1

Pitch and Pitch Class

Overview

When we read notated music, we translate its symbols into sound—sung, played on an instrument, or heard in our heads. We begin our study of music theory by learning to read and write the symbols that represent pitch, one of music's basic elements.

Repertoire

Ludwig van Beethoven, Piano Sonata in C Major, Op. 53 (*Waldstein*), mvt. 1
Georges Bizet, Symphony in C Major, mvt. 1
Claude Debussy, "Fantoches," from *Fêtes galantes*
Gregorian chant, "Ubi caritas et amor" ("Where charity and love are")
Scott Joplin, "Solace"
Wolfgang Amadeus Mozart, Piano Sonata in C Major, K. 545, mvt. 1
Florence Price, "The Goblin and the Mosquito"

Outline

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- Pitches and pitch classes

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- Enharmonic equivalents
- Intervals: Half steps and whole steps
- Double flats and sharps

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- Naming registers
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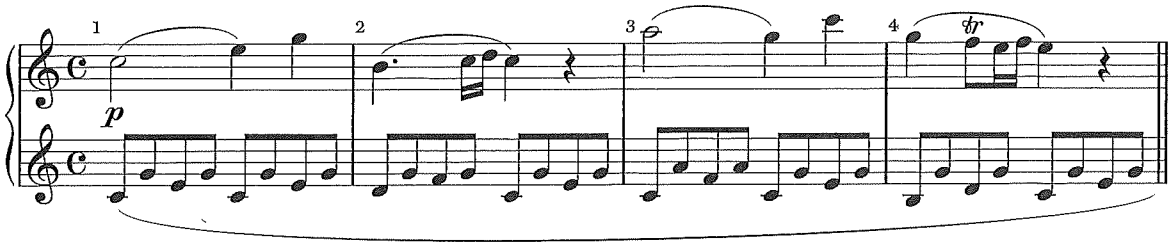
Introduction to Pitch: Letter Names

Listen to an excerpt from a piano work by Wolfgang Amadeus Mozart as you follow Example 1.1 (see Anthology 62a), the musical notation (or **score**). Many of the score's elements will be introduced in this chapter, beginning with naming the notes you see here.

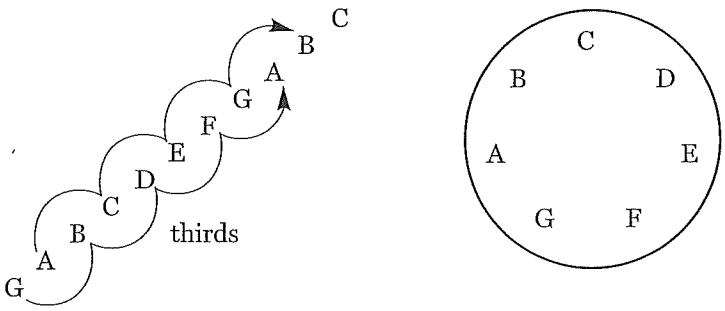
EXAMPLE 1.1: W. A. Mozart, Sonata in C Major, mvt. 1, mm. 1–4



Musical notes are named with the first seven letters of the alphabet—A, B, C, D, E, F, G—repeated endlessly.

KEY CONCEPT Imagine the seven letters of this **musical alphabet** ascending like stairs or arranged around a circle like a clock, as in Example 1.2. "Count" up or down by reciting the letters forward (clockwise) or backward (counterclockwise). To count beyond G, start over with A; to count below A, start over with G.

EXAMPLE 1.2: Seven letter names



Counting in letter names is a fundamental musical skill. Practice counting backward and forward from A to A, C to C, G to G, and so on. Think of the movement as "upward" when you count forward, and "downward" when you count backward. Always include the first and last letters in the series, and count the first letter name as 1: three above F is A, not B (count F–G–A, not G–A–B), and six below E is G (E–D–C–B–A–G).

For fluency, also practice reading alternate letter names, as marked in Example 1.2: G–B–D–F–A or A–C–E–G–B. This is called **counting in thirds**, because each pair of notes spans three letter names: A–C encompasses A, B, and C.

Try it #1

Find each letter name requested.

A. Remember to count the given note as 1.

(1) 7 above G: **F**
(2) 6 above F: _____
(3) 2 above D: _____
(4) 4 below B: _____
(5) 3 below C: _____
(6) 5 below A: _____
(7) 3 above E: _____
(8) 2 below C: _____
(9) 3 above G: _____
(10) 2 above B: _____
(11) 2 above F: _____
(12) 4 above C: _____
(13) 6 below A: _____
(14) 7 below E: _____
(15) 5 above G: _____

B. Count in thirds above the pitch given. Write one letter name in each blank.

(1) G: **B** - **D** - _____ - _____
(2) D: _____ - _____ - _____ - _____
(3) A: _____ - _____ - _____ - _____
(4) B: _____ - _____ - _____ - _____
(5) C: _____ - _____ - _____ - _____

Pitches and Pitch Classes

In this seven-name system, each letter name reappears every eighth position: eight below C is another C. Notes eight letter names apart make an **octave**. They sound similar, a principle known as **octave equivalence**.

KEY CONCEPT Octave-related notes belong to the same **pitch class** and have the same letter name. The pitch-class D, for example, represents every D in every octave. A **pitch**, on the other hand, is one that sounds in one particular octave.

Listen again to the beginning of Example 1.1 to hear pitch-class C played in two octaves simultaneously: these two different pitches belong to the same pitch class.

The Piano Keyboard

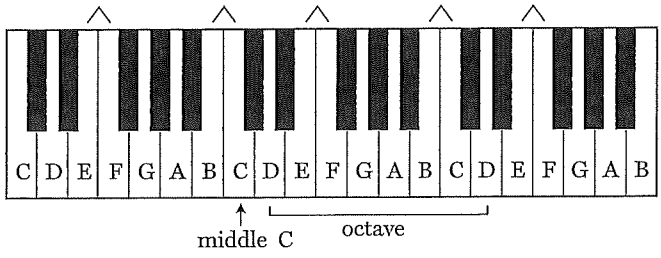
White Keys

As a musician, you will find keyboard skills are essential, whatever your primary instrument. Keyboard skills allow you to play simple accompaniments, demonstrate musical ideas, and harmonize melodies.

The white keys of the keyboard correspond to the seven letters of the musical alphabet, as shown in Example 1.3. Immediately to the left of any group of two black keys is pitch-class C; immediately to the left of any three black keys is pitch-class F. **Middle C** is often used as a reference point; it is the C closest to the middle of the piano keyboard.

KEY CONCEPT No black key appears between white keys E and F or between B and C as marked in Example 1.3.

