



Chapter 3

Scales, Keys, and Intervals

TERMS AND CONCEPTS TO KNOW

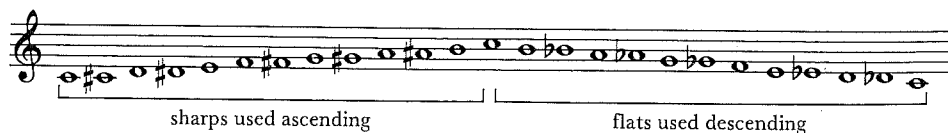
Intervals	Keys	Scales
chromatic interval	circle of fifths	chromatic scale
compound interval	enharmonic keys	harmonic minor scale
consonance	key signature	major scale
diatonic interval	transposition	melodic minor scale
dissonance		natural minor scale
enharmonic interval		parallel major/minor
inversion		relative major/minor
simple interval		tonic

Part One: Scales and Key Signatures

CHROMATIC SCALE

A **scale** (from the Italian *scala*, meaning “ladder”) is the arrangement, in ascending or descending order, of the pitch material that forms the basis of a musical composition. All twelve pitches of the octave, arranged in either ascending or descending order, constitute a **chromatic scale**. Notice that sharps are used when writing the ascending form and flats are used for the descending form.

Illustration 3.1



Although many different types of scales are possible, most of the music composed in Europe and the United States during the past three hundred years or so has had as its pitch basis a major or a minor scale.

A **major scale** is playable on the piano between any two Cs by striking, in ascending or descending order, only the white keys.

THE MAJOR SCALE

Illustration 3.2

Intervals: 1 1 ½ 1 1 1 ½
 lower half ↑ upper half
 whole step separates the two "halves" of the scale

1 = whole step
 ½ = half step

Notice that this scale is composed of two intervallically identical four-note segments, called *tetrachords*, which are themselves separated by a whole step. The resulting succession of intervals— $\overbrace{1\ 1\ \frac{1}{2}}^{\text{lower half}}\ 1\ \overbrace{1\ 1\ \frac{1}{2}}^{\text{upper half}}$ —constitutes a major scale.*

Many melodies consist *solely* of the notes of the major scale.

Illustration 3.3 *O Tannenbaum* (German folk song)


Pitch material used

Pitch material placed within octave from c^1 to c^2

*Although this is a convenient way to think of the major scale, early theorists described it more accurately in terms of its actual evolution, as a lower *pentachord* (five notes) and an upper tetrachord sharing a common tone (the fifth degree).

TRANSPOSITION In order to duplicate the interval pattern of the major scale when beginning on a pitch other than C, certain chromatic alterations become necessary. Notice what happens if we attempt to construct a *new* major scale starting on G, the fifth degree of C major.

Illustration 3.4



Interval:	1	1	½	1	1	½	1
Major scale interval pattern:	1	1	½	1	1	1	½

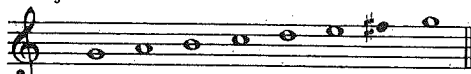
½	1
↙	↘
1	½

The positions of the whole step and half step in the *upper tetrachord* are reversed.

In order to maintain the interval pattern of the major scale, it is necessary to add a sharp before the F. This produces a major scale on G.

Illustration 3.5

G major scale



Interval: 1 1 ½ 1 1 1 ½

The process of rewriting a scale, or a passage based on a scale, at a different pitch level is called **transposition**. If we continue to transpose the major scale by beginning on the *fifth* degree of each *new* scale, an *additional sharp* is required each time to preserve the half step between the seventh and eighth degrees.

Illustration 3.6

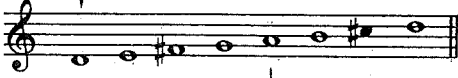
The major scale:

on G



contains F#

on D



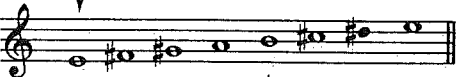
contains F#, C#

on A



contains F#, C#, G#

on E



contains F#, C#, G#, D#

on B



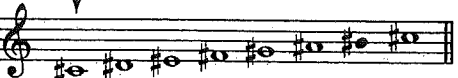
contains F#, C#, G#, D#, A#

on F#



contains F#, C#, G#, D#, A#, E#

on C#



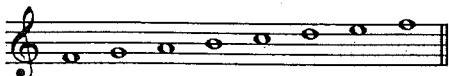
contains F#, C#, G#, D#, A#, E#, B#

(black note = newly added sharp in each scale)

In each case, the new sharp is the one added to the seventh scale degree.

