# Music Fundamentals 4: Intervals

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**C O N N E X I O N S**

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# Chapter 1

# Intervals and Inversions[1]

## 1.1 The Distance Between Pitches

The **interval** between two notes is the distance between the two pitches[2] - in other words, how much higher or lower one note is than the other. This concept is so important that it is almost impossible to talk about scales[3], chords[4], harmonic progression[5], cadence[6], or dissonance (Chapter 3) without referring to intervals. So if you want to learn music theory, it would be a good idea to spend some time getting comfortable with the concepts below and practicing identifying intervals.

Scientists usually describe the distance between two pitches in terms of the difference between their frequencies[7]. Musicians find it more useful to talk about interval. Intervals can be described using half steps and whole steps[8]. For example, you can say "B natural is a half step below C natural", or "E flat is a step and a half above C natural". But when we talk about larger intervals in the major/minor system[9], there is a more convenient and descriptive way to name them.

## 1.2 Naming Intervals

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

**Example 1.1**

[1] This content is available online at <http://cnx.org/content/m10867/2.27/>.
[2] "Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/>
[3] "Major Keys and Scales" <http://cnx.org/content/m10851/latest/>
[4] "Harmony": Chords <http://cnx.org/content/m11654/latest/#l0b>
[5] "Harmony": Chords <http://cnx.org/content/m11654/latest/#l0b>
[6] "Cadence in Music" <http://cnx.org/content/m12402/latest/>
[7] "Frequency, Wavelength, and Pitch" <http://cnx.org/content/m11060/latest/>
[8] "Half Steps and Whole Steps" <http://cnx.org/content/m10866/latest/>
[9] "Octaves and the Major-Minor Tonal System" <http://cnx.org/content/m10862/latest/>

**Counting Intervals**

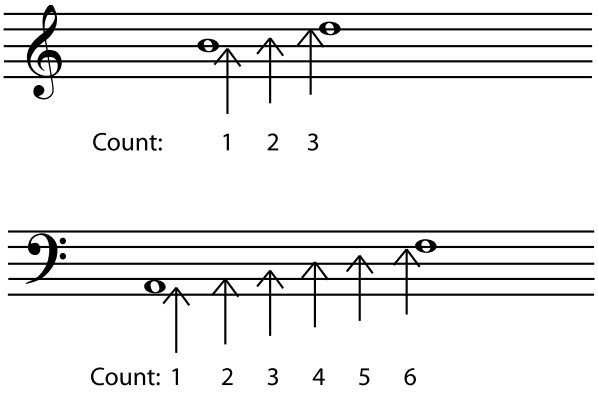


**Figure 1.1**

To find the interval, count the lines or spaces that the two notes are on as well as all the lines or spaces in between. The interval between B and D is a third. The interval between A and F is a sixth. Note that, at this stage, key signature[10], clef[11], and accidentals[12] do not matter at all.

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

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**Simple Intervals**

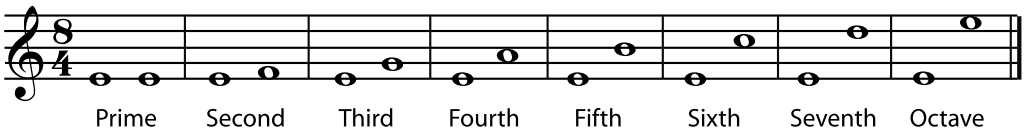


**Figure 1.2**

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If you like you can listen to each interval as written in Figure 1.2 (Simple Intervals): prime[13], second[14], third[15], fourth[16], fifth[17], sixth[18], seventh[19], octave[20].

**Compound intervals** are larger than an octave.

[10] "Key Signature" <http://cnx.org/content/m10881/latest/>
[11] "Clef" <http://cnx.org/content/m10941/latest/>
[12] "Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/#p0e>
[13] See the file at <http://cnx.org/content/m10867/latest/prime.mid>
[14] See the file at <http://cnx.org/content/m10867/latest/second.mid>
[15] See the file at <http://cnx.org/content/m10867/latest/third.mid>
[16] See the file at <http://cnx.org/content/m10867/latest/fourht.mid>
[17] See the file at <http://cnx.org/content/m10867/latest/fifth.mid>
[18] See the file at <http://cnx.org/content/m10867/latest/sixth.mid>
[19] See the file at <http://cnx.org/content/m10867/latest/seventh.mid>
[20] See the file at <http://cnx.org/content/m10867/latest/octave.mid>

**Compound Intervals**

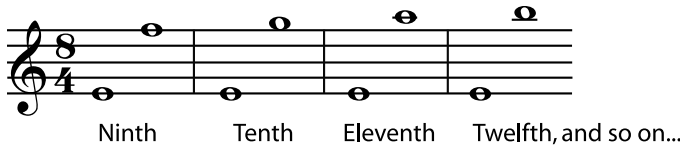


**Figure 1.3**

Listen to the compound intervals in Figure 1.3 (Compound Intervals): ninth[21], tenth[22], eleventh[23].