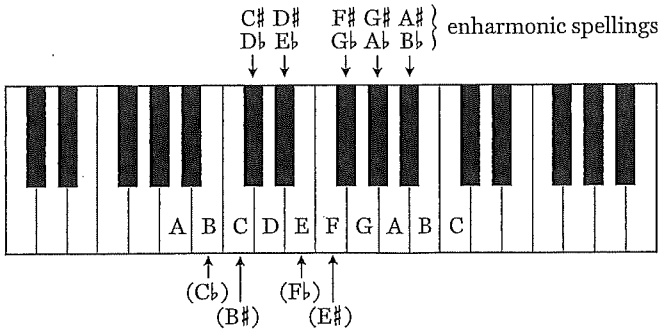
EXAMPLE 1.3: Piano keyboard with letter names



Black Keys: Flats and Sharps

The black-key pitches are named in relation to the white-key pitches. The black key immediately above (to the right of) any white key gets the white note's name plus a **sharp** (♯). As Example 1.4 shows, each group of two black keys is called C♯ (C-sharp) and D♯, and each group of three black keys is F♯, G♯, and A♯. At the same time, the black key immediately below (to the left of) any white key gets the white note's name plus a **flat** (♭). That means the group of two black keys can also be called D♭ (D-flat) and E♭, and the three black keys G♭, A♭, and B♭. Every black key has two possible names: one with a sharp and one with a flat. The two names are **enharmonic spellings**; this property is called **enharmonic equivalence.**

EXAMPLE 1.4: Keyboard with enharmonic pitches marked



The sharp and flat symbols are called **accidentals** (although there is nothing "accidental" about them). A third common accidental, a **natural** (♮), cancels a sharp or flat. It returns the pitch to its "natural" state and white-key location on the keyboard.

Enharmonic Equivalents

Enharmonic pitches, with the same sound but different names (B♭ = A♯), belong to the same pitch class. Not all sharped or flatted pitches are black keys, however: if you raise an E or B to the closest possible key on the keyboard, you get a white key, not a black one. E♯ is a white key enharmonic with F, just as B♯ is white and enharmonic with C. On the flat side, C♭ is enharmonic with B, and F♭ is enharmonic with E. These note names are labeled below the staff in Example 1.4.

Try it #2

Name the enharmonic equivalent.

(1) G♭: **F♯**
(2) B♯: _____
(3) A♯: _____
(4) D♭: _____
(5) B: _____
(6) A♭: _____
(7) E♯: _____
(8) B♭: _____
(9) D♯: _____
(10) E: _____
(11) F♯: _____
(12) F: _____

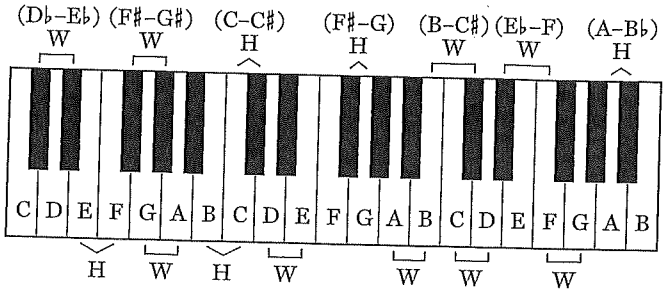
Intervals: Half Steps and Whole Steps

The distance between any two pitches is called an **interval**. Two intervals that serve as basic building blocks of music are half steps and whole steps.

KEY CONCEPT A **half step** (or **semitone**) is the interval between any pitch and the next closest pitch on the keyboard. The combination of two half steps forms a **whole step** (or **whole tone**); a whole step always has one pitch in between its two pitches.

On a keyboard, a half step spans a white key to a black key (or black to white)—except in the case of B to C and E to F, as shown in Example 1.5. Whole steps span two keys the same color—again except in the case of B–C and E–F. A whole step above E is not F, but F♯; a whole step below C is not B, but B♭.

EXAMPLE 1.5: Examples of half and whole steps at the keyboard



SUMMARY

1. The distance between any two pitches is an interval. Two important intervals are half and whole steps.
2. Half steps span keys of different colors: white to black or black to white.
   - Exceptions are E–F and B–C, the white-key half steps.
3. Whole steps span keys the same color: white to white or black to black.
   - Exceptions are E♭–F, E–F♯, B♭–C, and B–C♯.
4. Double-check the spelling of any half or whole step that includes E, F, B, or C.

Try it #3

A. Name the pitch a half step above or below the given pitch, and give an enharmonic equivalent where possible.

(1) Above G: **G♯** or **A♭**

(2) Below C♯: _____ or _____

(3) Above E: _____ or _____

(4) Below B♭: _____ or _____

(5) Above D: _____ or _____

(6) Below F: _____ or _____

(7) Below G♯: _____ or _____

(8) Below A♭: _____ or _____

B. Identify the interval spanned by writing W (whole step), H (half step), or N (neither).

(1) F♯ to E: **W**

(2) C♯ to D: _____

(3) B♭ to A♭: _____

(4) C to B♭: _____

(5) E to F: _____

(6) F to G: _____

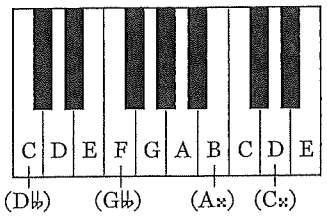
(7) B♯ to C: _____

(8) D♭ to E♭ _____

Double Flats and Sharps

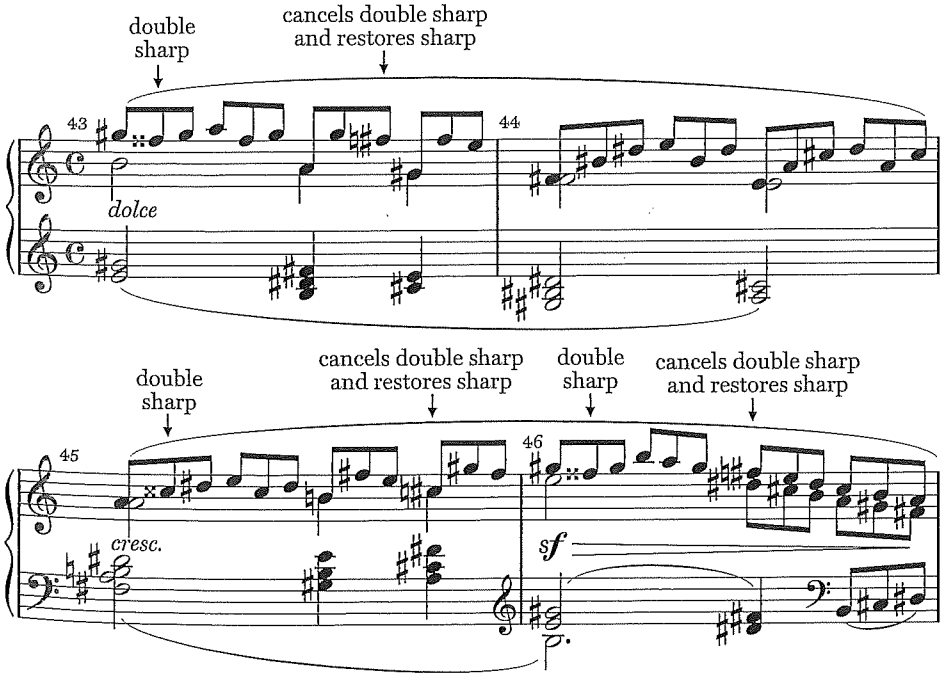
Two remaining accidentals appear less frequently in musical scores. A **double sharp** (𝄪) raises a pitch two half steps (or one whole step) above its letter name; a **double flat** (𝄫) lowers a pitch two half steps below its letter name. For example, the pitches G𝄫 and F are enharmonic, as are A𝄪 and B (Example 1.6).

