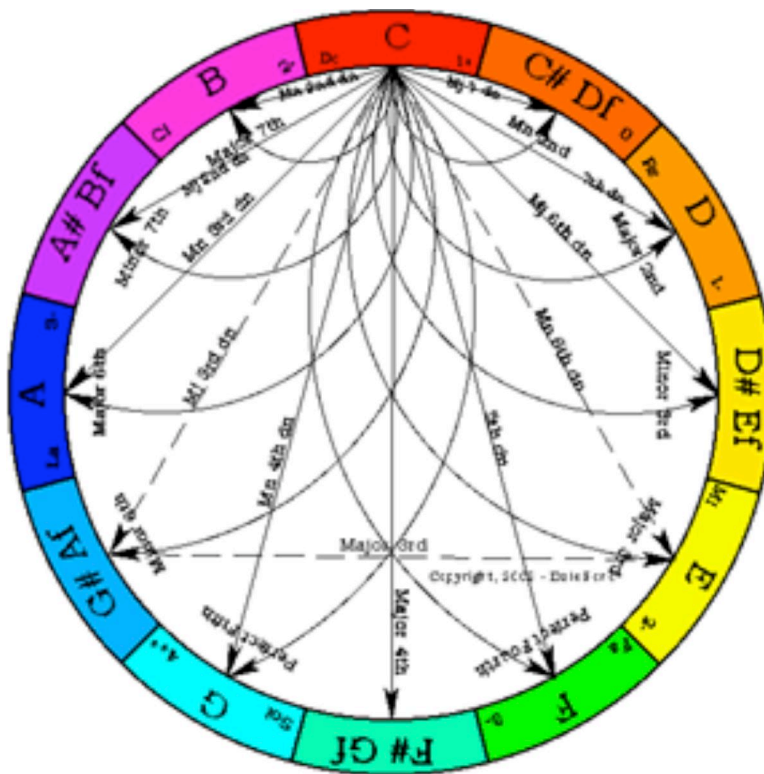


# Musical Interval Calculator



Developed for the non-musician.  
A Handy and Easy Way to Count Musical Intervals

(some assembly required)

# Musical Interval Calculator

by Dale Pond

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To the Reader:

I wish to thank my good and patient friend Luigi Martino for spending countless hours helping me to learn better basics from a practicing musician's perspective.

There are at least two accepted methods of counting musical intervals. Counting notes and counting steps between the notes. I have found both methods to be confusing.

In an effort to rid myself of this confusion I created the following Musical Interval Calculators. Using these calculators eliminates all the confusion of counting because counting has been eliminated. Simply point the pointer to the note being counted from and read off the interval between that note and whatever note desired.

Later I will be adding calculator centers for calculating in more than one octave and quite possibly another to calculate the more obscure intervals.

To use these calculators simply print out the Colored Note Ring preferably onto card stock. Next print out each of the Center Calculators, also on card stock. Cut out the two center calculators. Pin the center of the Center Calculator through the center of the Colored Note Ring and it is ready to go. Switching calculators is a simple matter depending on what you wish to calculate.

Enjoy! Have fun!

In Life, Light and Love,  
Dale Pond

*"For the experience becomes rather as a very delicate instrument of music upon which the chords of life (which is God) are played." Cayce (1436-2)*

*"What, then, is the purpose of the entity's activity in the consciousness of mind, matter, spirit in the present? That it, the entity, may KNOW itself to BE itself and part of the Whole; not the Whole; not the Whole but one WITH the Whole; and thus retaining its individuality, knowing itself to be itself, yet one with the purposes of the First Cause that called it, the entity, into BEING into the awareness, into the consciousness of itself. That is the purpose, that is the cause of BEING." Cayce (826-11)*

# How to Use the Musical Interval Calculator

## Colored Note Ring

This ring contains the twelve chromatic notes of the regular music scale. Print this page out preferably in color and on heavy card stock. The Center Calculators will be pinned to this sheet.

## Center Calculator - Thirds

This Calculator is designed primarily in Thirds and Fifths. Print this page out in black and white. Cut it out with scissors around the periphery. Use a pin or tack to pin it to the center of the Colored Note Ring. The Pointer is where all the lines converge. Place the Pointer on the note counting from and read off the intervals to the target note.

## Center Calculator - Chromatic

This Calculator is designed to work with all regular intervals within an octave. Print this page out in black and white. Cut it out with scissors around the periphery. Use a pin or tack to pin it to the center of the Colored Note Ring. The Pointer is where all the lines converge. Place the Pointer on the note counting from and read off the intervals to the target note. The curved lines are for counting UP while the straight lines are for counting DOWN.