**Exercise 1.1** ***(Solution on p. 13.)***

Name the intervals.

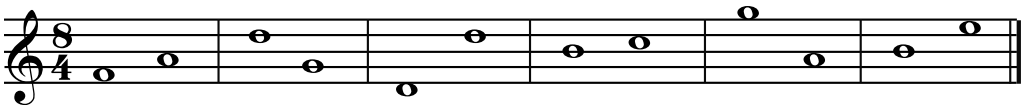

**Figure 1.4**

**Exercise 1.2** ***(Solution on p. 13.)***

Write a note that will give the named interval.

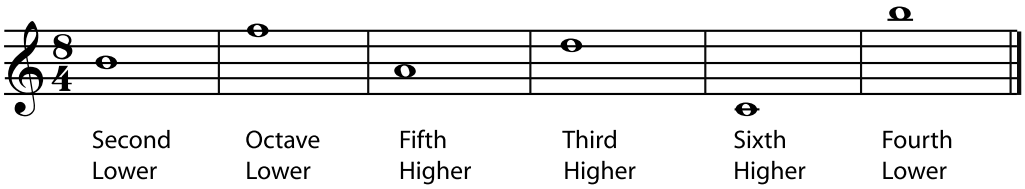


**Figure 1.5**

## 1.3 Classifying Intervals

So far, the actual distance, in half-steps, between the two notes has not mattered. But a third made up of three half-steps sounds different from a third made up of four half-steps. And a fifth made up of seven half-

[21] See the file at <http://cnx.org/content/m10867/latest/ninth.mid>
[22] See the file at <http://cnx.org/content/m10867/latest/tenth.mid>
[23] See the file at <http://cnx.org/content/m10867/latest/eleventh.mid>

steps sounds very different from one of only six half-steps. So in the second step of identifying an interval, clef[24], key signature[25], and accidentals[26] become important.

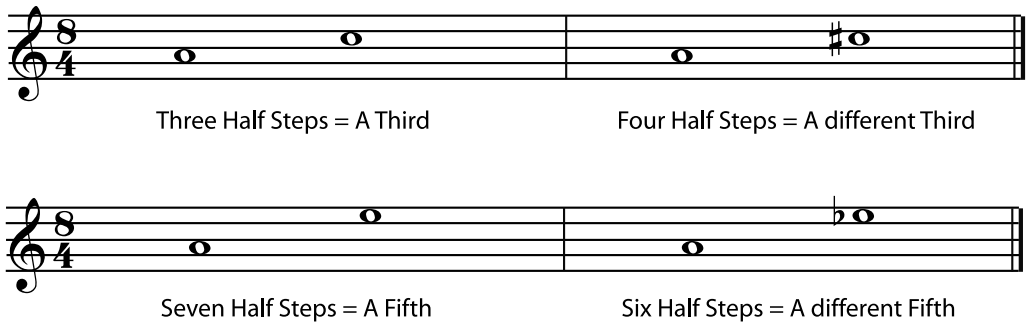


**Figure 1.6:** A to C natural and A to C sharp are both thirds, but A to C sharp is a larger interval, with a different sound. The difference between the intervals A to E natural and A to E flat is even more noticeable.

Listen to the differences in the thirds[27] and the fifths[28] in Figure 1.6.

So the second step to naming an interval is to classify it based on the number of half steps[29] in the interval. Familiarity with the chromatic scale[30] is necessary to do this accurately.

### 1.3.1 Perfect Intervals

Primes, octaves, fourths, and fifths can be **perfect** intervals.

> NOTE: These intervals **are never classified as major or minor**, although they can be augmented or diminished (see below (Section 1.3.3: Augmented and Diminished Intervals)).

What makes these particular intervals perfect? The physics of sound waves (**acoustics**) shows us that the notes of a perfect interval are very closely related to each other. (For more information on this, see Frequency, Wavelength, and Pitch[31] and Harmonic Series[32].) Because they are so closely related, they sound particularly good together, a fact that has been noticed since at least the times of classical Greece, and probably even longer. (Both the octave and the perfect fifth have prominent positions in most of the world's musical traditions.) Because they sound so closely related to each other, they have been given the name "perfect" intervals.

