intervals and Chords

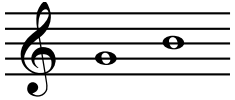

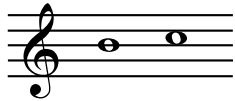

		
Major third	sounds the same as	Diminished fourth
		
Minor second	sounds the same as	Augmented prime

Figure 1.34

Chords⁴³ and intervals⁴⁴ 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 Interval⁴⁵. For practice naming chords, see Naming Triads⁴⁶ and Beyond Triads⁴⁷. For an introduction to how chords function in a harmony, see Beginning Harmonic Analysis⁴⁸.)

⁴³"Harmony": Chords <<http://cnx.org/content/m11654/latest/#10b>>

⁴⁴"Interval" <<http://cnx.org/content/m10867/latest/>>

⁴⁵"Interval" <<http://cnx.org/content/m10867/latest/>>

⁴⁶"Naming Triads" <<http://cnx.org/content/m10890/latest/>>

⁴⁷"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

⁴⁸"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

Diminished fourth Major third Minor seventh Augmented sixth

C sharp minor D flat minor E diminished minor seventh
 respelled (E becomes F flat)
 = G diminished seventh

Figure 1.35

1.5.4 Enharmonic Spellings and Equal Temperament

All of the above discussion assumes that all notes are tuned in equal temperament⁴⁹. Equal temperament has become the "official" tuning system for Western music⁵⁰. 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 intonation⁵¹, which is more closely based on the harmonic series⁵². 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 traditions⁵³ 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 Systems⁵⁴.

⁴⁹"Tuning Systems": Section Equal Temperament <<http://cnx.org/content/m11639/latest/#s22>>

⁵⁰"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

⁵¹"Tuning Systems" <<http://cnx.org/content/m11639/latest/#p12a>>

⁵²"Harmonic Series I: Timbre and Octaves" <<http://cnx.org/content/m13682/latest/>>

⁵³"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

⁵⁴"Tuning Systems" <<http://cnx.org/content/m11639/latest/>>

Solutions to Exercises in Chapter 1

Solution to Exercise 1.1 (p. 8)

The figure shows three staves of musical notation. The top staff is in treble clef, the middle in bass clef, and the bottom in alto clef (C-clef on the third line). Each staff contains a sequence of notes with corresponding letter labels below them.

Staff	Clef	Notes (from left to right)	Letter Labels (from left to right)
1	Treble	E, B, C, G, E, A, D, D, B, C, G	E, B, C, G, E, A, D, D, B, C, G
2	Bass	G, D, E, B, G, C, F, F, D, E, B	G, D, E, B, G, C, F, F, D, E, B
3	Alto	F, C, D, A, F, B, E, E, C, D, A	F, C, D, A, F, B, E, E, C, D, A

Figure 1.36

Solution to Exercise 1.2 (p. 8)

Figure 1.37 shows the answers for treble and bass clef. If you have done another clef, have your teacher check your answers.

The figure shows two staves of musical notation. The top staff is in treble clef and the bottom in bass clef. Each staff contains a sequence of notes with corresponding letter labels below them.

Staff	Clef	Notes (from left to right)	Letter Labels (from left to right)
1	Treble	B, F, G, D, A, C, E, C, E, B, F, D, G, A	B, F, G, D, A, C, E, C, E, B, F, D, G, A
2	Bass	D, A, B, F, C, E, G, E, G, D, A, F, B, C	D, A, B, F, C, E, G, E, G, D, A, F, B, C

Figure 1.37

Solution to Exercise 1.3 (p. 9)

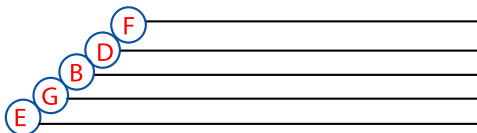
Figure 1.38 shows the answers for treble clef, and Figure 1.39 the answers for bass clef. If you are working in a more unusual clef, have your teacher check your answers.

Clef Practice

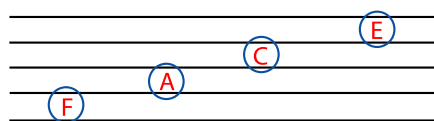
Practice writing your clef symbol on this staff. Write at least eight clef symbols



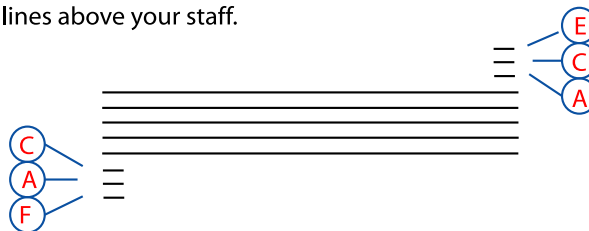
Write the letter names of the lines in your staff:



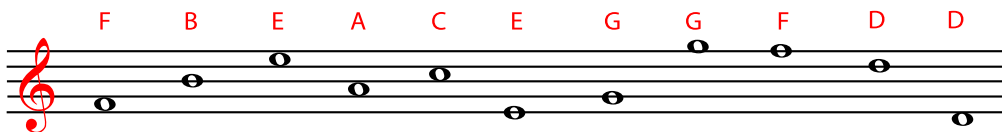
Write the letter names of the spaces:



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.



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

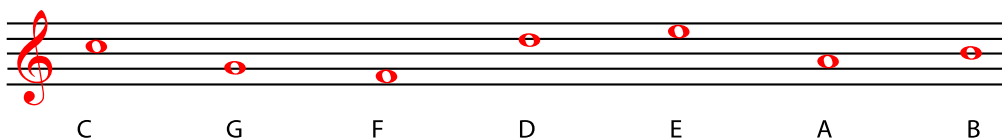


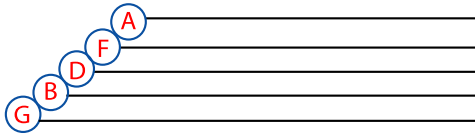
Figure 1.38

Clef Practice

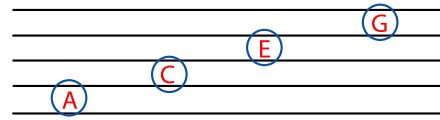
Practice writing your clef symbol on this staff. Write at least eight clef symbols



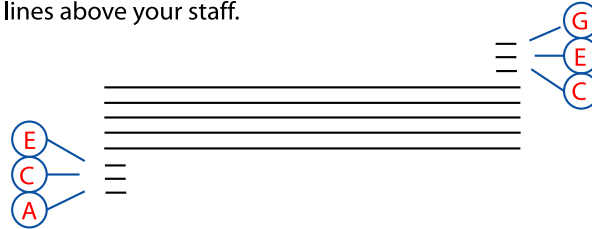
Write the letter names of the lines in your staff:



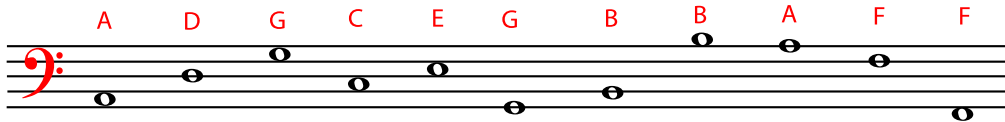
Write the letter names of the spaces:



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.