Example 1.6: Enharmonic pitches on the keyboard



Example 1.7 shows double sharps in a Beethoven piano sonata (Anthology 21). Each is followed a few pitches later with ♮♯ to cancel the 𝄪 and restore a ♯.

Example 1.7: Beethoven, Piano Sonata in C Major (*Waldstein*), mvt. 1, mm. 43–46



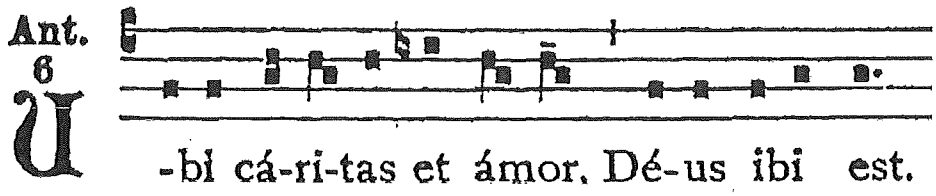
Reading Pitches from a Score

Staff Notation

The earliest forms of Western notation showed rising or falling melodies, without identifying pitches by name. With the invention of the **staff** (the plural is "staves"), specific pitches could be notated by placing them on lines or spaces. Early staves had a variable number of lines (Example 1.8a), but the modern staff consists of exactly five lines and four spaces (Example 1.8b), which are generally read from bottom to top, with the bottom line called the first and the top line the fifth (Example 1.8c).

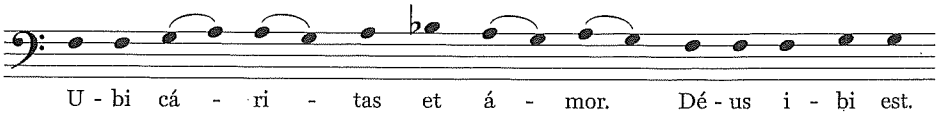
EXAMPLE 1.8: The staff

(a) Gregorian chant, "Ubi caritas et amor"

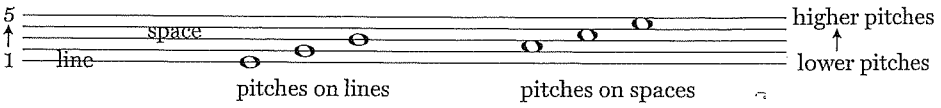


Translation: Where charity and love are. God is there.

(b) "Ubi caritas" in modern notation



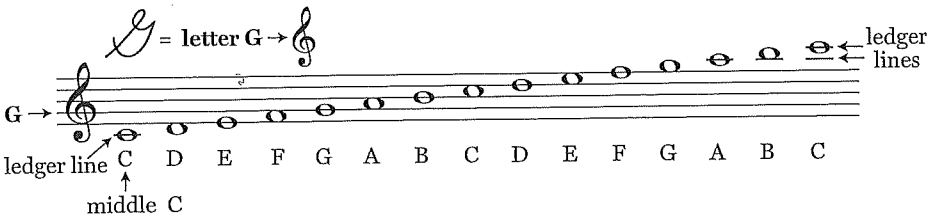
(c) Modern staff



Treble Clef

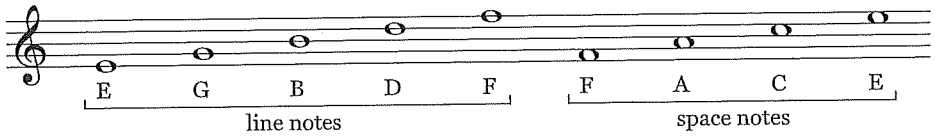
To identify notes on the staff's lines and spaces, you need a **clef**, the symbol that appears to the far left of every staff. The clef tells which line or space represents which pitch (in which octave). The **treble clef** is used for higher notes (those played by a piano's right hand or higher instruments and voices). This is a G clef: its shape resembles a cursive uppercase G, and the end of its central curving line rests on the staff line G. Example 1.9 shows how all the other pitches can be read from G.

EXAMPLE 1.9: Treble clef (G clef)



To write notes below or above the staff, we add short lines called **ledger lines**, as in Example 1.9. Memorize the note names for each line and space. Learn the "line notes" together and the "space notes" together, as in Example 1.10 (these should be familiar from counting letter names in thirds).

EXAMPLE 1.10: Treble-clef lines and spaces



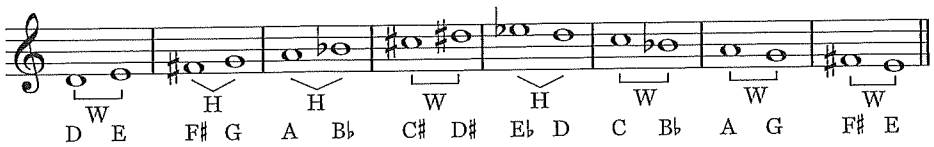
Another Way

To memorize the lines or spaces, make up sentences whose words begin with their letter names. The treble-clef lines (E–G–B–D–F), for example, might be "Every Good Bird Does Fly" or "Every Good Bond Drives Fast." The spaces of the treble clef simply spell F–A–C–E.

Example 1.11 shows whole and half steps on the treble staff, notated with accidentals.

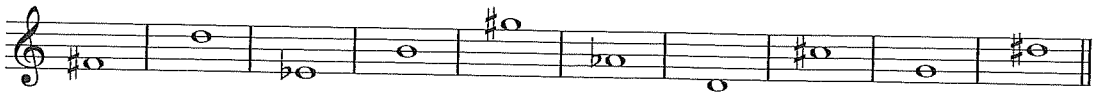
KEY CONCEPT When you write pitches on the staff, place the accidental before (to the left of) the **note head**, the main (oval) part of the note. When you say or write the letter names, the accidental goes after the letter name; for example, C♯ (C-sharp).

EXAMPLE 1.11: Half and whole steps on a treble staff



Try it #4

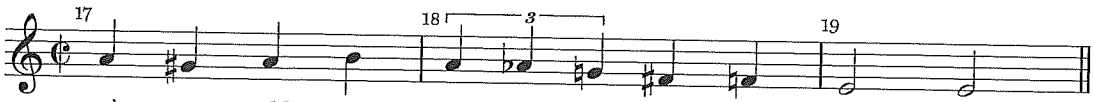
A. Write the letter names in the blanks below.



(1) F♯ (2)___ (3)___ (4)___ (5)___ (6)___ (7)___ (8)___ (9)___ (10)___

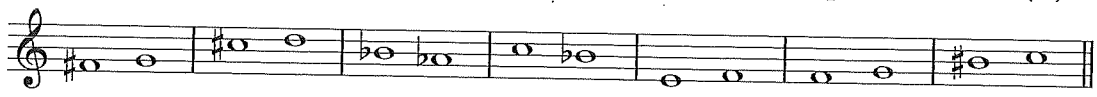
B. Write the letter name in every blank below (including when the note is repeated).