> NOTE: Actually, modern equal temperament[33] tuning does not give the harmonic-series-based pure[34] perfect fourths and fifths. For the music-theory purpose of identifying intervals, this does

[24] "Clef" <http://cnx.org/content/m10941/latest/>
[25] "Key Signature" <http://cnx.org/content/m10881/latest/>
[26] "Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/#p0e>
[27] See the file at <http://cnx.org/content/m10867/latest/twothirds.mid>
[28] See the file at <http://cnx.org/content/m10867/latest/twofifths.mid>
[29] "Half Steps and Whole Steps" <http://cnx.org/content/m10866/latest/>
[30] "Half Steps and Whole Steps" <http://cnx.org/content/m10866/latest/#p0bb>
[31] "Frequency, Wavelength, and Pitch" <http://cnx.org/content/m11060/latest/>
[32] "Harmonic Series" <http://cnx.org/content/m11118/latest/>
[33] "Tuning Systems": Section Equal Temperament <http://cnx.org/content/m11639/latest/#s22>
[34] "Tuning Systems": Section Pythagorean Intonation <http://cnx.org/content/m11639/latest/#s11>

not matter. To learn more about how tuning affects intervals as they are actually played, see Tuning Systems[35].

A perfect prime is also called a **unison**. It is two notes that are the same pitch[36]. A perfect octave is the "same" note an octave[37] - 12 half-steps - higher or lower. A **perfect 5th** is 7 half-steps. A **perfect fourth** is 5 half-steps.

**Example 1.2**

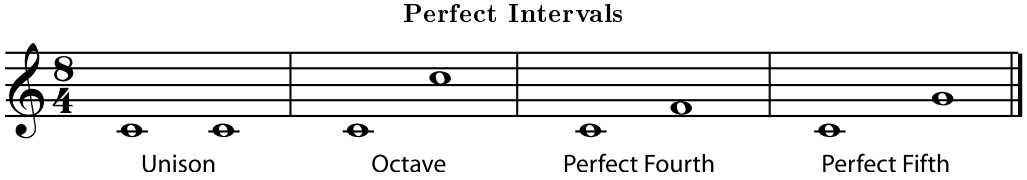


**Figure 1.7**

Listen to the octave[38], perfect fourth[39], and perfect fifth[40].

### 1.3.2 Major and Minor Intervals

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

**Major and Minor Intervals**

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

**Example 1.3**

[35]"Tuning Systems" <http://cnx.org/content/m11639/latest/>
[36]"Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/>
[37]"Octaves and the Major-Minor Tonal System" <http://cnx.org/content/m10862/latest/>
[38]See the file at <http://cnx.org/content/m10867/latest/P8.mp3>
[39]See the file at <http://cnx.org/content/m10867/latest/P4.mp3>
[40]See the file at <http://cnx.org/content/m10867/latest/P5.mp3>

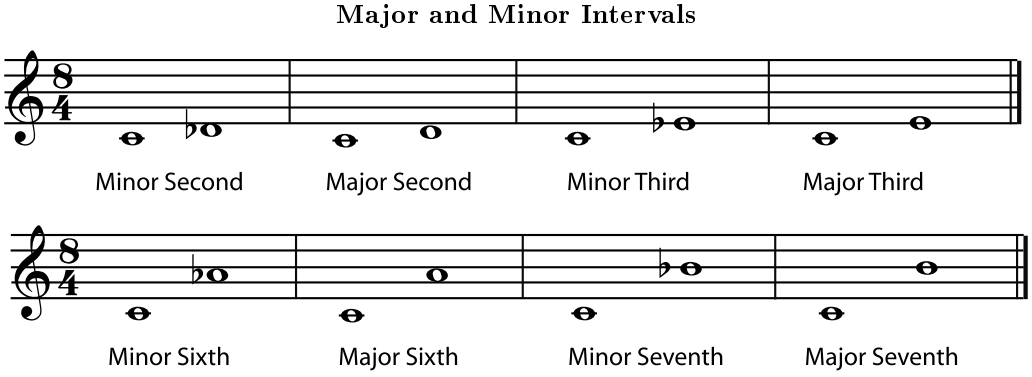


**Figure 1.8**

Listen to the minor second[41], major second[42], minor third[43], major third[44], minor sixth[45], major sixth[46], minor seventh[47], and major seventh[48].

**Exercise 1.3** *(Solution on p. 13.)*

Give the complete name for each interval.

