

Pitches and Clefs

In This Chapter

- ◆ Understanding musical tones
- ◆ Assigning names to specific pitches
- ◆ Putting notes on a staff
- ◆ Using the treble, bass, and other clefs

As you can tell from the title, this is a book about music theory. But what exactly *is* music theory? And, even more basic than that, what is *music*?

There are lots of different definitions of the word “music,” some more poetic than practical. For example, William Shakespeare called music the “food of love,” George Bernard Shaw called music the “brandy of the damned,” and Gottfried Wilhelm Leibnitz called music “sounding mathematics.”

Interesting definitions all, but not really what we’re looking for here.

Let’s try another definition:

Music is the art, the craft, and the science of organizing sound and silence in the framework of time.

Now that’s a little more helpful, but it’s still fairly broad. This definition could describe a tremendous range of activities—a mother singing a lullaby to her child, an orchestra playing a Mozart symphony, a rock group performing their latest hit, a group of Native Americans playing ceremonial drum beats, Louis Armstrong playing trumpet in a jazz quartet, a group of sailors chanting “yo heave ho,” or a nightingale warbling a serenade. You probably didn’t buy this book to learn about *all* these things, although all of them have been called “music,” at one time or another.

So we’ll use a slightly different definition of music in this book. This definition is a lot more specific:

Music is a succession of tones arranged in a specific rhythm.

Better? This definition doesn’t cover *everything* that’s ever been called “music,” but it probably covers those types of music that you’re familiar with—primarily, twentieth-century popular music, from ragtime to reggae to rock, and everything in between.

Now to the word “theory.” In scientific circles, this word is used as the formulation of a hypothesis, such as Einstein’s theory of relativity. While academic music theorists sometimes do formulate hypotheses in this scientific fashion, that’s not what this book is about.

In our context, we’ll use the word “theory” to mean a study of the rudiments of music—the basic things that performers and listeners need to know to produce and enjoy this marvelous art. This goes back to the root meaning of the word, which means “a way of looking.” If we broaden this definition to include not just looking, but also listening and performing, then we’re set.

Now that we’ve defined our terms, it’s time to get started—and learn the theory behind the music. To do this, we have to go back to our definition of music, which says that music is a succession of tones, arranged in a specific rhythm. To study music, then, we have to learn about notes, and about arranging them.

We’ll get to the “arranging in a specific rhythm” bit starting with Chapter 5. That lets us focus our attention, for the time being, on tones.

Understanding Musical Tones

So what’s a tone? The definition is simple; a tone is a sound that is played or sung at a specific *pitch*.

When you hum (go ahead ...), you’re humming a tone. When you whistle, you’re whistling a tone. When you go “aaaahhhh,” you’re sounding a tone. If you put two or more hums, whistles, or “aaaahhhs” together, you have music.

You can hum lots of different tones, high or low. The higher tones are referred to as *higher pitched*; lower tones are called *lower pitched*.

Here’s an exercise: Hum a tone. Now hum a tone higher than the first tone.



Definition

Pitch describes the specific frequency or tuning of a tone. (Frequency is a measurement of how fast air molecules are vibrating.)

What you’ve just hummed are two separate tones, at two separate pitches. The second tone was higher pitched than the first tone.

Different voices, and different instruments, produce different ranges of tones. For example, women tend to have higher voices than men; the tones most women sing are higher-pitched than the tones most men sing. (There are exceptions to this rule, of course; listen to some of the doo-wop singers of the 1950s and you’ll hear some fairly high male voices!)

In the world of musical instruments, bigger instruments tend to produce lower-pitched tones, whereas smaller instruments tend to produce higher-pitched tones. This is why a flute produces higher notes than a tuba, and why the thin strings on a guitar are higher-pitched than the thick strings.

Note

Some instruments produce tones that aren’t at specific pitches. These instruments—such as drums and cymbals—are called unpitched or nonpitched instruments. The tones they produce can be high or low, but typically don’t correspond to specific note pitches.

Some instruments produce a broader range of tones than other instruments. In particular, the piano has a very broad range. From the lowest tone (the key on the far left of the keyboard) to the highest (the key on the far right), the piano reproduces more tones than just about any other instrument—and certainly a lot more than the human voice!

Time for another exercise: Hum the lowest tone you can hum; then gradually raise the pitch until you’re humming the highest tone you can hum. You just hummed a whole lot of different tones. How, then, do you describe a specific tone so that someone else can hum the same tone?