Dorothy Fields and Jerome Kern, "A Fine Romance," from *Swing Time*, mm. 17–19

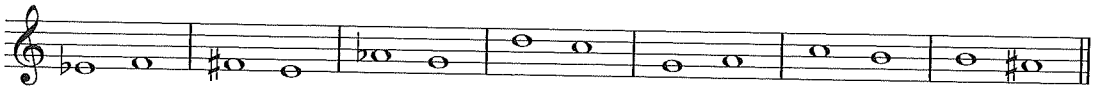


A ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

C. Identify whether each pair of pitches spans a whole step (W), half step (H), or neither (N).



(1) H (2) ___ (3) ___ (4) ___ (5) ___ (6) ___ (7) ___

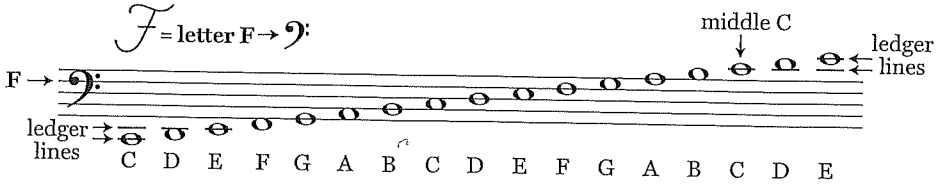


(8) ___ (9) ___ (10) ___ (11) ___ (12) ___ (13) ___ (14) ___

Bass Clef

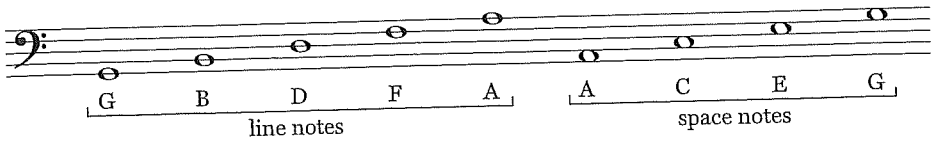
Lower notes (for a pianist's left hand or lower instruments like the cello) are designated with a **bass clef**, which is an F clef. This clef resembles a cursive uppercase F, and its two dots surround the line that represents F (Example 1.12). Count other pitches from F or memorize their position on the staff.

EXAMPLE 1.12: Bass clef (F clef)



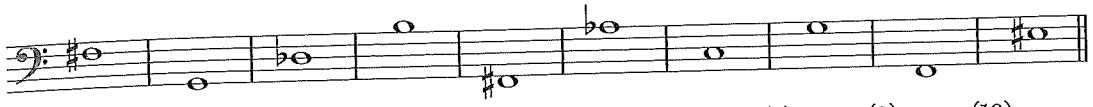
Example 1.13 shows the bass-clef lines and spaces. One way to remember the lines (G–B–D–F–A) is "Great Big Doves Fly Away." The spaces (A–C–E–G) could be "All Cows Eat Grass" or "All Cars Eat Gas."

Example 1.13: Bass-clef lines and spaces



Try it #5

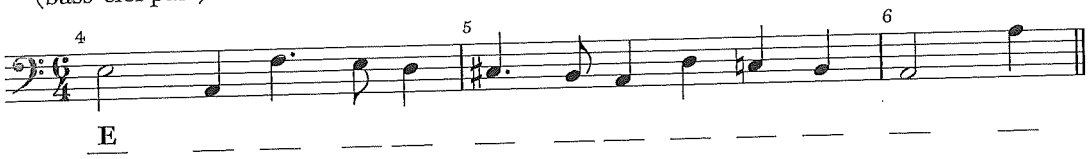
A. Write the letter names in the blanks below.



(1) F♯ (2)___ (3)___ (4)___ (5)___ (6)___ (7)___ (8)___ (9)___ (10)___

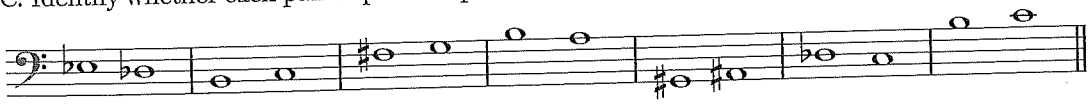
B. Write the letter name in each blank below.

Elisabeth-Claude Jacquet de la Guerre, Gigue, from Suite No. 3 in A Minor, mm. 4–6 (bass-clef part)

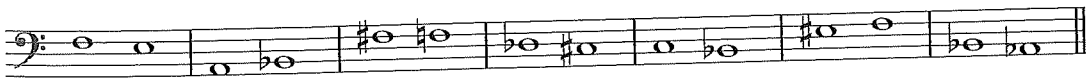


E ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

C. Identify whether each pair of pitches spans a whole step (W), half step (H), or neither (N).



(1) W (2) ___ (3) ___ (4) ___ (5) ___ (6) ___ (7) ___



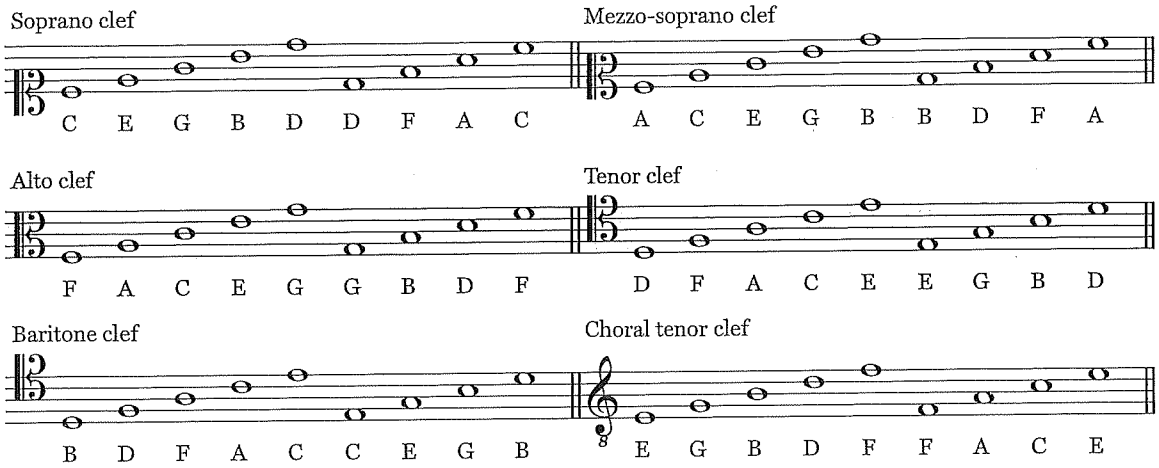
(8) ___ (9) ___ (10) ___ (11) ___ (12)___ (13) ___ (14) ___

C Clefs and Other Clefs

Although music reading starts with knowledge of the treble and bass clefs, you should learn how to read the other clefs as well, since they are standard in orchestral, choral, and chamber music scores. A **C clef** is a "movable" clef: its distinctive shape—𝄡— identifies middle C by the point on the staff at which the two curved lines join together in the middle, as illustrated in Example 1.14. Depending on its position, the clef may be called a soprano, mezzo-soprano, alto, tenor, or baritone clef. In modern scores, the **alto** and **tenor clefs** (shaded in the example) are most common, but you may come across the others in older editions. In choral scores, the tenor's voice part is often notated using a treble clef with a small "8" beneath

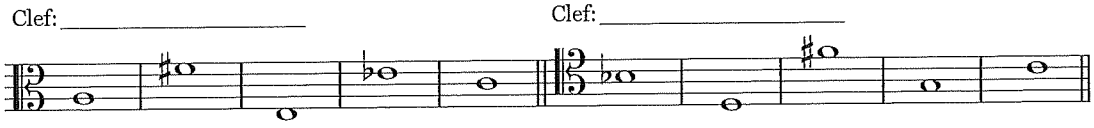
it, known as the **choral tenor clef**. These pitches are read down an octave. To read these clefs well, practice counting the lines and spaces in thirds (as in the example), then memorize them.