If we now construct a new major scale beginning on the *fourth* degree of the C major scale—on F—a *different* alteration is required in order to preserve the proper interval structure.

Illustration 3.7



Interval: 1 1

1	1/2
1/2	1

 1 1 1/2
Major scale
interval pattern: 1 1

1	1/2
1/2	1

 1 1 1/2

The positions of the whole step and half step in the *lower tetrachord* are reversed.

A *flat* must be added to the fourth scale degree in order to maintain the half step between the third and fourth degrees. This produces a major scale on F.

Illustration 3.8

F major scale

Interval: 1 1 1/2 1 1 1 1/2

If we continue to transpose the major scale by beginning on the *fourth* degree of each *new* scale, an *additional flat* is required each time to preserve the half step between the third and fourth degrees.

Illustration 3.9

The major scale
on F

contains Bb

contains Bb, Eb

contains Bb, Eb, Ab

contains Bb, Eb, Ab, Db

contains Bb, Eb, Ab, Db, Gb

contains Bb, Eb, Ab, Db, Gb, Cb

contains Bb, Eb, Ab, Db, Gb, Cb, Fb

(black note = newly added flat in each scale)

In each case, the new flat is the one added to the fourth scale degree.

EXAMPLES FOR FURTHER STUDY

Other well-known melodies that use *only* the notes of the major scale can be found on page 269 (No. 1) and page 284 (Illustration 11.8). For practice in transposing, you may wish to rewrite these melodies in the key of C major.

The first note of a scale is called the **tonic**. It is the pitch of greatest stability and the focal pitch of most compositions that have that scale as their basis. In the melody of Illustration 3.3, the note C is heard as the tonic, or focal pitch, because it represents the final resting point of the melody and because of other reasons which we will consider in Chapter Ten.

The sharps or flats of the scale on which a piece is based usually are placed at the beginning of each staff. This is referred to as the **key signature**. As Illustration 3.10 shows, there is a *precise manner of placement* for the sharps or flats of a key signature.

THE
TONIC

KEY
SIGNATURES

Illustration 3.10

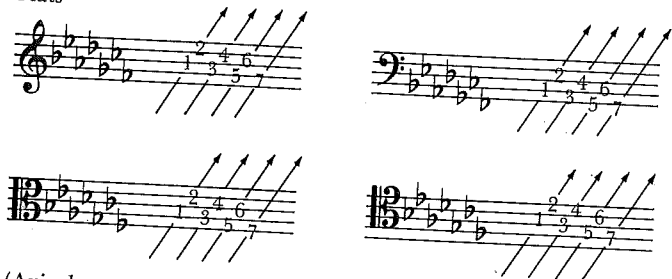
Sharps



PLACEMENT
OF SHARPS
AND FLATS

(Axis slants *downward to right* for all clefs except tenor.)

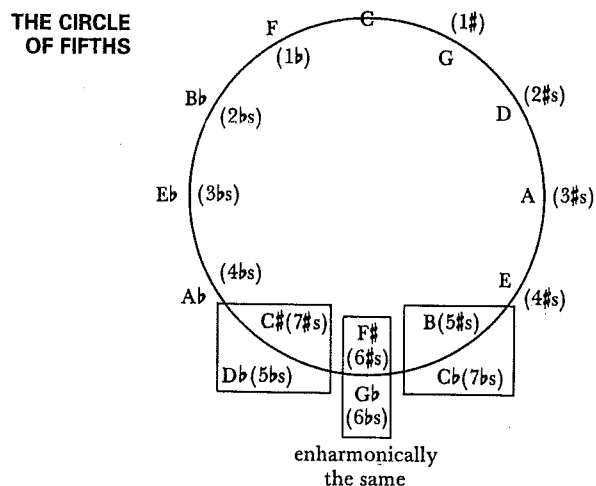
Flats



(Axis slants *upward to right* for all clefs.)