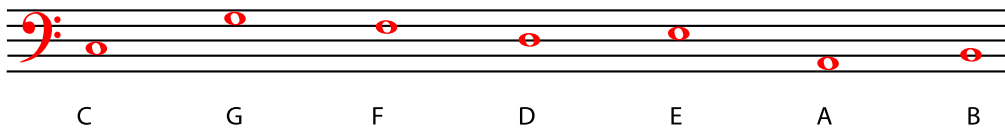


Figure 1.39

Solution to Exercise 1.4 (p. 17)

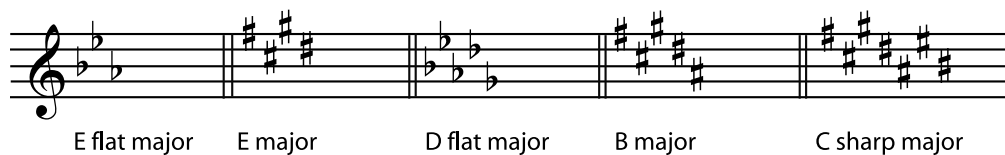


Figure 1.40

Solution to Exercise 1.5 (p. 19)

- C sharp and D flat
- F sharp and G flat
- G sharp and A flat
- A sharp and B flat



Figure 1.41

Solution to Exercise 1.6 (p. 20)

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

Solution to Exercise 1.7 (p. 21)



Figure 1.42

Chapter 2

Time

2.1 Duration: Note Lengths in Written Music¹

2.1.1 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 (Section 1.3) of a written note, you look at the clef (Section 1.2) and the key signature (Section 1.4), then see what line or space the note is on. The higher a note sits on the staff (Section 1.1), the higher it sounds. To find out the duration of the written note, you look at the tempo (Section 2.6) and the time signature (Section 2.3) and then see what the note looks like.

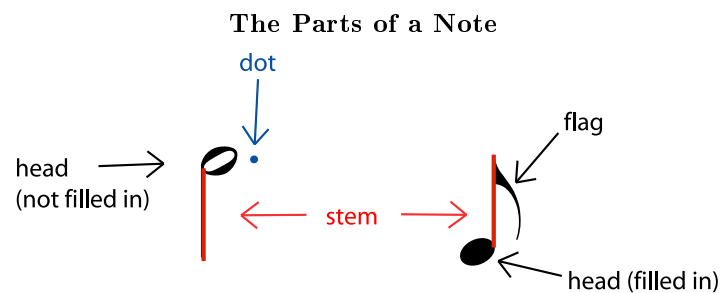


Figure 2.1: All of the parts of a written note affect how long it lasts.

The pitch of the note depends only on what line or space the **head** of the note is on. (Please see pitch (Section 1.3), clef (Section 1.2) and key signature (Section 1.4) for more information.) If the note does not have a head (see Figure 2.2 (Notes Without Heads)), that means that it does not have one definite pitch.

¹This content is available online at <<http://cnx.org/content/m10945/2.9/>>.

Notes Without Heads

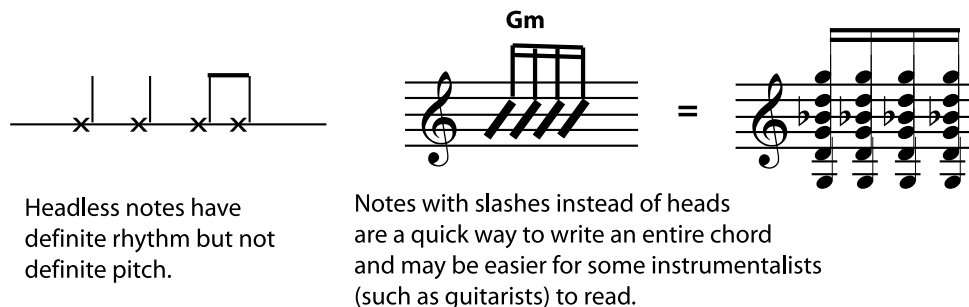


Figure 2.2: If a note does not have head, it does not have one definite pitch. Such a note may be a pitchless sound, like a drum beat or a hand clap, or it may be an entire chord rather than a single note.

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 (Section 3.2) 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 (Section 2.2).) If this is confusing, please see the explanation in articulation (Section 3.2).

2.1.2 The Length of a Note

Most Common Note Lengths

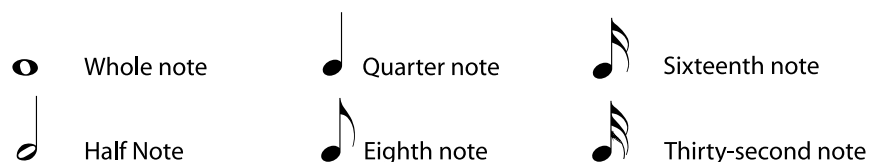


Figure 2.3

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 (Section 2.5) to find out how notes of unusual lengths are written.)



Figure 2.4: 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 2.4 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.

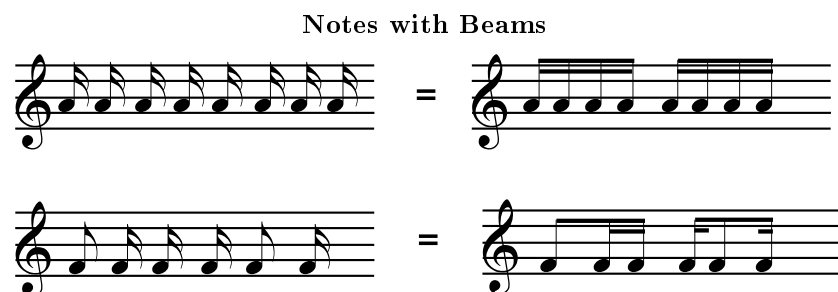


Figure 2.5: The notes connected with beams are easier to read quickly than the flagged notes. Notice that each note has the same number of beams as it would have flags, even if it is connected to a different type of note. The notes are often (but not always) connected so that each beamed group gets one 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 Measures².)