Example 1.14: Reading pitches in C clefs



Try it #6

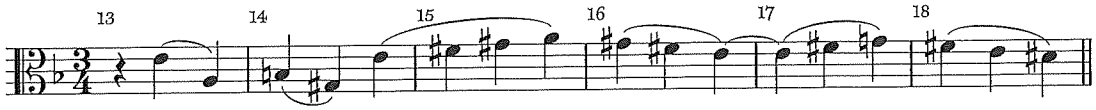
A. First identify the clef, then write each letter name in the blanks below.



(1) A (2) ___ (3) ___ (4) ___ (5) ___ (6) ___ (7) ___ (8) ___ (9) ___ (10) ___

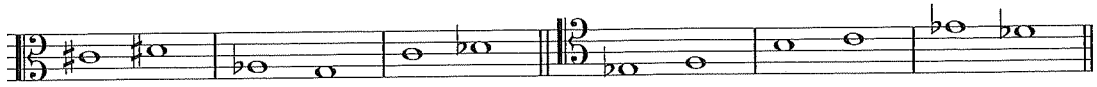
B. Write each letter name in the blanks below.

W. A. Mozart, String Quartet in D Minor, K. 421, mvt. 3, mm. 13–18 (viola part)



E ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

C. Identify whether each pair of pitches spans a whole step (W), half step (H), or neither (N).



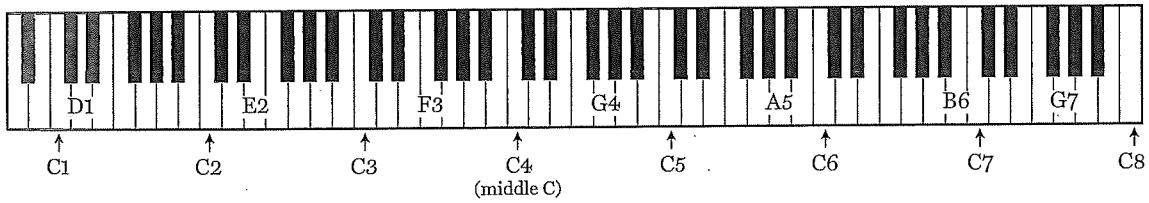
(1) W (2) ___ (3) ___ (4) ___ (5) ___ (6) ___

Musicians read different clefs because each one corresponds to the range of pitches needed for a particular instrument or voice type. The higher instruments, like the flute and violin, read treble clef. Lower instruments, like the timpani and double bass, generally read bass clef, while violas use the alto clef. (Look ahead to Example 1.25 to see these clefs in a full orchestral score.) Pianists read both bass and treble clefs, and bassoonists and cellists read both bass and tenor clefs.

Naming Registers

Pitch names specify a precise octave placement, while pitch-class names are the same for all octave-related notes. To indicate the octave we will use the system shown in Example 1.15. The lowest C on the piano is C1 and the highest is C8; middle C is C4. The number for a particular octave includes all the pitches from C up to the following B, so the B above C4 is B4, and the B below C4 is B3. The three notes below the C1 on the piano are A0, B♭0, and B0. The G indicated by the treble clef is G4; the two dots of the bass clef surround F3.

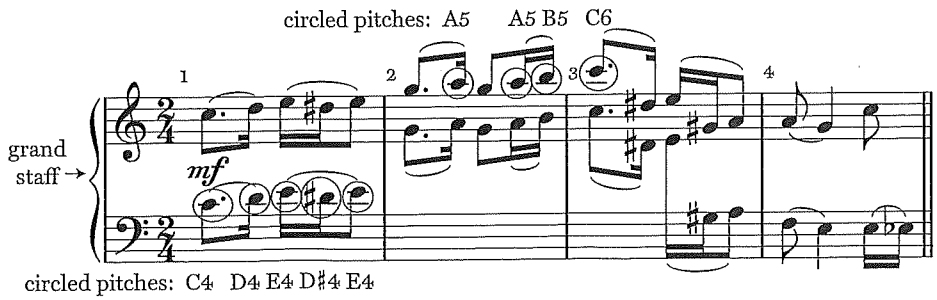
EXAMPLE 1.15: Piano keyboard with octave designations



Ledger Lines

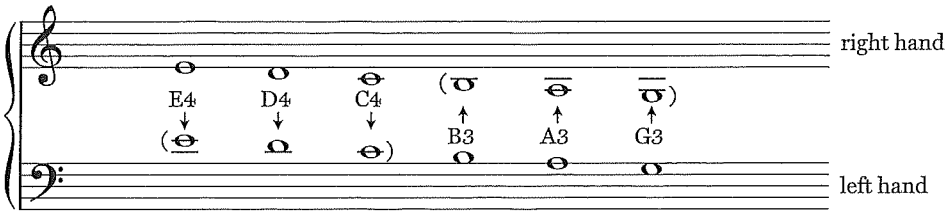
Listen to Example 1.16, the beginning of Joplin's rag "Solace" (Anthology 53). Like most piano music, this work is notated on a **grand staff**—two staves, one with a treble clef and one with a bass clef, connected by a curly brace. The circled pitches are written with ledger lines. Ledger lines may be written above, below, or between staves. Read ledger lines like other staff lines, by counting forward or backward from pitches on the staff.

EXAMPLE 1.16: Scott Joplin, "Solace," mm. 1–4



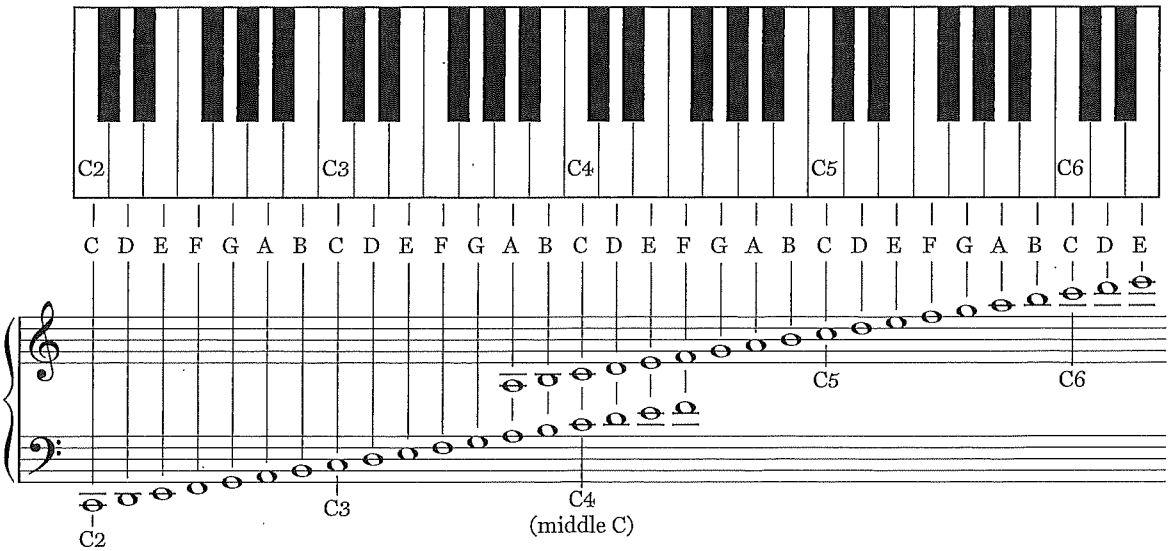
Pitches near middle C may be written between the two staves of the grand staff, as in Example 1.17 (arrows point to equivalent ledger-line pitches). In keyboard music, the choice of clef usually indicates which hand should play the note: bass clef for the left hand and treble clef for the right.