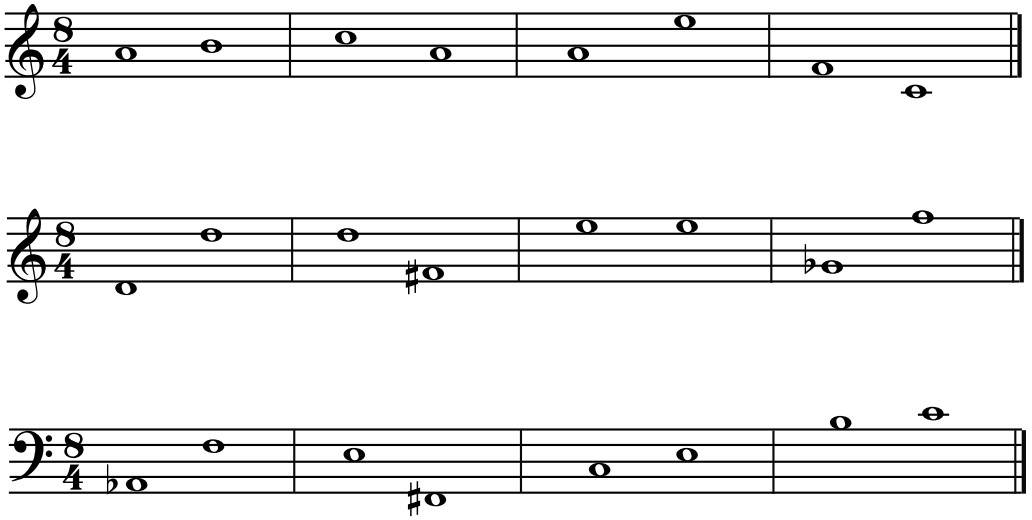

**Figure 1.9**

[41] See the file at <http://cnx.org/content/m10867/latest/min2.mp3>
[42] See the file at <http://cnx.org/content/m10867/latest/M2.mp3>
[43] See the file at <http://cnx.org/content/m10867/latest/min3.mp3>
[44] See the file at <http://cnx.org/content/m10867/latest/M3.mp3>
[45] See the file at <http://cnx.org/content/m10867/latest/min6.mp3>
[46] See the file at <http://cnx.org/content/m10867/latest/M6.mp3>
[47] See the file at <http://cnx.org/content/m10867/latest/min7.mp3>
[48] See the file at <http://cnx.org/content/m10867/latest/M7.mp3>

**Exercise 1.4** *(Solution on p. 14.)*

Fill in the second note of the interval given.

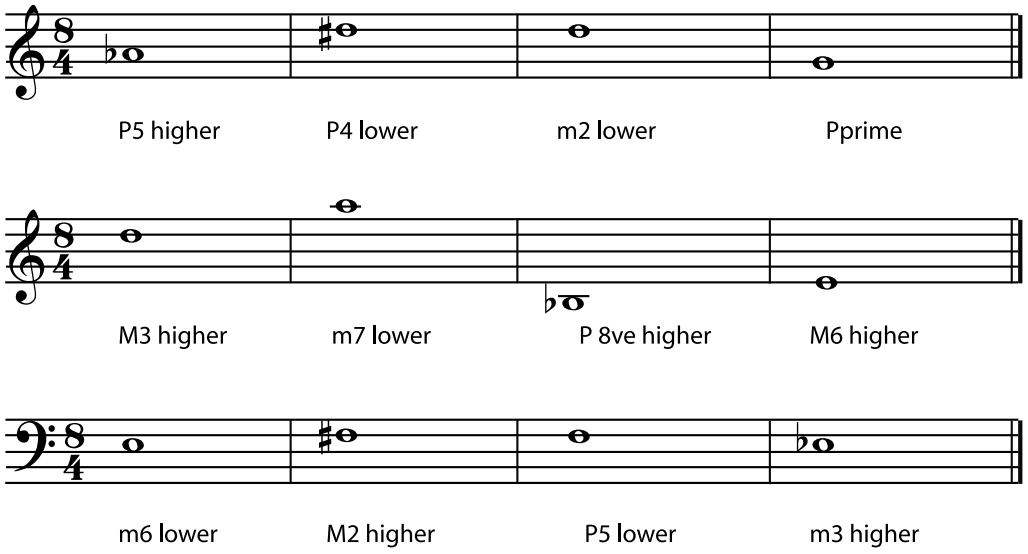


**Figure 1.10**

### 1.3.3 Augmented and Diminished Intervals

If an interval is a half-step larger than a perfect or a major interval, it is called **augmented**. An interval that is a half-step smaller than a perfect or a minor interval is called **diminished**. A double sharp[49] or double flat[50] is sometimes needed to write an augmented or diminished interval correctly. Always remember, though, that it is the actual distance in half steps between the notes that determines the type of interval, not whether the notes are written as natural, sharp, or double-sharp.

**Example 1.4**

[49] "Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/#p0f>
[50] "Pitch: Sharp, Flat, and Natural Notes" <http://cnx.org/content/m10943/latest/#p0f>