Note

You'll find lots of musical terms in this book, but you need to know that musicians tend to use a lot of these terms interchangeably. A conductor who says "That *note* was wrong," might mean that the *pitch* was wrong, or that the *note value* (rhythm) was wrong. That's because the word "note" can be used in place of either more specific definition.

Don't get hung up on the differences between "tones" and "pitches" and "notes." While there are specific definitions for each word, it's acceptable to be a little loose on the usage. I might even substitute one word for another in this book. You'll understand what I mean from the context.

Tones Have Value

When it comes to describing a tone, it helps to know that every tone you can sing or play has a specific value. You can measure that value scientifically, and use that value to describe the tone—or, more precisely, it's pitch. If that's too complicated, you also can assign an arbitrary name to each tone. (Go ahead: Hum a note called "Bob.")

What's the Frequency, Kenneth?

If you plug a microphone into an oscilloscope, and then hum a tone into the microphone, the oscilloscope will measure the *frequency* of the tone. This is actually a measurement of how fast the molecules of air are vibrating; the faster the vibrations, the higher the pitch.

These vibrations are measured in *cycles per second*, and there are a lot of them. (Cycles per second are often called *hertz*; abbreviated Hz.) If you hum the pitch we call middle C (the white key in the exact center of a piano keyboard, or the first fret on the B string of a guitar), the oscilloscope will measure 256Hz—that is, the air is cycling back and forth 256 times per second.

So one way to identify specific pitches is by their frequency. Unfortunately, writing out even a simple melody in terms of frequency gets a tad unwieldy.

For example, here's the first half of "Mary Had a Little Lamb" ("Mary had a little lamb, little lamb, little lamb") notated by frequency:

659Hz, 587Hz, 523Hz, 587Hz, 659Hz, 659Hz, 659Hz,
587Hz, 587Hz, 587Hz,
659Hz, 783Hz, 783Hz

The specific frequencies of "Mary Had a Little Lamb."

Not easy to read, is it?

Which is why we don't use the frequency method to write music.

Note

Actually, the "standard" pitch today is the A above middle C, which equals 440Hz; all the other notes are pitched in relation to this note. In earlier times and cultures, this note had other values—as low as 376Hz in early eighteenth-century France, and as high as 560Hz in early seventeenth-century Germany (referred to as *North German church pitch*).

Note

One good way to determine a specific pitch is with a *tuning fork*, which is a fork-shaped piece of metal that resonates at a specific frequency when struck. Most tuning forks resonate at 440Hz, which is the pitch A. Some people have what is called *perfect pitch*, in that they can hear absolute pitches in their heads. However, most people need the guidance of a tuning fork, pitch pipe, piano, or other musical instrument to fix a specific pitch.

Play by Numbers

An easier way to designate tones is to number each individual pitch. But before we start numbering, it helps to know a little bit about how different pitches relate to each other.

Because you can slide a hum from lower to higher, you might think that there are an infinite number of pitches available. (You can certainly see this when you look at frequencies; you have one tone at 256Hz, another at 257Hz, another at 258Hz, and so on.)

Although that might be true in theory, in practice some pitches are too close together to clearly distinguish them. For example, if you hum a 256Hz tone and a 257Hz tone, they sound almost identical in pitch because there isn't a big enough *interval* between the tones.

We need to place a reasonable interval between tones, and then assign values to those main pitches that result: You end up with a series of pitches called a *scale*. (You'll learn more about scales in Chapter 2.) Each scale starts on a specific tone, and ends on a higher-pitched version of that same tone.

In the Western world, we divide our scales into seven main notes—eight if you count the first note, which is repeated at the end of the scale. Because there are seven notes, it's easy to number them—one through seven. Using this numbering system, here's what the first half of "Mary Had a Little Lamb" looks like:

3 2 1 2 3 3 3
2 2 2
3 5 5

"Mary Had a Little Lamb" by the numbers.

If you're reading ahead and want to see how the numbering system applies to traditional music notation, here's what the C Major scale looks like, by the numbers:

Numbering the notes in the C Major scale.



Now, not to be confusing here, but there are actually notes *between* some of these main notes—enough of them that we really have *twelve* pitches before they start repeating. These in-between pitches are equally spaced in what we call *half steps*, where the major pitches (A, B, C, etc.) have either one or two half steps between them, depending on the note. (I know, it's getting confusing already ...)

For the time being, we're going to focus on the seven main notes of a scale, since that's easiest to understand. We'll leave the half steps for Chapter 2. Feel free to read ahead if you're interested.

