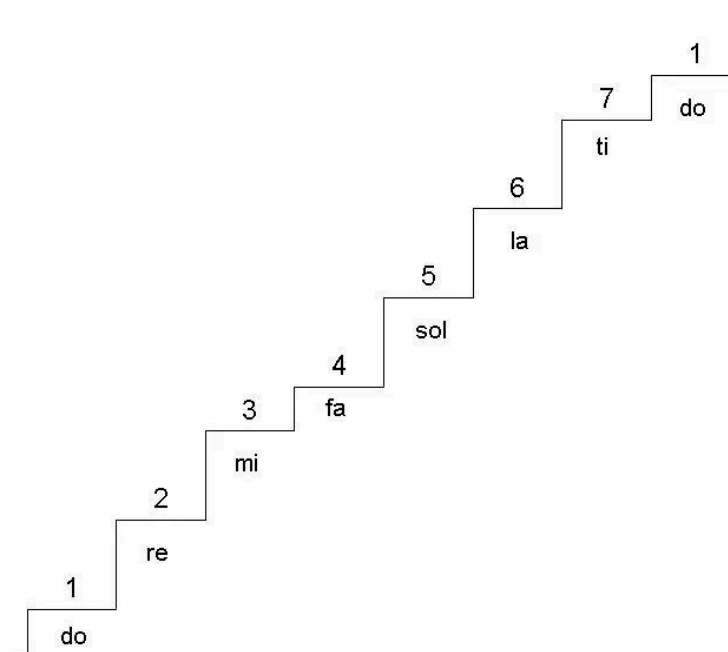


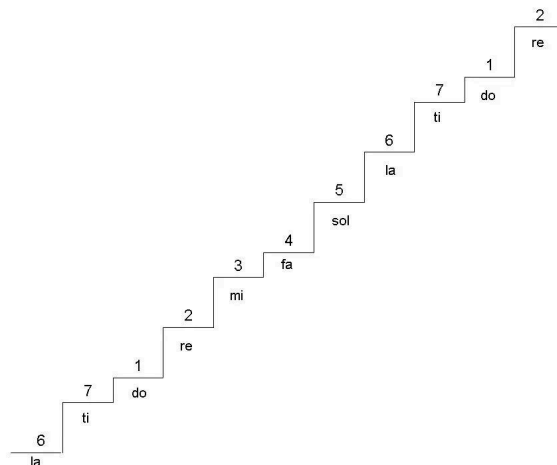
Intervals in scales; major and minor intervals

Intervals in scales

So far, we've learned about intervals only in terms of numbers of steps within the major scale. This initial understanding of intervals as distances between notes in a scale is essential to all understanding of intervals, keys, and chords. It is easiest to count intervals on the piano in C major or A natural minor (all on white keys). For example, the distance from C up to the next G is a 5th. However, we can count intervals in a scale not just on white keys, but on any key. If we are using **solfège**, we can count intervals the same way between solfège syllables. Here are the steps of all major scales in movable-do solfège:

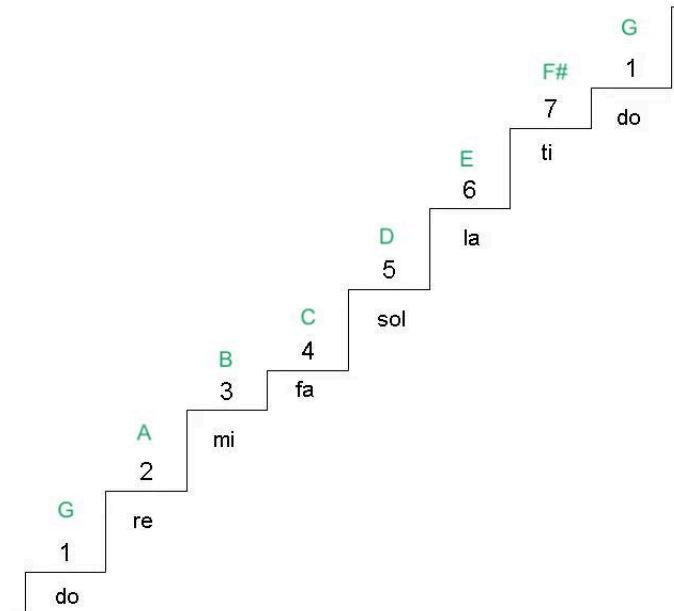


The solfège steps of the scale repeat for every octave, so the staircase can hypothetically go on infinitely, or for the range of the entire piano/instrument/singer's voice:



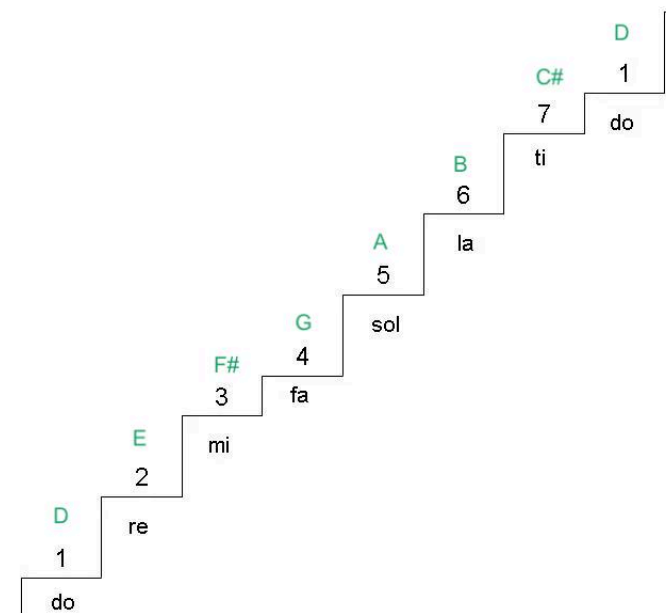
Regardless of what note is **do** (any note can be do), we can say that the interval between **do** and **mi** is a 3rd, the interval between **mi** and **ti** is a 5th, the interval between **ti** and **re** is a 3rd, the interval between **fa** and **re** is a 6th, and so on.

We count intervals in exactly this same way when a note that is not C is do. For instance, in the **key of G major**, we have the following notes:



Therefore, the interval between G and B is a 3rd; the interval between B and F# is a 5th, the interval between F# and A is a 3rd, and so on.

The same can be done with the **D major** scale:



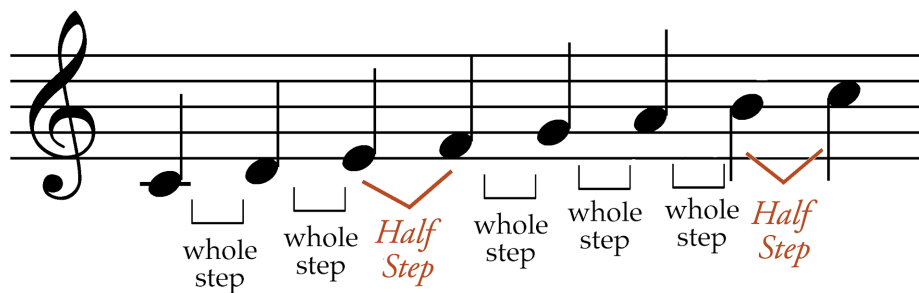
For example, the interval between D and F# is a 3rd; the interval between F# and C# is a 5th, the interval between C# and E is a 3rd, and so on.

This system of counting intervals applies to all keys, regardless of how many sharps or flats they have.