Example 1.17: Ledger lines between staves on the grand staff



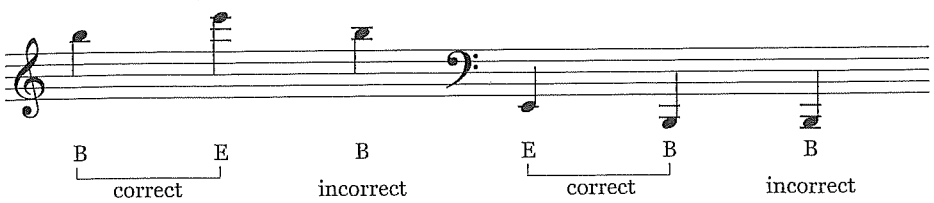
Example 1.18 shows pitches on a grand staff, extending over four octaves (some with ledger lines), and their positions on a keyboard.

Example 1.18: Pitches on a grand staff and keyboard



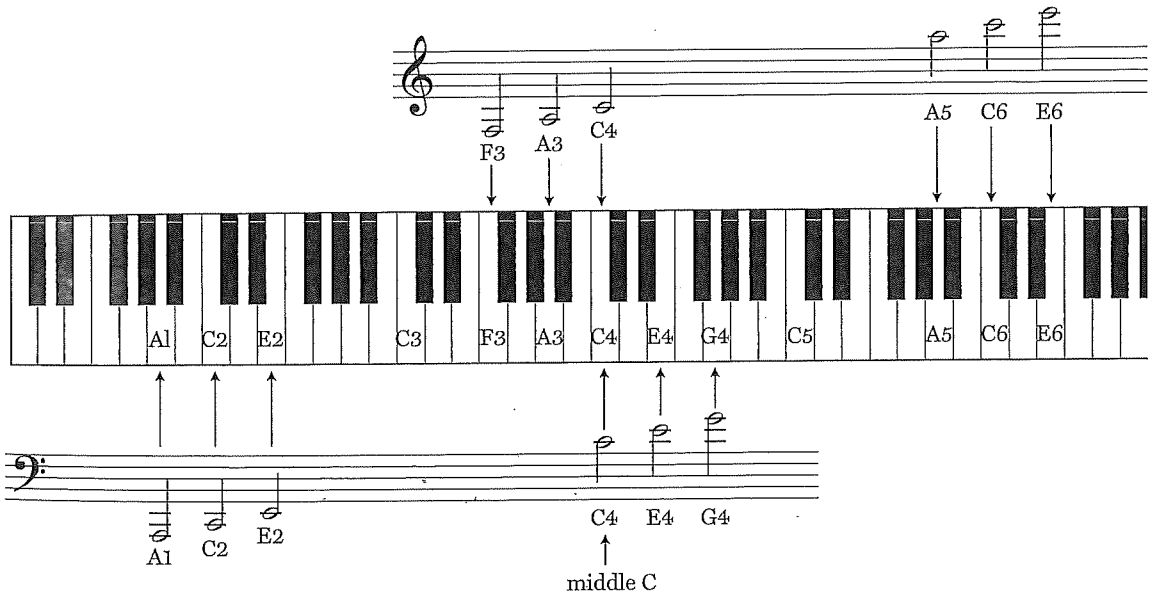
Pitches notated higher than the staff have ledger lines drawn through them or below them, but never above them; notes below the staff have ledger lines through them or above them, but never below. Draw ledger lines the same distance apart as staff lines, as in Example 1.19.

EXAMPLE 1.19: Correct and incorrect ledger lines



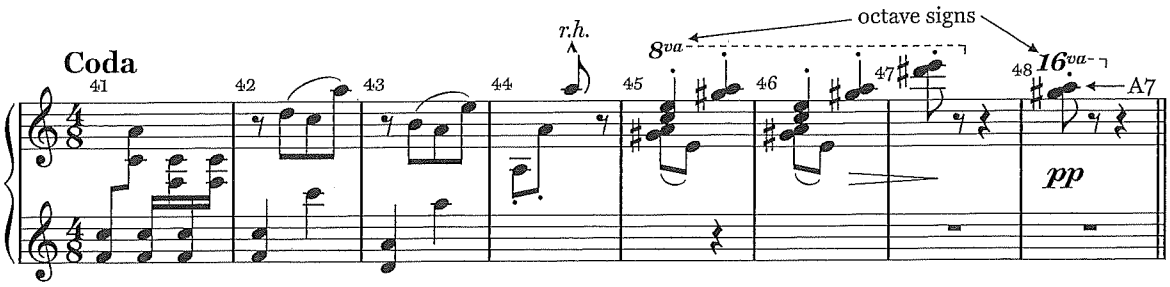
Memorize landmark pitches above and below the staves to read ledger lines quickly—as in Example 1.20, which gives the first three lines above and below each staff.

EXAMPLE 1.20: Landmark ledger-line pitches

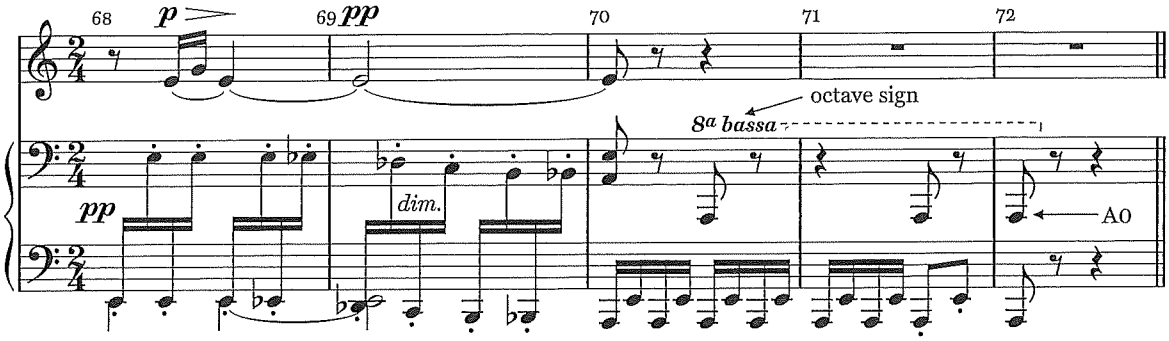


An alternative to ledger lines is the **ottava sign**: "8va" means play up an octave, while "8vb" means play down an octave. A two-octave transposition is indicated by a "16va," shown at the conclusion of Florence Price's character piece for piano, Example 1.21 (Anthology 67). This A7 is the highest A on the keyboard. Compare with Example 1.22, from a Debussy song (Anthology 36), which ends with A0—the lowest A on the piano—notated with "8^{a} bassa."