Do Re Mi

Another way to remember each tone is by assigning a simple syllable to each tone. Remember the song from *The Sound of Music* that goes “Do, a deer, a female deer”? That’s what we’re talking about here.

In this particular method, called *Solfège* (or Solfeggio), each of the seven notes of a scale has its own name. The following table shows the words to use.



Tip

Solfège (pronounced sol-fezh) is a method of naming musical tones using a set of syllables—do, re, mi, and so on. These syllables come from the initial syllables of the first six words to the Hymn to St. John; the seventh syllable (Ti) is derived from the name St. John, in Latin.

The Solfège Method

Tone	Solfège name	Pronunciation
1	Do	Doh
2	Re	Ray
3	Mi	Mee
4	Fa	Fah
5	So (Sol)	So
6	La	Lah
7	Ti	Tee
8	Do	Doh

Here’s what the first half of “Mary Had a Little Lamb” looks like using the Solfège method:

Mi Re Do Re Mi Mi Mi
 Re Re Re
 Mi So So

“Mary Had a Little Lamb” in Solfège.

If you’re reading ahead and want to know how the Solfège names apply to traditional music notation, here’s what the C Major scale looks like:



The Do Re Mis of the C Major scale.

Tones Have Names

It’s important to know that both the numbering and the Solfège methods are *relative* ways of naming musical tones. That is, the first note in a scale is always number one, and is always called Do. The second tone is

always number two, and is always called Re. It doesn't matter what actual tone you start with, these names always apply.

The problem with using relative naming is that it doesn't tell you what precise pitch to start with. You might start your Do Re Mi on a low pitch, and your neighbor might start hers on a higher pitch, and your duet will end up sounding like two water buffaloes in heat.

And that's not good. (Unless you're a water buffalo, of course.)

No, what we need is a way to designate specific pitches—without resorting to the cumbersome frequency method.

Learning the ABCs

The accepted way of naming musical specific pitches uses the first seven letters of the alphabet—A, B, C, D, E, F, and G. While the numbering method is relative (the number 1 can be assigned to any pitch), the letter method is absolute. This means that A always refers to a specific frequency. When you tell someone to sing or play an A, they'll always sing or play the same pitch.

The only problem with this method is that you can sing or play more than one A.

Try this exercise: Sing A B C D E F G A (think “Do Re Mi Fa So La Ti Do”). The first A and the second A should be the same tone, with the second A an *octave* higher than the first A. (You'll learn about octaves a little later in this chapter—suffice to say it's a way of presenting a lower or higher version of the same note.)

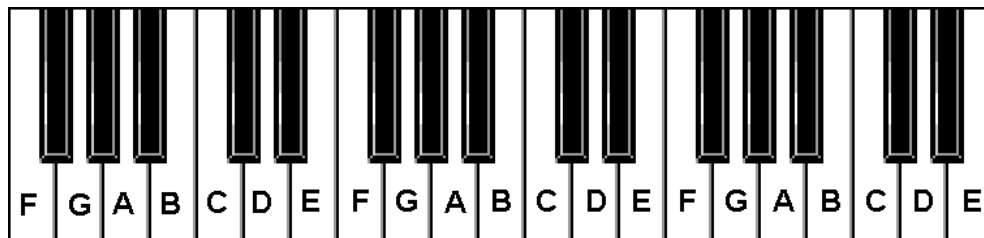
You can play an A with a low pitch, and an A with a higher pitch—and other As both below and above those. Now, all the As will have the same tone; they're just higher or lower versions of the basic pitch.

How, then, do you tell which A to play or sing?

Notes on a Piano Keyboard

A good way to visualize the seven basic notes (A through G) is to look at a piano keyboard. Each white key on the keyboard corresponds to one of these seven main notes, as shown in the following figure. (And ignore the black keys, for the time being.)

The white keys on a piano keyboard.



As you can see, the black and white keys on a piano form a certain pattern. If you start in the right place, you'll see that the black keys are arranged in groups of threes and twos. The first white key to the left of a group of *three* black notes is always assigned to the tone of F. The first white key to the left of a group of *two* black notes is always assigned to C. Once you know where F and C are, you can figure out the location of the other tones.

To figure out which A (or F or C) to play, know that the C located in the very middle of the piano keyboard—directly underneath the manufacturer's logo or pull-down door handle—is called *middle C*. (It's the C in the middle of the keyboard—easy to remember.) All other notes can be described relative to middle C—as in “the F above middle C” or “the D below middle C.”