That's it! Happy intervaling!

## A Bit on Intervals

"The distance between any two sounds. In discussing all subjects relating to melody, or to the construction of chords, it is necessary to find names for the various kinds of intervals. Hence, in the earliest treatises on music they are divided into classes. The old axiom that consonance depends on simplicity of ratio naturally led authors to draw a line at the point at which two sounds ceased to be consonant and became dissonant. Among the Greeks, the uni-

son, octave, fifth and fourth were considered more perfect than the third and sixth and other intervals. In medieval treatises an interesting division of intervals into perfect, medium, and imperfect is found; the unison and octave belonged to the first class, the fourth and fifth to the second, the third and sixth to the last. In later works appeared a division which is to this day followed by many writers, namely, into Perfect and Imperfect.

So far, this division seems plain enough. But modern music requires that intervals shall be designated according to their scale value.

Hence a perfect interval when accidentally flattened becomes imperfect and a major interval becomes minor. But the application of the word imperfect to a perfect interval made smaller led to serious confusion, because, an imperfect fifth came as a subdivision of perfect intervals, while imperfect intervals of themselves formed a separate class. To avoid this cross-division, theorists have in the last few years used the name *diminished* for perfect fifths reduced by one semitone. But it is important to note that by this change of a name a new difficulty arises, for diminished has almost by universal consent been applied to certain intervals when made less than minor, for example, C# to Bf is a diminished seventh, C# to B# a major seventh, C# to Bn a minor seventh, C# to Bf one semitone less than minor. The word diminished when applied by these authors to a fourth or fifth signifies that it is reduced from its normal state by one semitone, but the same word "diminished" when applied to a seventh signifies that it is reduced by two semitones. That utter confusion should result from such an undigested system is absolutely inevitable; and it will be found that *professors and teachers of music to this day are unable to talk intelligibly to each other on the simple subject of Intervals*. For many years a system has been taught in Germany which makes the whole matter perfectly plain. It is this:

1) Intervals are reckoned upwards, inclusively, and by the number of notes they contain.

2) Intervals are in their normal state when reckoned from the first note of the major scale. The lowest note of the interval being considered for the time as a tonic.

3) Normal intervals are major. Thus, D to F# is a major third, because F# is the third degree of the scale of D; F to Bf is a major fourth, because Bf is the fourth of the scale of F; B to F# is a major fifth, because F# is the fifth of the scale of B; and so on. In other words, all the intervals of any major scale reckoning up from the tonic respectively are major.

4) Intervals one semitone less than major are minor. Thus, C to Df is a minor second because it is one semitone less than the normal D in the scale of C; B to Fn is a minor fifth because one semitone less than the normal F# in the scale of B; and so on.

5) Intervals one semitone greater than major are augmented. Thus, C to D# is an augmented second, because it is one semitone greater than C to D, the normal interval; C to G# an augmented fifth; and so on.

6) Intervals one semitone less than minor are diminished. Thus, F# to Ef is a diminished seventh; C# to Gf, a diminished fifth; C# to Ef, a diminished third; and so on.

The simplicity of this system is already apparent. The following shows it at a glance:

Tonic	C
Major 2nd	D
Major 3rd	E
Major 4th	F
Major 5th	G
Major 6th	A
Major 7th	B
Major 8th	C

Tonic	C
Minor 2nd	Df
Minor 3rd	Ef
Minor 4th	Ff
Minor 5th	Gf

Minor 6th	Af
Minor 7th	Bf
Minor 8th	Cf

Tonic	C
Augmented 2d	D#
Augmented 3rd	E#
Augmented 4th	F#
Augmented 5th	G#
Augmented 6th	A#
Augmented 7th	B#
Augmented 8th	C#

Tonic	C	or	C#
Diminished 2nd	Dff		Df
Diminished 3rd	Eff		Ef
Diminished 4th	Fff		Ff
Diminished 5th	Gff		Gf
Diminished 6th	Aff		Af
Diminished 7th	Bff		Bf
Diminished 8th	Cff		Cf

It will be seen from this that diminished intervals are produced in two ways - either by making the upper note of a minor interval flatter, or by making the lower note of some interval sharper. Hence it is that some intervals have to be calculated from notes not having a diatonic scale of their own; thus, B# to An. In such cases, the nature of the interval is readily found by temporarily reducing the lower note; thus, Bn to An is a minor seventh, therefore B# to An, being a semitone less than minor, must be a diminished seventh.