EXAMPLE 1.21: Florence Price, "The Goblin and the Mosquito," mm. 41–48

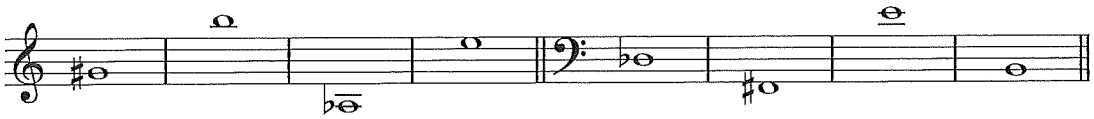


EXAMPLE 1.22: Claude Debussy, "Fantoches," mm. 68–72



Try it #7

A. Write the name and octave number of each pitch in the blank.

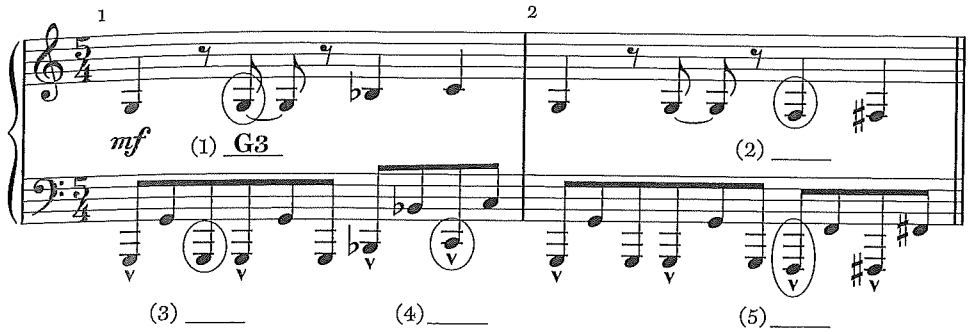


(1) G♯4 (2)____ (3)____ (4)____ (5)____ (6)____ (7)____ (8)____

(1)____ (2)____ (3)____ (4)____ (5)____ (6)____ (7)____ (8)____

B. Write the name and octave number of each circled pitch in the blank.

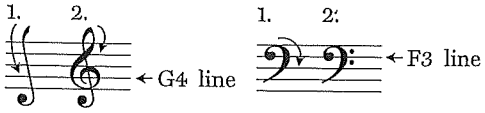
Lalo Schifrin, Theme from *Mission Impossible,* mm. 1–2



Writing Pitches on a Score

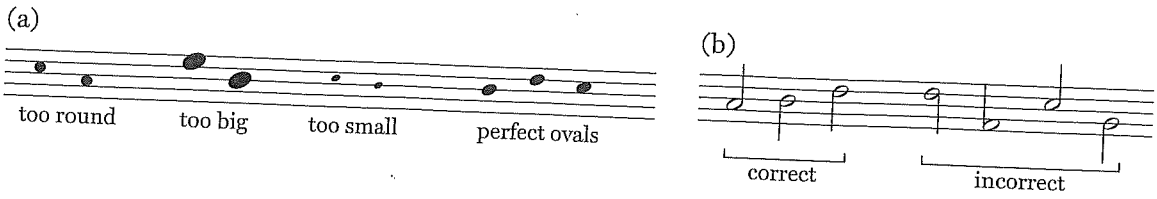
Though software for music notation is widely available, musicians must also notate music by hand. Draw a treble clef with a single continuous curved line, or in two strokes (Example 1.23): (1) draw a wavy line from top to bottom, like an elongated S; then (2) draw a second line that joins at the top and curves around it (ending on G4). To draw a bass clef, follow the diagram in the example, and make sure that the two dots straddle the F line.

Example 1.23: Drawing treble and bass clefs



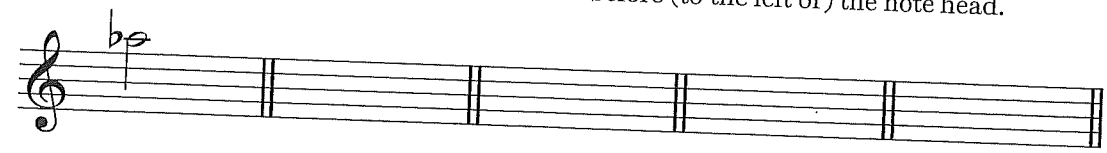
Note heads show duration, with hollow note heads lasting longer than solid ones. When you draw note heads, make them oval-shaped rather than round, and not so large that it is hard to tell whether they sit on a line or space (Example 1.24a). Most note heads are attached to thin vertical lines, called **stems**, that extend above or below (𝅗𝅥 ♩). If a note lies below the middle line of the staff, its stem goes up, on the right side of the note head; if a note lies on or above the middle line, its stem goes down, on the left side (1.24b). The length of a stem from top to bottom spans about an octave.

Example 1.24: Notation guidelines



Try it #8

Write each of the specified notes in the correct octave, using hollow note heads and correctly notated stems and ledger lines. Place accidentals before (to the left of) the note head.



(1) A♭5 (2) F♯3 (3) B4 (4) D♭6 (5) G♯3

(6) D♯4 (7) C♯2 (8) F♯2 (9) E4 (10) B3

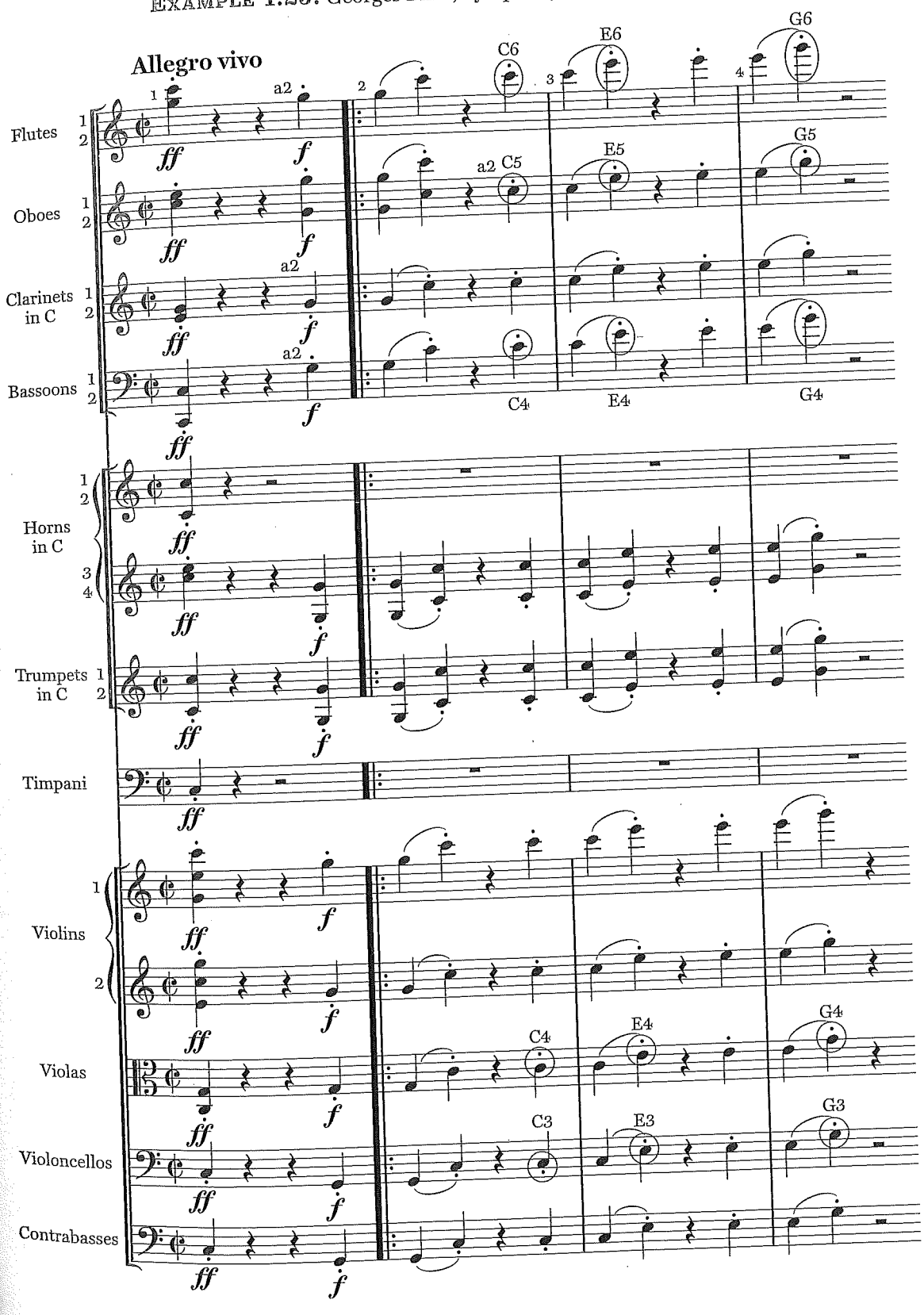
(11) G4 (12) B3 (13) B4 (14) C♯3 (15) A♭4