Example 2.1

²"Fractions, Multiples, Beats, and Measures" <<http://cnx.org/content/m11807/latest/>>

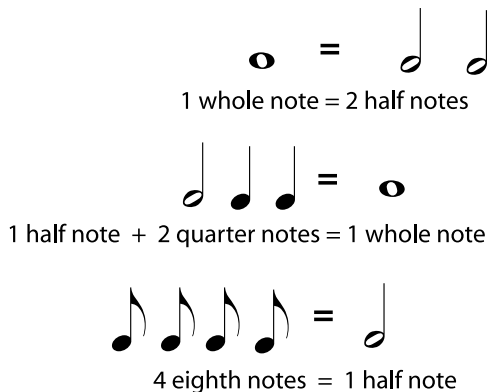


Figure 2.6

Exercise 2.1*(Solution on p. 55.)*

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







 = <input type="text"/>	 = <input type="text"/>
1 whole = ____ quarters	1 half = ____ quarters
 = <input type="text"/>	 = <input type="text"/>
1 whole = ____ eighths	1 half = 1 quarter + ____ eighths
 = <input type="text"/>	 = <input type="text"/>
4 sixteenths = 1 _____	4 eighths + 1 half = 1 _____

Figure 2.7

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 (Section 2.3.1: Beats and Measures). To find out exactly how many beats it takes, you must know the time signature (Section 2.3). And to find out how long a beat is, you need to know the tempo (Section 2.6).

Example 2.2

Largo ← Beats are slow and long
 4
 Quarter note gets one beat

Allegro ← Beats are fast and short
 2
 Half notes get one beat

On both staves,
 a half note is twice as long
 as a quarter note.
 But
 a half note on the second staff
 will be a lot shorter than
 a half note on the first staff.

Figure 2.8: 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.

2.1.3 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.

Stem Direction


Single notes




Notes on a beam



Notes in chords



Separate parts



Multiple Rhythms in one part

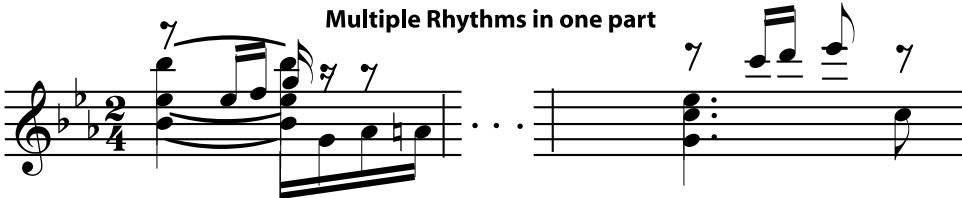


Figure 2.9: Keep stems and beams in or near the staff, but also use stem direction to clarify rhythms and parts when necessary.

2.2 Duration: Rest Length³

A **rest** stands for a silence in music. For each kind of note (Section 2.1), there is a written rest of the same length.

The Most Common Rests



Whole Rest	Half Rest	Quarter Rest	Eighth Rest	Sixteenth Rest	Thirty-second Rest
---------------	--------------	-----------------	----------------	-------------------	-----------------------

Figure 2.10

Exercise 2.2

(Solution on p. 55.)

For each note on the first line, write a rest of the same length on the second line. The first measure (Section 2.3.1: Beats and Measures) is done for you.

³This content is available online at <<http://cnx.org/content/m11887/1.5/>>.



Figure 2.13: A whole rest may be used to indicate a completely silent measure, no matter what the actual length of the measure will be.

2.3 Time Signature⁴

The **time signature** appears at the beginning of a piece of music, right after the key signature (Section 1.4). Unlike the key signature, which is on every staff (Section 1.1), the time signature will not appear again in the music unless the meter changes. The meter⁵ of a piece of music is its basic rhythm; the time signature is the symbol that tells you the meter of the piece and how (with what type of note (Section 2.1)) it is written.

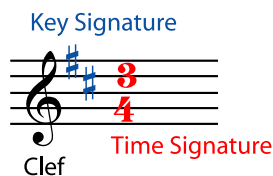


Figure 2.14: The time signature appears at the beginning of the piece of music, right after the clef symbol and key signature.

2.3.1 Beats and Measures

Because music is heard over a period of time, one of the main ways music is organized is by dividing that time up into short periods called **beats**. In most music, things tend to happen right at the beginning of each beat. This makes the beat easy to hear and feel. When you clap your hands, tap your toes, or dance, you are "moving to the beat". Your claps are sounding at the beginning of the beat, too. This is also called being "on the downbeat", because it is the time when the conductor's baton⁶ hits the bottom of its path and starts moving up again.

⁴This content is available online at <http://cnx.org/content/m10956/2.9/>.

⁵"Meter in Music" <http://cnx.org/content/m12405/latest/>

⁶"Conducting" <http://cnx.org/content/m12404/latest/>

Example 2.3

Listen to excerpts A, B, C and D. Can you clap your hands, tap your feet, or otherwise move "to the beat"? Can you feel the 1-2-1-2 or 1-2-3-1-2-3 of the meter? Is there a piece in which it is easier or harder to feel the beat?

- A⁷
- B⁸
- C⁹
- D¹⁰

The downbeat is the strongest part of the beat, but some downbeats are stronger than others. Usually a pattern can be heard in the beats: strong-weak-weak-strong-weak-weak, or strong-weak-strong-weak. So 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 (Section 2.1) gets a beat.

Reading the Time Signature

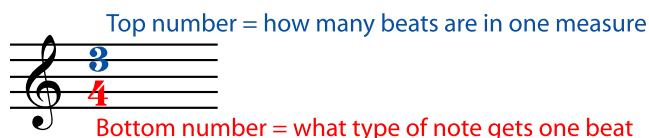


Figure 2.15: This time signature means that there are three quarter notes (or any combination of notes that equals three quarter notes) in every measure. A piece with this time signature would be "in three four" or just "in three four".

Exercise 2.3*(Solution on p. 55.)*

Listen again to the music in Example 2.3. 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?

2.3.2 Meter: 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.


⁷<http://cnx.org/content/m10956/latest/Tanz.mp3>

⁸<http://cnx.org/content/m10956/latest/EasyWinners.MID>

⁹<http://cnx.org/content/m10956/latest/Jetztkommt.MID>

¹⁰<http://cnx.org/content/m10956/latest/Greensleeves.mp3>

4 beats in a measure



4 quarters = 2 halves = 1 whole = 2 quarters + four eighths = and so on

A quarter note gets one beat

Figure 2.16: In "four four" time, there are four beats in a measure and a quarter note gets a beat. Any combination of notes that equals four quarters can be used to fill up a measure.

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 fractions¹¹, 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 that equals four quarters: one whole, two halves, one half plus two quarters, and so on.