The following is the simplest form of stating the rule for naming intervals according to this system:

"When asked the nature of any interval, bear in mind the major scale of the lower note, then, if the upper note is higher by a semitone than it would be in the major scale of the lower note, it is augmented; if the upper note is actually a note of that major scale it is major; if it is less than major by one semitone it is minor; if it is less than minor by one semitone it is diminished. When the lower note is a sharpened note, which has no scale of its own, consider it as one semitone lower, e.g., C## to G# is a minor fifth, because the interval is one semitone less than C# to G#, the normal fifth.

When the lower note is a flattened note, which has no scale of its own, consider it as temporarily raised before determining the nature of the interval, thus Cff to Gf is an augmented fifth, because it is one semitone greater than the normal fifth Cf to Gf."

The only obstacle to the general adoption of this excellent method of tabulating intervals is to be found in the pertinacity with which professors adhere to the expression perfect fifth and perfect fourth, and abhor the term major fifth and major fourth. This absurd prejudice, which arguments drawn from the history and science of music seem to have no power to remove, must be allowed to die of old age. If there is any real distinction between the perfection of a fifth and the imperfection of a third, it might even then be allowed to students to call fourths and fifths majors, on the understanding that they also possessed a remarkable perfection which no other intervals possess.

It has been suggested that intervals should be called, instead of (1) minor, (2) major, and (3) augmented; (1) minor, (2) normal, and (3) major. This would certainly be a better system than any yet devised; but it is to be feared that it would be impossible to disturb the universally accepted meaning of the word major.

Intervals greater than major or normal have been termed (besides augmented) extreme, sharp, superfluous, pluperfect, etc." *A Dictionary of Musical Terms*, Novello, Ewer and Co., London, pre-1900

An interval is a combination of two tones. It is also the distance between or the difference between two tones. When these two tones are sounded together the result is an harmonic interval, and when they are sounded one after the other the result is a melodic interval. The quality of an interval is determined by its size and by the relationship of its position to the keynote.

There are five types of intervals: major (indicated by M), minor (m), perfect (P), diminished (dim.), and augmented (Aug.).

A major interval contracted - by lowering

the upper note or raising the lower note - by one half step becomes minor, and contracted by another half step becomes diminished.

A perfect interval contracted by a half step becomes diminished, and contracted by another half step (not usually practical), becomes doubly diminished.

A perfect or a major interval expanded by a half step becomes augmented." *Basic Principles of Music*, Joseph Brye

## Musical Intervals

INTERVAL	RATIO
Unison	1:1
Pythagorean Komma	81:80
Enharmonic	128:125
Lesser Chromatic Semitone	25:24
Diesis	25:24
Greater Chromatic Semitone	135:128
Minor Diatonic Semitone	17:16
Major Diatonic Semitone	16:15
Limma	16:15
Minor Second	27:25
Smaller Step or Minor Tone	10:9
Greater Step or Major Tone	9:8
Major Second	9:8
Augmented Second	75:64
Minor Third	6:5
Major Third	5:4
Diminished Fourth	32:25
Augmented Third	125:96
Perfect Fourth	4:3
Augmented Fourth	25:18
Tritone	45:32
Diminished Fifth	64:45
Diminished Fifth	36:25
Perfect Fifth	3:2
Augmented Fifth	25:16
Minor Sixth	8:5
Major Sixth	5:3
Augmented Sixth	125:72
Harmonic Seventh	7:4
Dominant or Minor Seventh	16:9
Minor Seventh	9:5
Tonic Seventh	9:5
Major Seventh	15:8
Diminished Octave	48:25
Augmented Seventh	125:64
Octave	2:1
Minor Ninth	32:15
Major Ninth	9:4
Harmonic Minor Tenth	7:31
Minor Tenth	12:5
Major Tenth	5:2
Perfect Eleventh	8:3
Harmonic Eleventh	11:4
Augmented Eleventh	45:16
Perfect Twelfth	3:1
Augmented Twelfth	25:8
Minor Thirteenth	16:5
Harmonic Thirteenth	13:4
Major Thirteenth	10:3
Harmonic Fourteenth	7:2
Dominant Fourteenth	32:9
Tonic Fourteenth	18:5
Major Fourteenth	15:4
Double Octave	4:1

This list contains all the intervals I've found in many old music theory books *that had numeric values*.

There is much license in interval definition. Some authorities give the intervals as so many semitones and tones without an accurate definition as to the relative frequency of either. In this publication we will try to stick with the numerically defined ratios thereby diminishing ambiguities.

The Greek mode intervals have not been included though I may create a calculator for them at a later date.

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*If you learn music, you learn history. If you learn music, you'll learn mathematics. If you learn music, you'll learn almost all there is to learn -- unless something bad!" Cayce (3053-1)*