Dynamic Markings

Example 1.25 shows the beginning an orchestral work by Georges Bizet. Every pitch in this short excerpt is a C, E, or G, notated in treble, bass, or alto clef. Selected pitches are circled and labeled with octave indications.

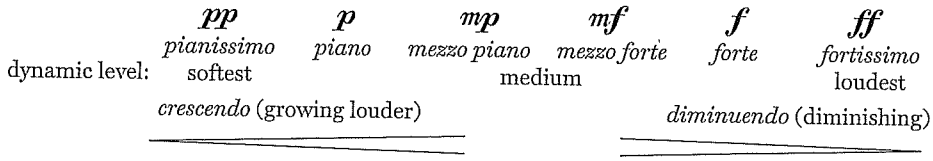
This passage begins with a full sound, marked with a large ***ff*** in the score. This indication is a **dynamic marking**, which tells performers how soft or loud to play. Such markings also help musicians make decisions about the character or mood of a piece.

EXAMPLE 1.25: Georges Bizet, Symphony in C Major, mvt. 1, mm. 1–4



The ***ff*** stands for *fortissimo*, a loud dynamic marking; *piano* (abbreviated ***p***) is a soft one. Other frequently encountered markings are ***f*** (for forte, "loud"), ***mp*** (for *mezzo piano*, "half as soft"), and ***mf*** (for *mezzo forte*, "half as loud"). Example 1.26 shows a typical range of dynamic markings. The indication to get louder is *crescendo* (<), while *decrescendo* or *diminuendo* (>) means to grow softer. When performing, pay careful attention to the dynamic markings. They will contribute greatly to shaping a musical and sensitive performance.

Example 1.26: Dynamic markings



Style Periods

Because compositional styles have changed over time, it can be helpful to understand when a composer lived and worked. In this book, we will refer to the following style periods. Dates and a few significant composers are provided for each. Our primary focus in this text is music of the Common Practice era and beyond.

- **Early music**
  - **Medieval (c. 500-1400):** Guido d'Arezzo, Hildegard von Bingen, Gregorian chant
  - **Renaissance (c. 1400-1600):** William Byrd, Maddalena Casulana, Orlando di Lasso, Giovanni Pierluigi da Palestrina, Tomás Luis de Victoria
- **Common Practice**
  - **Baroque (c. 1600-1750):** Johann Sebastian Bach, Arcangelo Corelli, George Frideric Handel, Elisabeth-Claude Jacquet de la Guerre, Henry Purcell, Barbara Strozzi
  - **Classical (c. 1730-1820):** Ludwig van Beethoven, Joseph Haydn, Wolfgang Amadeus Mozart, Louise Reichardt
  - **Romantic (c. 1815-1910):** Amy Beach, Georges Bizet, Johannes Brahms, Frédéric Chopin, Louise Farrenc, Gabriel Fauré, Fanny Mendelssohn Hensel, Franz Schubert, Robert and Clara Schumann, Richard Wagner

- **Modern and contemporary**
  - **Early twentieth century and modernist (c. 1890–1945):** Béla Bártok, Claude Debussy, Scott Joplin, Florence Price, Maurice Ravel, Arnold Schoenberg, Ruth Crawford Seeger, Igor Stravinsky, Germaine Tailleferre, Anton Webern
  - **Post-World War II and late twentieth century (c. 1945–2000):** Luciano Berio, Pierre Boulez, John Cage, György Ligeti, Ursula Mamlok, Tōru Takemitsu
  - **Twenty-first century:** John Adams, John Corigliano, Arvo Pärt, Steve Reich, Kaija Saariaho, Joan Tower, Chen Yi, Ellen Taaffe Zwilich

Did You Know?

Scott Joplin (Example 1.16) was born into a musical family: his father, a formerly enslaved person, played violin, and his mother played the banjo. One of Joplin's most famous compositions, "Maple Leaf Rag" (published in 1899), earned him one penny for every sheet-music copy sold, an income that helped support him for the rest of his life. Although his opera *Treemonisha* (composed in 1911) won an award for being the "most American opera" ever written, Joplin never saw it fully staged. His music was played in bars, dance halls, and other popular gathering places from the 1890s to the 1910s—and became popular once again in the 1970s after it was featured in the movie *The Sting* (1973), with Paul Newman and Robert Redford. Joplin's rags have remained among the best-known American music of the early twentieth century.

TERMS YOU SHOULD KNOW

- accidental
  - flat
  - sharp
  - natural
  - double flat
  - double sharp
- clef
  - treble clef
  - bass clef
  - C clef
  - alto clef
  - tenor clef
  - choral tenor clef
- counting in thirds
- dynamic marking
- enharmonic equivalence
- enharmonic spelling
- grand staff
- interval
  - half step (semitone)
  - whole step (whole tone)
- ledger line
- middle C
- musical alphabet
- note head
- octave
- octave equivalence
- ottava sign
- pitch
- pitch class
- score
- staff
- stem

QUESTIONS FOR REVIEW

1. How do a staff and clef work together to identify pitches?
2. How do pitches and pitch classes differ?
3. What is the function of (a) C clefs, (b) accidentals, (c) ledger lines?
4. How do the piano's white and black keys help you determine whole and half steps?
5. Which white-key pairs of notes form half steps, without the addition of accidentals?
6. Give two guidelines each for notating ledger lines, note heads, and stems.
7. How are octave numbers assigned? What is the octave number for middle C?
8. Pick a melody from the Anthology or music that you are playing that includes ledger lines. Identify all its pitches and octave numbers.