Example 2.4

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 (Section 2.5) is worth an extra half of the note it follows. Listen¹² to the rhythms in Figure 2.17.



3 eighths = 6 sixteenths = 1 quarter + 1 eighth = dotted quarter = 2 eighths + 2 sixteenths

Figure 2.17: 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 2.4

(Solution on p. 55.)

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 file¹³.

1. Two four time
2. Three eight time
3. Six four time

¹¹"Fractions, Multiples, Beats, and Measures" <<http://cnx.org/content/m11807/latest/>>

¹²<http://cnx.org/content/m10956/latest/timesig1.MID>

¹³<http://cnx.org/content/m10956/latest/staffpaper1.pdf>

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.

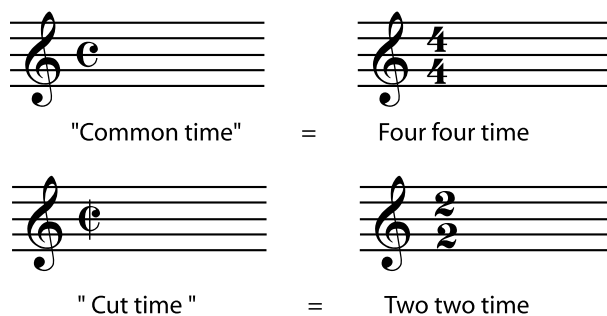


Figure 2.18

2.3.3 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"?

↓ = downbeat (beginning of beat)

Figure 2.19: 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 Figure 2.20 would sound like this¹⁴.

Figure 2.20: 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

¹⁴<http://cnx.org/content/m10956/latest/14k.mid>

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 is six eight time, and the other time signatures (for example nine eight and twelve eight) commonly used to write compound meters¹⁵. 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 will give only two beats per measure, with a dotted quarter (or three eighth notes) getting one beat. Since beats normally get divided into halves and quarters, this is the easiest way for composers to write beats that are divided into thirds. 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.

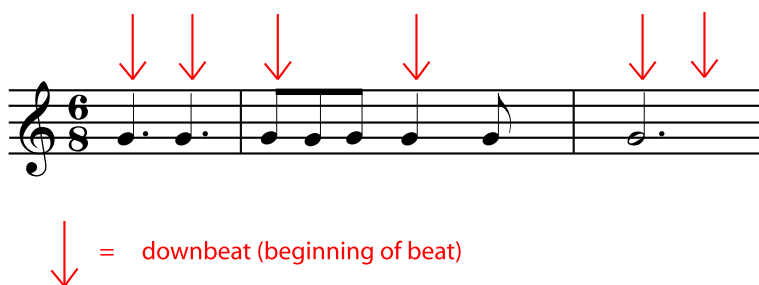


Figure 2.21: In six eight time, a dotted quarter usually gets one beat. This is the easiest way to write beats that are evenly divided into three rather than two.

2.4 Pickup Notes and Measures¹⁶

2.4.1 Pickup Measures

Normally, all the measures (Section 1.1.1: The Staff) of a piece of music must have exactly the number of beats (Section 2.3.1: Beats and Measures) indicated in the time signature (Section 2.3). The beats may be filled with any combination of notes or rests (with duration (Section 2.1) 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 2.22: 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*.

¹⁵"Meter in Music" <<http://cnx.org/content/m12405/latest/>>

¹⁶This content is available online at <<http://cnx.org/content/m12717/1.4/>>.

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 (p. 37). 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 meter¹⁷ 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.)

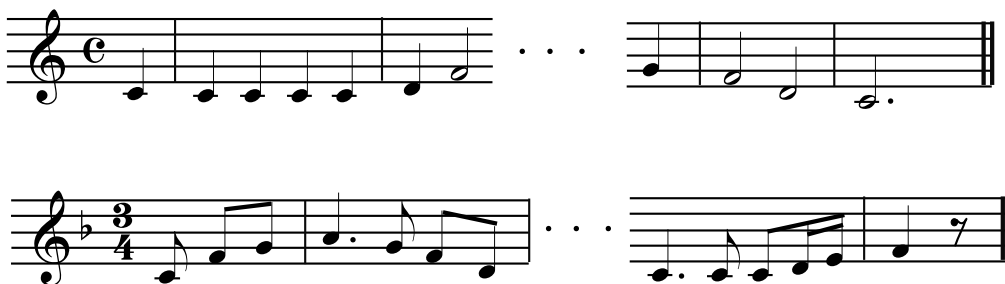


Figure 2.23: If a piece begins with a pickup measure, the final measure of the piece is shortened by the length of the pickup measure.

2.4.2 Pickup Notes

Any phrase¹⁸ 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.

¹⁷"Meter in Music" <<http://cnx.org/content/m12405/latest/>>

¹⁸"Melody": Section Melodic Phrases <<http://cnx.org/content/m11647/latest/#s2>>

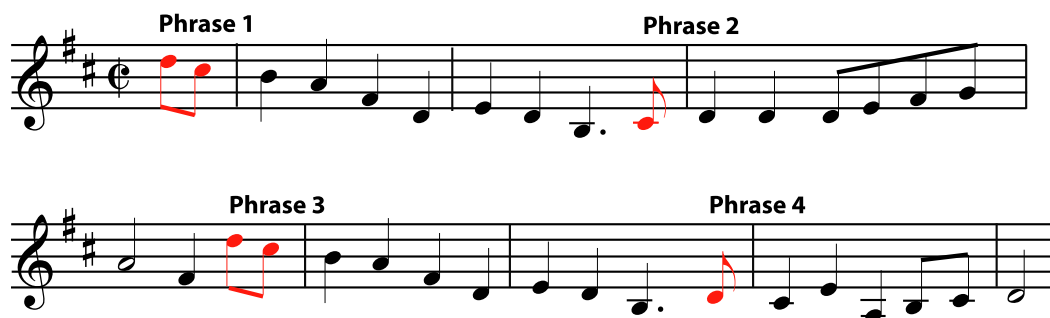


Figure 2.24: Any phrase may begin with pickup notes. Each of these four phrases begins with one or two pickup notes. (You may listen to the tune here¹⁹; can you hear that the pickup notes lead to the stronger downbeat?)

A piece that is using pickup measures or pickup notes may also sometimes place a double bar (p. 1) (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.

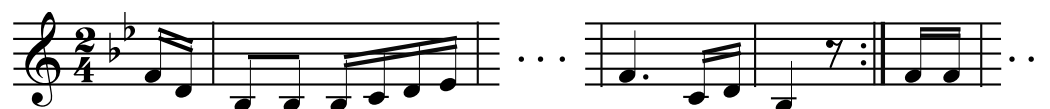


Figure 2.25: At the ends of sections of the music, a measure may be interrupted by a double bar that places the pickup notes in the correct section and assures that repeats have the correct number of beats. When this happens, the bar line will still appear at the end of the completed measure. This notation can be confusing, though, and in some music the pickups and repeats are written in a way that avoids these broken-up measures.