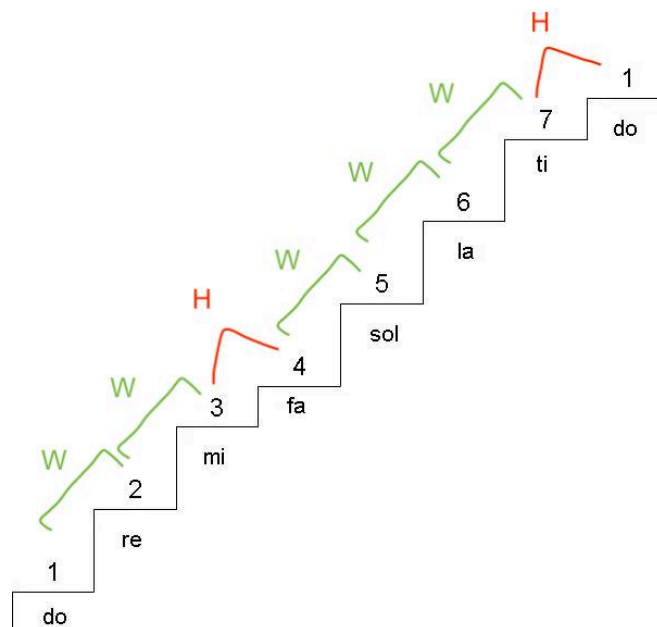
Half steps, whole steps, and interval qualities

Natural (white-key) half and whole steps

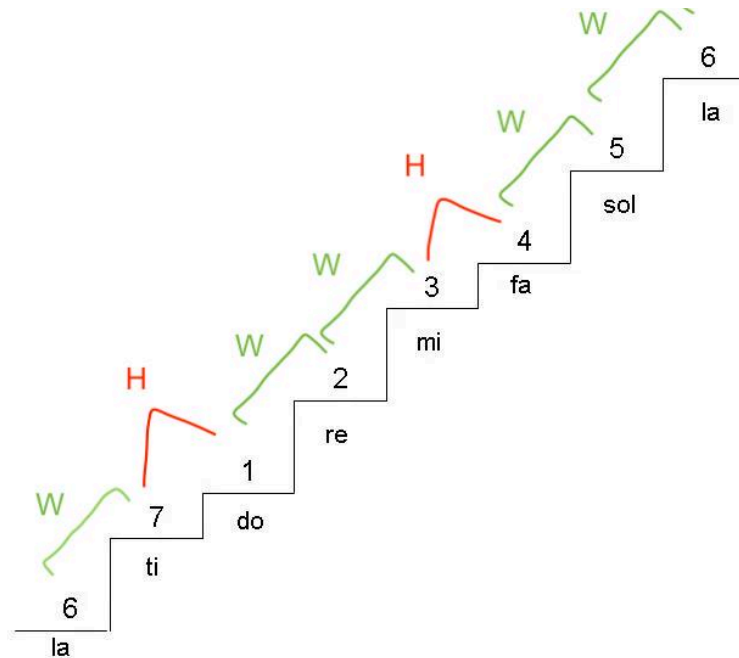
Let's now observe that not all intervals such as 2nds, 3rds, and so on are the same. This is easiest to observe with **half steps** and **whole steps**. Using white keys only, there are two **half steps** in every octave—E to F and B to C. We can observe that in every scale or mode made on white keys only, there are two half steps. These are the white keys that are right next to each other, with no black key in between. Here is the pattern of half steps and whole steps in C major:



This pattern of whole steps and half steps is the same for every major scale. It is what defines a major scale.



Here is the pattern of whole versus half steps that makes a natural minor scale. The natural minor scale is the mode created by starting on **la**, the sixth degree of the scale (^6).



Chromatic (white and black key) intervals and interval quality

It is also possible to make half steps using both white keys and black keys. The interval between any white key and a black key immediately next to it (skipping over no other keys) is a half step, and likewise the interval between any black key and the white key immediately next to it is a half step. A **half step** is defined by being the interval between two notes that have exactly 0 other notes on a piano between them. **Whole steps** are two half steps added together. Most white keys form whole steps with the other white keys immediately neighboring them. The **whole steps** within the octave on white keys are C-D, D-E, F-G, G-A, and A-B. All of these keys have exactly one black key between them. Half steps and whole steps are both 2nds. When referred to as 2nds, half steps are called **minor 2nds**, and whole steps are called **major 2nds**. The term “minor” in an interval name means that it is the smaller interval and has a lesser total number of half steps in it. The term “major” in an interval name means that it is the larger interval and has a greater total number of half steps in it.