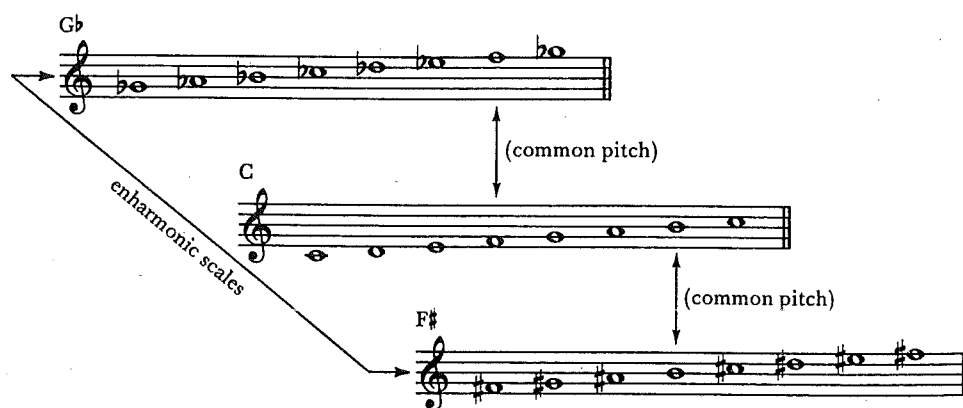
The names of the major scales and their key signatures are arranged in a circular pattern in Illustration 3.11.

Illustration 3.11



Moving clockwise around the circle, each new scale begins on the fifth degree of the preceding scale. For this reason, the circular arrangement is called the **circle of fifths**. Moving *counterclockwise*, each new scale begins on the *fourth* degree of the preceding scale. By moving in *both* directions around the circle, we arrive at *the same scale, spelled enharmonically two different ways*. This scale, spelled with either six sharps as F# major or with six flats as Gb major, is the most distant from the C major scale in terms of common pitches. *Each shares only one tone in common with the C major scale.*

Illustration 3.12




This same relationship holds for any two scales located directly across the circle from each other, such as G and D \flat . Viewed another way, two keys are most remote from each other when the sum of their flats and sharps is six. For example, the key of A (three sharps) is most remote from E flat (three flats), while the key of A flat (four flats) is most remote from D (two sharps).


Practice Assignments A on page 79 and G (Nos. 1, 2, and 3) on pages 86–87 can be completed at this time.

Every major scale has a **relative minor**—that is, a scale that shares the same key signature. To find a major scale’s relative minor, count upward to the sixth degree. This is the relative minor’s tonic. **RELATIVE MINOR**

Illustration 3.13

E♭ major: 

Scale degree: 1 2 3 4 5 ⑥ 7 8

C minor: 

Scale degree: ① 2 3 4 5 6 7 8

Interval pattern: $1 \quad \frac{1}{2} \quad 1 \quad 1 \quad \frac{1}{2} \quad 1 \quad 1$

Notice that the interval pattern of this scale differs from that of the major scale. However, *the pitch content is identical*.

Illustration 3.14 lists the **relative major** and minor scales for key signatures up to seven sharps and seven flats.

Illustration 3.14

RELATIVE MAJOR AND MINOR SCALES



Major Scale

Relative Minor Scale*

C

a



G

e



D

b



A

f#



E

c#



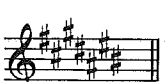
B

g#



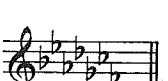
F#

d#



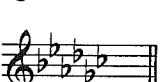
C#

a#



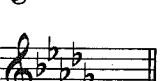
Cb

ab



Gb

eb



Db

bb



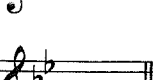
Ab

f



Eb

c



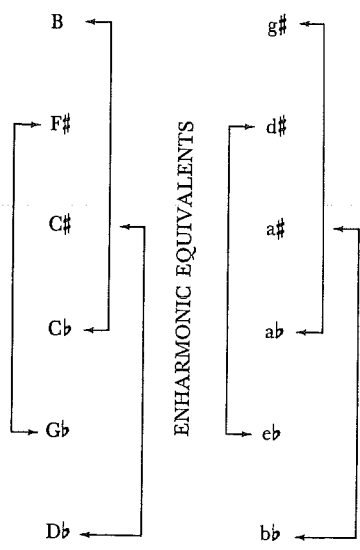
Bb

g



F

d



*When used alone, without the adjective "major" or "minor," capital letters designate major scales (or keys) and lower-case letters designate minor scales (or keys).