2.5 Dots, Ties, and Borrowed Divisions²⁰

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 (Section 2.1).) The same goes for rests. (See Duration: Rest Length (Section 2.2).) But what if you want a note (or rest) length that isn't half of another note (or rest) length?

2.5.1 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

¹⁹<http://cnx.org/content/m12717/latest/GirlILeftBehind.MID>

²⁰This content is available online at <<http://cnx.org/content/m11888/1.6/>>.

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.

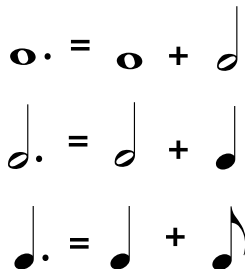


Figure 2.26: The dot acts as if it is adding another note half the length of the original note. A dotted quarter note, for example, would be the length of a quarter plus an eighth, because an eighth note is half the length of a quarter note.

Exercise 2.5

(Solution on p. 56.)

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

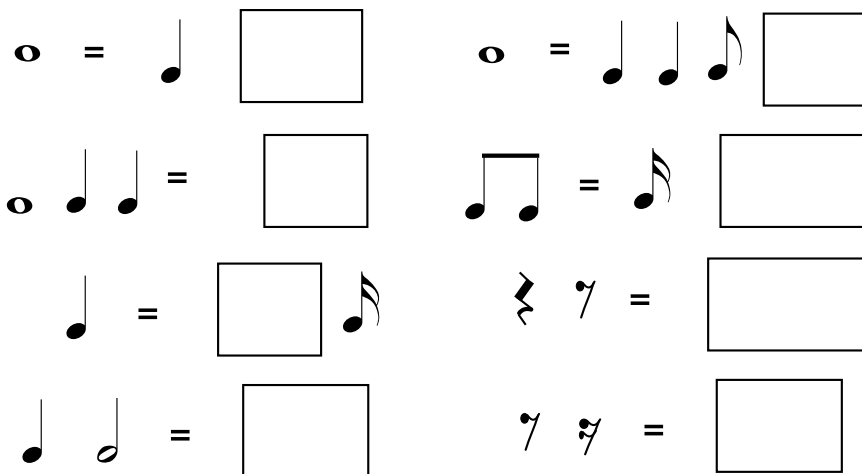


Figure 2.27

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.

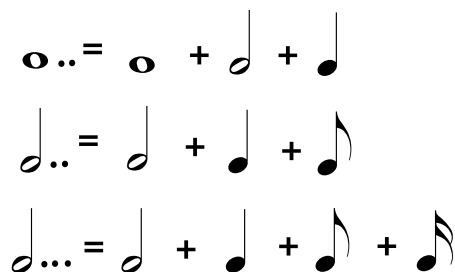


Figure 2.28: When a note has more than one dot, each dot is worth half of the dot before it.

2.5.2 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 (Section 2.3.1: Beats and Measures) and ends in a different measure.

NOTE: Ties may look like slurs (p. 62), but they are not the same; a slur connects to notes with different pitches (Section 1.3) and is a type of articulation (Section 3.2).



Figure 2.29: 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.

2.5.3 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 meter²¹. 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.

²¹"Meter in Music" <<http://cnx.org/content/m12405/latest/>>

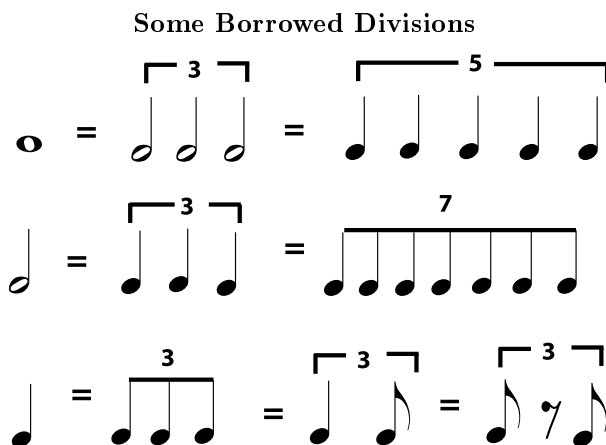


Figure 2.30: Any common note length can be divided into an unusual number of equal-length notes and rests, for example by dividing a whole note into three instead of two "half" notes. The notes are labeled with the appropriate number. If there might be any question as to which notes are involved in the borrowed division, a bracket is placed above them. Triplets are by far the most common borrowed division.

Borrowed Duplets



Figure 2.31: In a compound meter²², 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 (Section 2.6) notation that says **swing** usually means that all rhythms should be played as triplets. **Straight** means to play the rhythms as written.

NOTE: 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 (Section 2.6) is fast. This distinction is not important for students of music theory, but jazz students will want to work hard on using both rhythm²³ and articulation (Section 3.2) to produce a convincing "swing".

²²"Meter in Music" <<http://cnx.org/content/m12405/latest/>>

²³"Rhythm" <<http://cnx.org/content/m11646/latest/>>

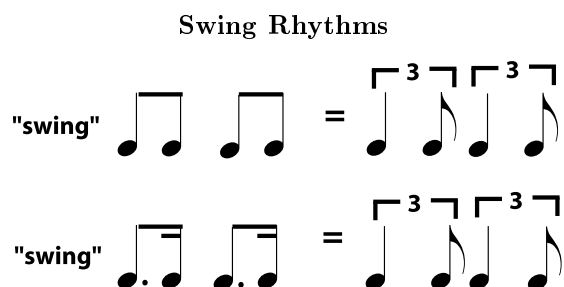


Figure 2.32: Jazz or blues with a "swing" rhythm often assumes that all divisions are triplets. The swung triplets may be written as triplets, or they may simply be written as "straight" eighth notes or dotted eighth-sixteenths. If rhythms are not written as triplets, the tempo marking usually includes an indication to "swing", or it may simply be implied by the style and genre of the music.

2.6 Tempo²⁴

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* (Gradual Tempo Changes, p. 49) may appear either above or below the staff.

2.6.1 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 2.33 shows some examples of metronome markings.

²⁴This content is available online at <<http://cnx.org/content/m11648/1.6/>>.