The number of half steps in an interval can be used to specify which kind of interval it is, or what the interval’s **quality** is. In the Western musical system, there are four kinds of intervals in an octave that can be **major** or **minor** in **quality**: **2nds**, **3rds**, **6ths**, and **7ths**. 4ths, 5ths, and octaves are called **perfect** intervals for multiple reasons. Firstly, **4ths**, **5ths**, and **octaves** are low intervals in the [harmonic series](#), are easy for adult humans to sing, and therefore sound **consonant**, low-tension, or pleasing to us. Secondly, 4ths and 5ths have no minor or major

variants because of the way that the octave is divided into half steps. A half step less than a **perfect 4th** is a major 3rd; a half step greater than a perfect 4th is something called a **tritone**. Similarly, a half step less than a **perfect 5th** is a tritone; a half step greater than a **perfect 5th** is a minor 6th. A **tritone** gets its name from being generated by three subsequent whole steps such as the white keys F-G-A-B, which is 6 total half steps; tritones can be made starting on any note and going up or down 6 half steps. A tritone can be considered either an **augmented 4th** or a **diminished 5th**, depending upon the context. The note which forms a tritone with **do** in a scale is the exact middle of the octave: try starting on C with both hands, and stepping one half step inward for each beat.



Any interval can technically be augmented or diminished. Augmented intervals are one half step larger than a perfect or major interval; diminished intervals are one half step smaller than a perfect or minor interval. However, most augmented and diminished intervals are not diatonic (formed with the notes in the given key signature), but are rather modifications of scale degrees in that key (e.g. **do** or $\wedge 1$ to **ri** or $\wedge 2$ is an augmented 2nd). The only augmented and diminished intervals that are diatonic are augmented 4ths (e.g. F to B in C major/A minor) or diminished 5ths (B to F in C major/A minor).

We can count the number of **half steps** in an interval to specify what the **quality** of the interval is. For example, let's count the half steps between C and E, a major 3rd:

1. C to C#
2. C# to D
3. D to D#
4. D# to E

There are four half steps between C and E. We can determine that C to E is a major 3rd using two different methods. Firstly, we know that C to E is a major 3rd because it is made by the interval **do** - **mi** or $\wedge 1$ - $\wedge 3$ in C major, and since it is the first 3rd in a major scale, it is a major interval. Secondly, we know that it is a major 3rd because it has 4 half steps rather than 3 half steps, which would be a minor third. When we talk about intervals in terms of numbers of half steps rather than degrees of a scale, we are describing **pitch intervals**. The following page has a table comparing the common way of counting intervals (key intervals) with the system of **pitch intervals**.

Common interval name	Abbreviation	Pitch interval (number of half steps)	Example
Minor 2nd (half step)	m2	1	C to D \flat
Major 2nd (whole step)	M2	2	C to D
Minor 3rd	m3	3	C to E \flat
Major 3rd	M3	4	C to E
Perfect 4th	P4	5	C to F
Augmented 4th or Diminished 5th (tritone)	4 ⁺ 5 [°] (TT)	6	C to F \sharp or C to G \flat
Perfect 5th	P5	7	C to G
Minor 6th	m6	8	C to A \flat
Major 6th	M6	9	C to A
Minor 7th	m7	10	C to B \flat
Major 7th	M7	11	C to B
Perfect octave	P8	12	C to C

This table shows every kind of **pitch interval** within an **octave** in Western music. When we talk about intervals, we'll primarily use the common key interval names and symbols found in the left two columns, e.g. "major third" or "minor sixth". The reason why key-interval names are used most often rather than pitch-interval names is that most music we play is written in a **key** using a specific scale, which means that intervals are typically discussed in relation to what scale degrees form them.