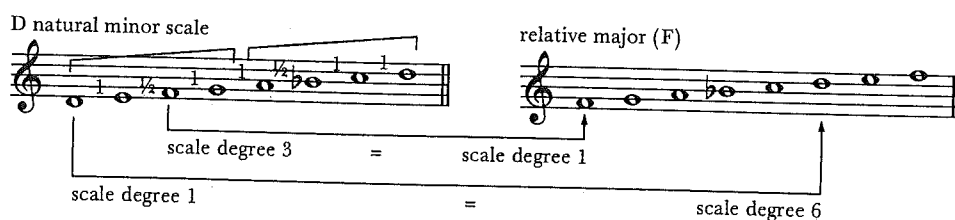
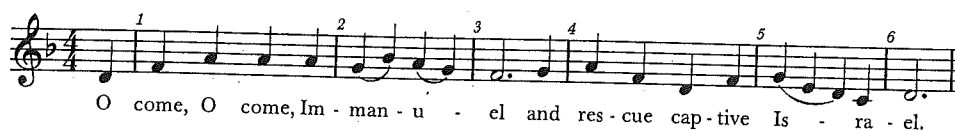
Note on Illustration 3.14:

Arrows point to scales that are enharmonic equivalents.

The form of the minor scale that uses the *precise* pitch content of its relative major is called the **natural minor scale**. Following is a musical example using this form.

**NATURAL
MINOR
SCALE**

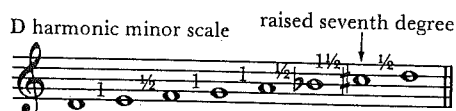
Illustration 3.15 *O Come, Immanuel* (Gregorian chant)



In actual practice, the natural minor scale was rarely used without certain alterations. The **harmonic minor scale** is a natural minor scale with the seventh degree raised one half step.

**HARMONIC
MINOR
SCALE**

Illustration 3.16



Raising the seventh degree creates an interval equal to three half steps between the sixth and seventh degrees. This interval gives the harmonic minor scale a unique sound. The subject of Bach's well-known C minor Fugue, shown in Illustration 3.17, employs this scale form.

Illustration 3.17 Bach: Fugue No. 2 from *The Well-Tempered Clavier* (Vol. I)



CLASS ACTIVITY

Notate the pitch material of this passage within the octave c^1-c^2 and compare the scale's interval structure with that in Illustration 3.16.

As we will learn in Chapter Five, this form of the minor scale was favored for *harmonic* structures. However, the extra-large interval between scale degrees seven and eight was usually considered somewhat awkward sounding in melodic passages and probably was difficult to sing as well. Therefore, a different form was favored for melodies.

MELODIC
MINOR
SCALE

The **melodic minor scale** is a natural minor scale with the sixth and seventh degrees raised by one half step *in ascent* and lowered to their natural minor positions in descent.

Illustration 3.18

D melodic minor scale

(ascending form) (descending form—identical to natural minor form)

In the melodic minor scale, the upward push of the raised seventh degree is retained, but the extra large interval in the harmonic minor form is avoided (by raising the sixth degree as well). Illustration 3.19 is a musical example using this scale form.

Illustration 3.19 Haydn: *Hungarian Rondo*

(Presto)

Notes on the Minor Scale Forms:

1. In all three minor scale forms, the lower five notes (the lower *pentachord*) are identical.
2. In the melodic minor scale, the interval pattern of the *upper tetrachord ascending* is identical with that of the major scale.
3. In the melodic minor scale, the interval pattern of the *upper tetrachord descending* is identical with that of the natural minor scale.
4. The raising of the sixth and seventh scale degrees in a minor key requires the use of accidentals.