Notes on a Staff

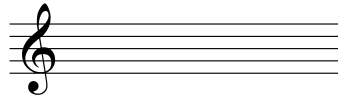
Now that you know the seven basic notes and where they lay on a piano keyboard, how do you go about communicating those notes to others? You could just spell out a song; if you used this method, the first half of “Mary Had a Little Lamb” would look like this:

E D C D E E E
 D D D
 E G G

The notes of “Mary Had a Little Lamb.”

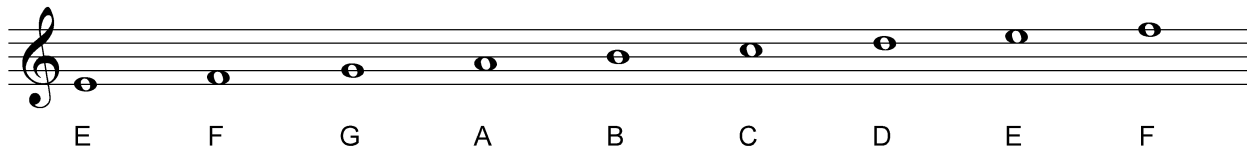
Now, that’s more specific than using numbers or Solfège, but it’s still somewhat difficult to read. A better way to notate pitches is to do so *visually*, using a graphic that in some ways resembles a basic piano keyboard. This graphic is called a *staff*.

The basic music staff is composed of lines and spaces, like this:



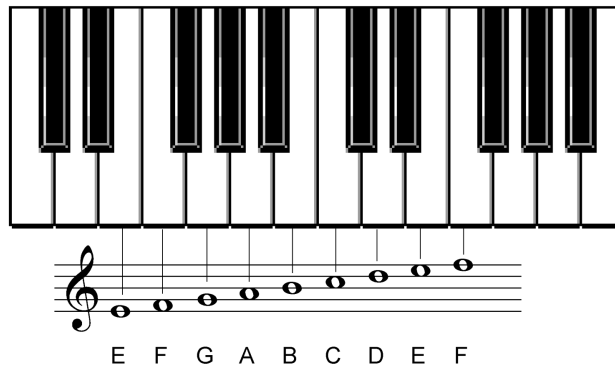
A blank staff.

As you can see, the staff has precisely five lines and four spaces. Each line or space represents a specific pitch. The pitches are determined by the *clef* at the beginning of the staff; the staff we’re looking at here uses what is called the treble clef. (There are several different types of clefs, which we’ll discuss later in this chapter.)



The notes of a staff (treble clef).

This treble clef staff pictures the notes in the exact middle of a piano keyboard—just above middle C. (The bottom line of the staff represents the E above middle C.) The following figure shows how the notes of the staff relate to specific piano keys.



The notes on a staff and where they appear on a piano keyboard.

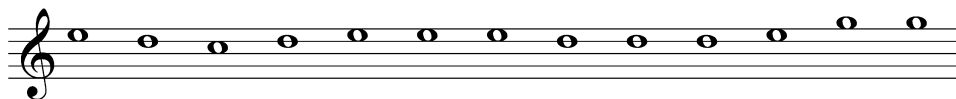


Tip

Some musicians identify the specific pitch by placing a number after the note name. Using this method (which is sometimes called *scientific pitch notation*), the lowest C on a grand piano is notated C1. The next C up from that is C2; then C3, C4, and so on—and the same for all the other notes. (In this notation, middle C is C4.)

Back to “Mary Had a Little Lamb”; here’s what the first part of that song looks like on a music staff:

The notes of “Mary Had a Little Lamb” on a music staff.



Above—and Below—the Staff

The basic staff describes nine basic notes. What about all those notes either above or below these nine notes? (Like that last note in “Mary Had a Little Lamb”?)

Notes higher than the F at the top of the staff are written in the lines and spaces *above* the staff. For example, the first space above the staff is the first note after F: G. The first line above the staff is the first note after G: A. You can keep adding spaces and lines above the staff to describe higher and higher notes, as shown in the following figure.

Notes above the staff.

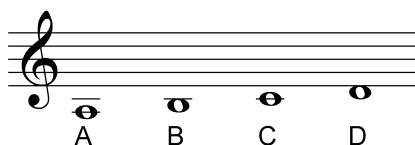


Definition

The lines you add above or below a staff are called **ledger lines**.

Just as you can add lines and spaces above the staff, you can also add lines and spaces below the staff to describe lower notes. For example, the first space below the staff is the first note before E: D. The first line below the staff is the first note before D: C. The following figure shows the first few notes below the standard staff. By the way, the first line below the staff is middle C.