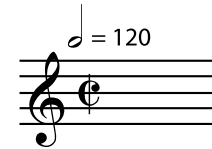
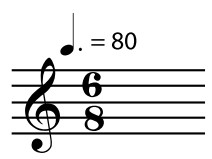
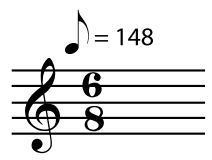
	<p>Four four time (quarter note gets one beat) 88 beats, or 88 quarter notes, per minute</p>
	<p>Cut time (two two) (half note gets one beat) 120 beats, or 120 half notes, per minute</p>
	<p>Six eight time Probably dotted quarter gets one beat 80 dotted quarters per minute (This would be the same speed as ♩ = 240 .)</p>
	<p>Six eight time 148 eighth notes per minute Could be conducted in a fast six (eighth note gets one beat) or in a slow two (dotted quarter gets one beat: about ♩. = 50 .)</p>

Figure 2.33

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.

2.6.2 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 2.6

(Solution on p. 56.)

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

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.

2.6.3 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 (More useful Italian, p. 49) 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)

2.7 Repeats and Other Musical Road Map Signs²⁵

Repetition, either exact or with small or large variations, is one of the basic organizing principles of music. Repeated notes (Section 2.1), motifs²⁶, phrases²⁷, melodies²⁸, rhythms²⁹, chord progressions³⁰, and even entire repeated sections in the overall form³¹, are all very crucial in helping the listener make sense of the music. So good music is surprisingly repetitive!

So, in order to save time, ink, and page turns, common notation has many ways to show that a part of the music should be repeated exactly.

If the repeated part is very small - only one or two measures, for example - the repeat sign will probably look something like those in Figure 2.34 (Repeated Measures). If you have very many such repeated measures in a row, you may want to number them (in pencil) to help you keep track of where you are in the music.

Repeated Measures

Repeat the previous measure.

Repeat the previous two measures.

Figure 2.34

For repeated sections of medium length - usually four to thirty-two measures - **repeat dots** with or without endings are the most common markings. Dots to the right of a double bar line (Section 1.1.1: The Staff) begin the repeated section; dots to the left of a double bar line end it. If there are no beginning repeat dots, you should go all the way back to the beginning of the music and repeat from there.

²⁵This content is available online at <<http://cnx.org/content/m12805/1.4/>>.

²⁶"Melody": Section Motif <<http://cnx.org/content/m11647/latest/#s3>>

²⁷"Melody": Section Melodic Phrases <<http://cnx.org/content/m11647/latest/#s2>>

²⁸"Melody" <<http://cnx.org/content/m11647/latest/>>

²⁹"Rhythm" <<http://cnx.org/content/m11646/latest/>>

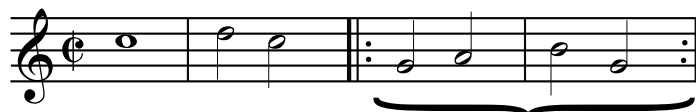
³⁰"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

³¹"Form in Music" <<http://cnx.org/content/m10842/latest/>>

Repeat Dots



Go all the way back to the beginning and repeat once.



Repeat (once) only the measures
in between the repeat dots.

Figure 2.35: If there are no extra instructions, a repeated section should be played twice. Occasionally you will see extra instructions over the repeat dots, for example to play the section "3x" (three times).

It is very common for longer repeated sections of music to be repeated exactly until the last few measures. When this happens, the repeat dots will be put in an **ending**. The bracket over the music shows you which measures to play each time you arrive at that point in the music. For example, the second time you reach a set of endings, you will **skip the music in all the other endings; play only the measures in the second ending, and then do whatever the second ending directs you to do** (repeat, go on, skip to somewhere else, etc.).

Other Common "Road Map" Signs




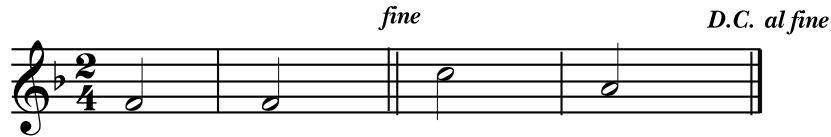
<i>D.C.</i>	or	<i>da capo</i>	"To the head" - Go back to the very beginning
<i>D.S.</i>	or	<i>dal segno</i>	"To the sign" - Go back to the sign
		<i>al fine</i>	"To the end" - On the repeat, stop when it says " <i>fine</i> "
			Sign
		<i>fine</i>	"End" - On the last time through, stop here
<i>to</i>			Go to the coda section
			Coda section

Figure 2.37

Again, instructions can easily get quite complicated, and these large-section markings may require you to study your part for a minute to see how it is laid out, and even to mark (in pencil) circles and arrows that help you find the way quickly while you are playing. Figure 2.38 contains a few very simplistic examples of how these "road map signs" will work.

Example 1:

Play to the D.C., then go back to the beginning and play until you reach "fine", then stop.



Example 2: Play to the D.S., then go back to the sign and play until you find the "to coda". Go directly to the coda and play to the end.

Figure 2.38: Here are some (shortened) examples of how these types of repeat instructions may be arranged. These types of signs usually mark longer repeated sections. In many styles of music, a short repeated section (usually marked with repeat dots) is often **not** repeated after a *da capo* or *dal segno*.

Solutions to Exercises in Chapter 2

Solution to Exercise 2.1 (p. 32)

\circ = ♩ =
 1 whole = 4 quarters 1 half = 2 quarters
 \circ = ♩ =
 1 whole = 8 eighths 1 half = 1 quarter + 2 eighths
 = =
 4 sixteenths = 1 quarter 4 eighths + 1 half = 1 whole

Figure 2.39

Solution to Exercise 2.2 (p. 34)

Figure 2.40

Solution to Exercise 2.3 (p. 37)

- 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 (Section 2.6).

Solution to Exercise 2.4 (p. 38)

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

Solution to Exercise 2.5 (p. 44)

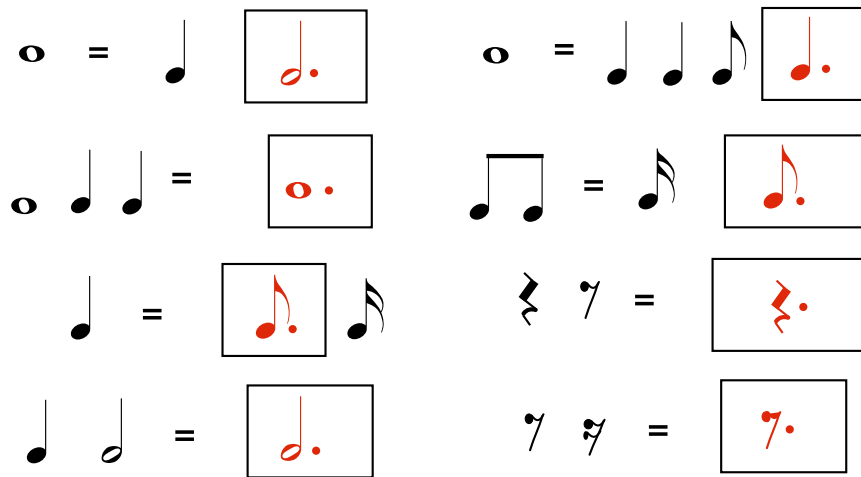


Figure 2.42

Solution to Exercise 2.6 (p. 49)