Practice Assignments B on page 81 and D, E, and F on pages 83–85 can be completed at this time.

EXAMPLES FOR FURTHER STUDY

See page 269, No. 2; page 279, Illustration 11.1; page 284, Illustration 11.7; page 287, No. 1 and No. 4

Composers have actually approached the minor scale not as three separate structures but as different facets of a single scale. The following can be regarded as a general principle:

MELODIC
MINOR
PRINCIPLE

1. Scale degree seven is usually raised when progressing upward. If scale degree six precedes it, it is also raised. (See Illustration 3.20a and b.)
2. Scale degree six is usually in its natural minor state when progressing downward. If scale degree seven precedes it, it is also in its natural minor state. (See Illustration 3.20c and d.)

Illustration 3.20

Illustration 3.20 consists of four musical examples, labeled a, b, c, and d, each shown on a single staff in treble clef with a key signature of one flat (B-flat). Example a shows an ascending scale with notes G4, A4, Bb4, C5, D5, E5, F5, G5. Degree indicators are placed below the notes: an upward arrow under F5, and upward arrows under E5 and D5. Example b shows a descending scale with notes G5, F5, E5, D5, C5, Bb4, A4, G4. Degree indicators are placed below the notes: an upward arrow under F5, and upward arrows under E5 and D5. Example c shows an ascending scale with notes G4, A4, Bb4, C5, D5, E5, F5, G5. Degree indicators are placed below the notes: downward arrows under G4, F5, and E5. Example d shows a descending scale with notes G5, F5, E5, D5, C5, Bb4, A4, G4. Degree indicators are placed below the notes: upward arrows under F5 and D5, and a downward arrow under E5.

Ultimate goal of seventh degree is upward to the tonic.

Here the goal of the seventh degree is upward, while the goal of the sixth degree is downward.

Consider the following passage from J. S. Bach's *Passacaglia in C Minor* (Illustration 3.21).

Illustration 3.21 J. S. Bach: *Passacaglia in C Minor*, BWV 582*

*This movement is contained in its entirety in *Analytical Anthology of Music*, by Ralph Turek (McGraw-Hill, Inc., 1984).

- a. ascending form of the upper tetrachord used in *descent*
- b. descending form of the upper tetrachord used in *descent*
- c. descending form of the upper tetrachord used in *descent*
- d. ascending form of the upper tetrachord used in *descent*
- e. ascending form of the upper tetrachord used in *ascent*
- f. ascending form of the upper tetrachord used in *ascent*
- g. descending form of the upper tetrachord used in *descent*
- h. ascending form of the upper tetrachord used in *descent*

Note on Illustration 3.21:

The three points at which the principle for melodic minor just stated is contradicted (a, d, and h) reflect Bach's effort to reconcile the melodic line with the supporting harmonies (which are, generally, based on the *harmonic minor* scale form).

FOR CLASS DISCUSSION

Aside from the bracketed points, identify all other occurrences of the sixth and seventh scale degrees in Illustration 3.21, and explain why they are or are not raised.

A major and minor scale that share the same tonic are termed *parallel*. By beginning on the first degree of any major scale and adding three flats (or cancelling three sharps), the **parallel minor** scale (in its natural form) is obtained.

PARALLEL
MINOR

Illustration 3.22

F major

F (natural) minor

three flats added

A major

A (natural) minor

three sharps cancelled

G major

G (natural) minor

one sharp cancelled, two flats added

Following are three observations regarding the relationship between **parallel major** and minor scales:

1. The single most important difference is scale degree three, which is one half step lower in a minor scale than in its parallel major.
2. Scale degrees six and seven *may or may not* be one half step lower in a minor scale than in its parallel major. For harmonic purposes (constructing chords), scale degree six will usually be one half step lower (producing the harmonic minor scale form). For melodic purposes, scale degrees six and seven can be viewed as a pair, which are identical with those of the parallel major *in ascent* and one half step lower *in descent*.
3. The parallel minor of a given major scale is always *three keys removed*—in the direction of more flats or fewer sharps.

FOR PRACTICE ASSIGNMENTS ON PART ONE, TURN TO PAGE 79.