Notes below the staff.



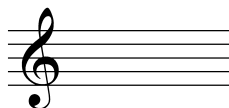
Different Clefs

Up till now, we’ve been looking at a staff that represents the notes just above middle C on the piano keyboard. The notes of this staff are determined by the type of *clef* that appears at the beginning of the staff—and there are several different types of clefs.

The Treble Clef

The clef we’ve been working with so far is called the *treble clef*; it looks like this:

The treble clef.



As you've already learned, in real-world terms the treble clef is positioned just above middle C. The bottom line of the treble clef staff is an E; the top line is an F.

The treble clef, like all clefs, fixes the position of a single pitch—from which you can figure out where all the rest of the notes go. In the case of the treble clef, the pitch it fixes is G, which is the second line on the staff. (If you look closely at the treble clef itself, you see that the big round part of the clef circles around the second line of the staff.) For this reason, the treble clef is sometimes called the G clef—and the clef itself looks a little like a capital G.

If you ever have trouble remembering which note goes with which line or space on a staff, here's an easy way to remember them. The lines of the treble clef staff are assigned, bottom to top, to the notes E, G, B, D, and F. You can remember the lines by recalling the first letters in the phrase “Every Good Boy Does Fine.” The spaces of the treble clef staff are assigned, bottom to top, to the notes F, A, C, and E. You can remember the spaces by remembering the word “FACE.”

Most higher-pitched instruments and voices use the treble clef. This includes trumpets, flutes, clarinets, and guitars, as well as singers singing the soprano, alto, and tenor parts.



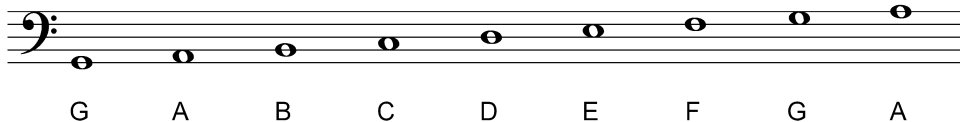
Definition

A **clef** is a graphical symbol, placed at the beginning of a staff or piece of music, that establishes the pitch of a specific line or space on the staff; thus it determines the pitch of all the other notes on the staff.

The Bass Clef

When you need to write music below the treble clef, you can use a different clef, called the *bass* clef. The bass clef is positioned just *below* middle C, and is sometimes called the F clef. (That's because the two dots on the clef surround the fourth line, which is F.)

Here's what the bass clef looks like, with the notes of a bass clef staff:



The bass clef.

Most lower-pitched instruments and voices use the bass clef. This includes trombones, tubas, bass guitars, and singers singing the bass part.

An easy way to remember the lines of the bass clef is with the phrase “Good Boys Do Fine Always.” (The first letter of each word describes each line of the staff, from bottom to top.) To remember the spaces of the bass clef, remember the first letters in the phrase “All Cows Eat Grass.”



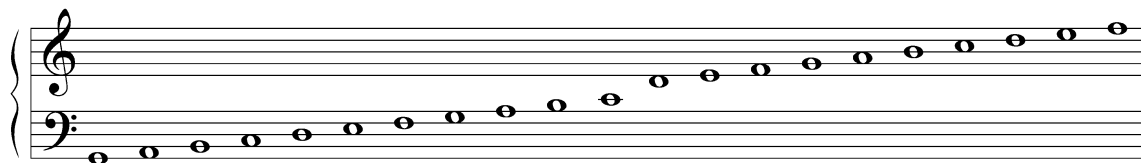
Definition

The word **bass**, as in “bass clef,” is pronounced *base*—like the bottom of things, not like the fish.

The Grand Staff

If you play or write for piano, there's another staff you need to know. This staff, called the *grand staff*, links together a treble clef staff and a bass clef staff. (That's because you play the piano with two hands; each staff roughly corresponds to each hand.)

The grand staff looks like this:



The grand staff.

When you use a grand staff, it's important to note that the two staves neatly flow into each other. The A at the top of the bass clef extends above that staff to a B and a C. The C is then linked to the treble clef, goes on up to a D, and then the E on the bottom line of the treble clef.

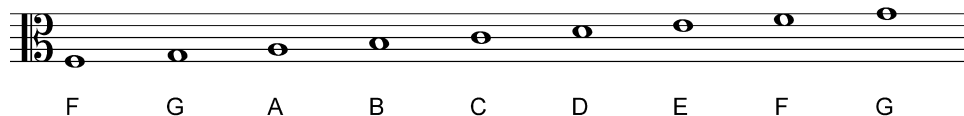
The neat thing is that the C—which just happens to be middle C—is halfway between each staff. So when you write a middle C on a grand staff, it might extend down from the treble clef staff or extend up from the bass clef staff, depending on where the surrounding notes are placed.