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

Chapter 3

Style

3.1 Dynamics and Accents in Music¹

3.1.1 Dynamics

Sounds, including music, can be barely audible, or loud enough to hurt your ears, or anywhere in between. When they want to talk about the loudness of a sound, scientists and engineers talk about amplitude². Musicians talk about **dynamics**. The amplitude of a sound is a particular number, usually measured in decibels, but dynamics are relative; an orchestra playing *fortissimo* is going to be much louder than a single violin playing *fortissimo*. The exact interpretation of each dynamic marking in a piece of music depends on:

- comparison with other dynamics in that piece
- the typical dynamic range for that instrument or ensemble
- the abilities of the performer(s)
- the traditions of the musical genre being performed
- the acoustics of the performance space

Traditionally, dynamic markings are based on Italian words, although there is nothing wrong with simply writing things like "quietly" or "louder" in the music. *Forte* means loud and *piano* means soft. The instrument commonly called the "piano" by the way, was originally called a "pianoforte" because it could play dynamics, unlike earlier popular keyboard instruments like the harpsichord.

¹This content is available online at <<http://cnx.org/content/m11649/1.7/>>.

²"Acoustics for Music Theory": Section Wave Amplitude and Loudness <<http://cnx.org/content/m13246/latest/#s12>>

 Typical Dynamic Markings

<i>mf</i>	mezzo forte	= medium loud	(pronounced "MET-soh FOR-tay")
<i>f</i>	forte	= loud	("FOR-tay")
<i>ff</i>	fortissimo	= very loud	("for-TISS-im-oh")
<i>fff</i>	fortississimo	= very, very loud	(FOR-tiss-SISS-im-oh)
<i>ffff</i>		and so on	
<i>mp</i>	mezzo piano	= medium soft	("MET-soh PYAN-oh")
<i>p</i>	piano	= soft	(PYAN-oh)
<i>pp</i>	pianissimo	= very soft	("PEE-an-ISS-im-oh")
<i>ppp</i>	pianississimo	= very, very soft	("PEE-an-iss-SISS-im-oh")
<i>pppp</i>		and so on	

Figure 3.1

When a composer writes a *forte* into a part, followed by a *piano*, the intent is for the music to be quite loud, and then suddenly quite soft. If the composer wants the change from one dynamic level to another to be gradual, different markings are added. A *crescendo* (pronounced "cresh-EN-doe") means "gradually get louder"; a *decrescendo* or *diminuendo* means "gradually get softer".

Gradual Dynamic Markings

The figure shows three musical staves, each with a treble clef and a common time signature (C). Each staff contains five quarter notes on a single pitch. The first staff is marked with *p*, *cresc.*, *f*, *decresc.*, and *p*. The second staff is marked with *p*, *cresc.*, *f*, *dim.*, and *p*. The third staff is marked with *p*, *f*, and *p*, with wedge-shaped lines indicating the gradual increase and decrease in volume.

Figure 3.2: Here are three different ways to write the same thing: start softly (piano), gradually get louder (crescendo) until the music is loud (forte), then gradually get softer (decrescendo or diminuendo) until it is soft (piano) again.

3.1.2 Accents

A composer may want a particular note to be louder than all the rest, or may want the very beginning of a note to be loudest. **Accents** are markings that are used to indicate these especially-strong-sounding notes. There are a few different types of written accents (see Figure 3.3 (Common Accents)), but, like dynamics, the proper way to perform a given accent also depends on the instrument playing it, as well as the style and period of the music. Some accents may even be played by making the note longer or shorter than the other notes, in addition to, or even instead of being, louder. (See articulation (Section 3.2) for more about accents.)

The figure shows a musical staff in 6/8 time. It contains three groups of eighth notes. The first two groups have a greater-than sign (>) above them. The third group has a triangle (^) above it. Below the staff, the markings *sfz* (sforzando) and *fp* (fortepiano) are shown.

Figure 3.3: The exact performance of each type of accent depends on the instrument and the style and period of the music, but the *sforzando* and *fortepiano*-type accents are usually louder and longer, and more likely to be used in a long note that starts loudly and then suddenly gets much softer. *Caret*-type accents are more likely to be used to mark shorter notes that should be stronger than unmarked notes.

3.2 Articulation³

3.2.1 What is Articulation?

The word **articulation** generally refers to how the pieces of something are joined together; for example, how bones are connected to make a skeleton or syllables are connected to make a word. Articulation depends on what is happening at the beginning and end of each segment, as well as in between the segments.

In music, the segments are the individual notes of a **line** in the music. This could be the melodic⁴ line, the bass⁵ line, or a part of the harmony⁶. The line might be performed by any musician or group of musicians: a singer, for example, or a bassoonist, a violin section, or a trumpet and saxophone together. In any case, it is a string of notes that follow one after the other and that belong together in the music. The **articulation** is what happens in between the notes. The **attack** - the beginning of a note - and the amount of **space** in between the notes are particularly important.

3.2.2 Performing Articulations

Descriptions of how each articulation is done cannot be given here, because they depend too much on the particular instrument that is making the music. In other words, the technique that a violin⁷ player uses to slur notes will be completely different from the technique used by a trumpet⁸ player, and a pianist and a vocalist will do different things to make a melody sound legato. In fact, the violinist will have some articulations available (such as **pizzicato**, or "plucked") that a trumpet player will never see.

So if you are wondering how to play slurs on your guitar or staccato on your clarinet, ask your music teacher or director. What you will find here is a short list of the most common articulations: their names, what they look like when notated, and a vague description of how they sound. The descriptions have to be vague, because articulation, besides depending on the instrument, also depends on the style of the music. Exactly how much space there should be between staccato eighth notes, for example, depends on tempo (Section 2.6) as well as on whether you're playing Rossini or Sousa. To give you some idea of the difference that articulation makes, though, here are audio examples of a violin playing a legato⁹ and a staccato¹⁰ passage. (For more audio examples of violin articulations, please see Common Violin Terminology¹¹.)

3.2.3 Common Articulations

Staccato notes are short, with plenty of space between them. Please note that this doesn't mean that the tempo (Section 2.6) or rhythm¹² goes any faster. The tempo and rhythm are not affected by articulations; the staccato notes sound shorter than written only because of the extra space between them.