Specialty Clefs

There are a handful of specialty clefs you must learn, although you probably won't use them much. These clefs are designed for instruments whose range doesn't fit comfortably within the traditional treble or bass clefs.

One of the most common specialty clefs is the *alto clef*, shown here:

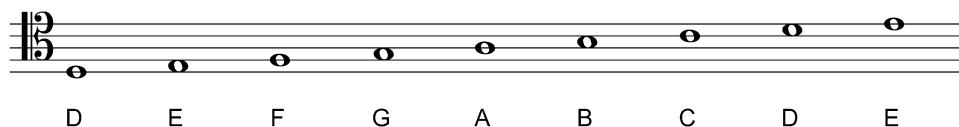
The alto clef.



The alto clef is used primarily by the viola, which is a slightly bigger version of a violin. The pointer on this clef points at middle C.

The tenor clef looks a lot like the alto clef, except the pointer points at a different line. (It still points to middle C, but middle C is positioned at a different point on the staff.) The tenor clef looks like this, and is sometimes used by bassoons, bass violins, and tenor trombones.

The tenor clef.



Although there are several other specialty clefs (including the baritone, subbass, and French violin clefs), you probably won't run into them too often; they're not widely used. However, you might run into what is called an *octave clef*, which looks like a normal treble or bass clef with the number 8 either above or below the clef.

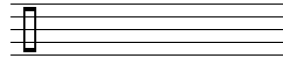
When you see this type of clef, you're supposed to transpose the normal treble clef notes either up (if the 8 is above the clef) or down (if the 8 is below the clef) an octave.

Octave clefs.



The Percussion Clef

There's one more clef you should know, and it's really the easiest of them all. This clef is used when you're writing for drums and other percussion instruments—those that don't play a fixed pitch. It's called either the *percussion clef* or the *indefinite pitch clef*, and it looks like this:



The percussion clef.

The neat thing about this clef is that the lines and spaces don't correspond to any specific pitches. Instead, you assign different instruments to different parts of the staff.

For example, if you're writing for drum set, you might assign the bass drum to the bottom space, the snare drum to the third space, and two tom-toms to the second and fourth spaces; you can put the ride cymbal on the top line of the staff.



Tip

There really aren't any rules for how to assign instruments to a percussion clef, so you're pretty much on your own. It's probably a good idea to consult a few drummers or look at a few percussion parts to get a better idea of how to use the percussion clef.

The Least You Need to Know

- ◆ Music is a succession of tones arranged in a specific pattern; a tone is a sound that is played or sung at a specific pitch.
- ◆ There are many different ways to describe a specific pitch. You can describe a pitch by its vibration frequency, by where it lies numerically compared to other pitches, or by using the Do Re Mi (Solfège) method.
- ◆ Established music notation assigns letters to the seven basic pitches, A through G. The letters repeat as you generate higher pitches.
- ◆ Pitches are assigned to specific keys on a piano keyboard, and to specific lines and spaces on a musical staff.
- ◆ The clef placed at the start of a staff determines which notes appear where on the staff. The most-used clef is the treble clef; the bass clef is used for lower-pitched instruments and voices.

Exercises

Exercise 1-1

Write the name of each note below the note.

F — — — — — — — — —

Exercise 1-2

Write the name of each note below the note.

C — — — — — — — — —

Exercise 1-3

Write each note on the staff.

A C G F B G D E D B

Exercise 1-4

Write each note on the staff.

E F D G C A B G A C

Exercise 1-5

Draw the indicated clefs on the staff.

Bass Treble Alto Tenor Treble (octave above)

Exercise 1-6

Write the following notes above the staff.

G B A D C B D C E F

Exercise 1-7

Write the following notes below the staff.

A musical staff consisting of two five-line staves. The left staff has a treble clef and a common time signature. The right staff has a bass clef. Below the staves, a sequence of ten notes is written: C, D, B, A, G, F, E, C, D, B. The notes are positioned as if they were to be written on the staff lines.

Exercise 1-8

Identify the following notes on the piano keyboard.

A diagram of a piano keyboard showing a sequence of ten keys. Below each key is a letter label: C, F, G, B, D, E, F, A, G, B. The keys are represented by vertical bars of varying heights to indicate white and black keys.