³This content is available online at <<http://cnx.org/content/m11884/1.5/>>.

⁴"Melody" <<http://cnx.org/content/m11647/latest/>>

⁵"Harmony": Accompaniment <<http://cnx.org/content/m11654/latest/#10c>>

⁶"Harmony" <<http://cnx.org/content/m11654/latest/>>

⁷"Introduction to the Violin and FAQ" <<http://cnx.org/content/m13437/latest/>>

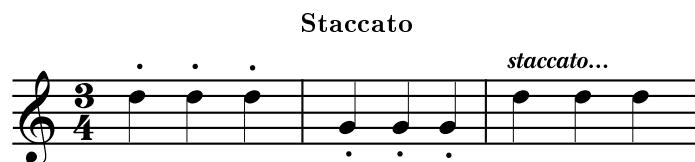
⁸"Trumpets and Cornets" <<http://cnx.org/content/m12606/latest/>>

⁹<http://cnx.org/content/m11884/latest/artleg.mp3>

¹⁰<http://cnx.org/content/m11884/latest/artstacc.mp3>

¹¹"Common Violin Terminology" <<http://cnx.org/content/m13316/latest/>>

¹²"Rhythm" <<http://cnx.org/content/m11646/latest/>>



"Staccato" may be written into the part or marked with dots above or below the notes. These staccato quarter notes would sound approximately like eighth notes and eighth rests:



Figure 3.4

Legato is the opposite of staccato. The notes are very connected; there is no space between the notes at all. There is, however, still some sort of articulation that causes a slight but definite break between the notes (for example, the violin player's bow changes direction, the guitar player plucks the string again, or the wind player uses the tongue to interrupt the stream of air).

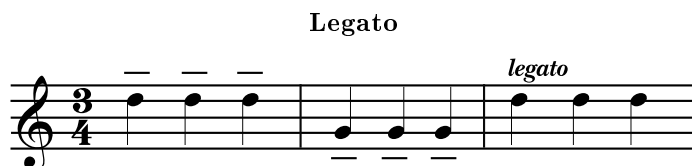


Figure 3.5

Accents - An accent (p. 59) requires that a note stand out more than the unaccented notes around it. Accents are usually performed by making the accented note, or the beginning of the accented note, louder than the rest of the music. Although this is mostly a quick change in dynamics (Section 3.1), it usually affects the articulation of the note, too. The extra loudness of the note often requires a stronger, more definite attack at the beginning of the accented note, and it is emphasized by putting some space before and after the accented notes. The effect of a lot of accented notes in a row may sound marcato (p. 64).

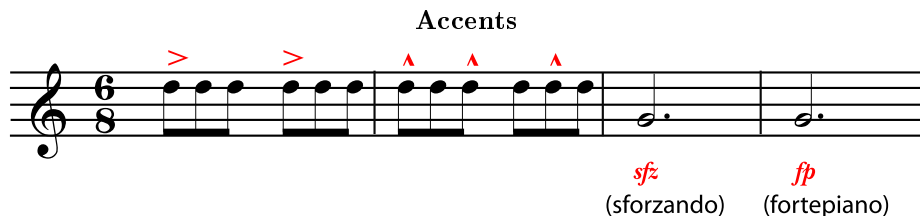


Figure 3.6: The performance of an accent depends on the style of music, but in general, sforzando and fortepiano accents involve a loud beginning to a longer note. They are usually heavier and longer than caret-type accents, which often rely more on a powerful attack (p. 60) to make a short note louder than the notes around it.

A **slur** is marked by a curved line joining any number of notes. When notes are slurred, only the first note under each slur marking has a definite articulation at the beginning. The rest of the notes are so seamlessly connected that there is no break between the notes. A good example of slurring occurs when a vocalist sings more than one note on the same syllable of text.

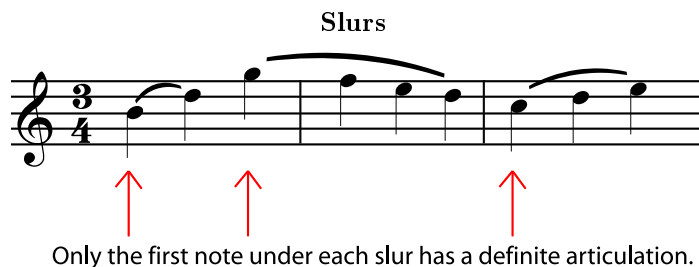


Figure 3.7

A tie (Section 2.5.3: Borrowed Divisions) looks like a slur, but it is between two notes that are the same pitch. **A tie is not really an articulation marking.** It is included here because it looks like one, which can cause confusion for beginners. When notes are tied together, they are played as if they are one single note that is the length of all the notes that are tied together. (Please see Dots, Ties, and Borrowed Divisions (Section 2.5).)

Scoops and Fall-offs



Figure 3.10: The notation for scoops and fall-offs has not been standardized, but either one will look something like a portamento or slur with a note on one end only.

Some articulations may be some combination of staccato, legato, and accent. **Marcato**, for example means "marked" in the sense of "stressed" or "noticeable". Notes marked *marcato* have enough of an accent and/or enough space between them to make each note seem stressed or set apart. They are usually longer than staccato but shorter than legato. Other notes may be marked with a combination of articulation symbols, for example legato with accents. As always, the best way to perform such notes depends on the instrument and the style of the music.

Some Possible Combination Markings

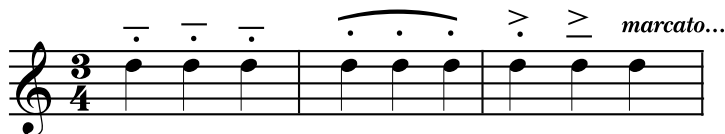


Figure 3.11

Plenty of music has no articulation marks at all, or marks on only a few notes. Often, such music calls for notes that are a little more separate or defined than legato, but still nowhere as short as staccato. Mostly, though, it is up to the performer to know what is considered proper for a particular piece. For example, most ballads are sung legato, and most marches are played fairly staccato or marcato, whether they are marked that way or not. Furthermore, singing or playing a phrase¹⁶ with musicianship often requires knowing which notes of the phrase should be legato, which should be more separate, where to add a little *portamento*, and so on. This does not mean the best players consciously decide how to play each note. Good articulation comes naturally to the musician who has mastered the instrument and the style of the music.

¹⁶"Melody": Section Melodic Phrases <<http://cnx.org/content/m11647/latest/#s2>>

Index of Keywords and Terms

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Reading Music: Common Notation

This course may be used to introduce or reinforce music-reading skills for someone just learning to play an instrument, or the individual lessons can be used to expand on basic music-reading knowledge or to look up any music-notation terms that are still unfamiliar.

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