# BEGINNING HAMMER DULCIMER

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# MUSICAL INTERVALS

***"Nobody ever became a great musician by reading a book. All great musicians got that way by listening to music, playing music, and talking music with fellow musicians."***
***James Galway***

## The Octave, Its Divisions and Pitches

An octave is easily recognized as two tones that sound alike, but one is higher than the other. It is formed when the high tone of a pair of tones is EXACTLY double the frequency of the low tone in the pair. To form an octave above "A" at 440 Hz, we must play "A" at 880 Hz. With middle "C" at 261.6 Hz an octave above is "C "at 523.2 Hz. And so it goes for all tones and their octaves. Double the frequency to move to an octave above. Halve the frequency to move to an octave below. Our ears hear this doubling as producing a higher pitch, but, somehow, the same note. We can have a very low "C" and a very high "C" - different pitches, but the same quality of "*c-ness*".

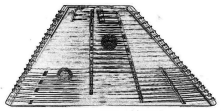
The octave gives us a framework for all other musical tones because, when we traverse the octave only part way we get a different tone – we lose that "c-ness..". How many divisions like this we make in the octave determines how many tones we have to work with in a musical scale. Here's a way to think about all these tones.

Our ears have a frequency range of about 10 octaves.

Western music divides the octave into no finer divisions than 12 equally space tones within an octave.

So, only 120 tones are used in Western music. Only 120. That shouldn't be so hard to deal with, now should it?

All this techno-talk need not confuse you because there are familiar reference points within the audio spectrum. A concert pitch middle "C" has a frequency of 261.6 Hz and the ensemble tunes to "A" at 440 Hz. A full piano keyboard extends from a low "C" at 16.35 Hz through middle "C" at 261.6 Hz to a high "C" at 4,186.01 Hz. A fiddle has a frequency range from about 160 Hz to about 3KHz. Generally, dulcimer music, fiddle tunes, and ballads lie in the two octaves above middle "C" and the one octave below middle "C". That range is roughly 130 Hz to 1,044 Hz. The approximate range of the human voice is from 80 Hz to 1,200 Hz. Male voices generally fall between 82.41 Hz (an "F" for the bass) and 493.88 Hz (a "B" for the tenor). Female voices generally fall between 164.81 Hz (an "E" for the Alto) and 1,174.66 Hz (a "D" for the soprano).



## Guido d'Arezzo

Guido d' Arezzo (circa 990-1050) was a Benedictine monk with a sour attitude and a need to organize things and people. He would be unhappy if you pronounce his name incorrectly, so say: *gweedoh daretzoh*. Guido sometimes is known by his other last name of Aretino. Things were like that before social security came into being.

Brother Guido wrote*: "Temporibus nostris super omnes homines fatui sunt cantores."* Like most Latin phrases, it sounds far better than it translates. In English it goes: "*Singers are the dumbest men of our times.*" The historical record is unclear whether Brother Guido thought them poor in their art or that they spent too much time singing. All we know is that he was sour about singers. He came upon the idea that singers and the brothers who had to write down music would do a better job if the music was written on lines instead of a blank page. Brother Guido invented the musical staff. His version – the first one, mind you – was four lines, not five. Another couple of hundred years passed by before the fifth line came into being.

Not satisfied with his invention of the musical staff, or perhaps just mistrusting of singers and scribes, he went on to create two additional musical tools. The first is solfege: Do Re Me Fa So La Ti Do. Brother Guido invented that. Here's the story. I can't vouch for its historical accuracy, but it is a nice piece of music mythology.

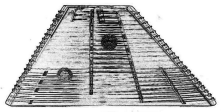
Brother Guido composed *Hymn to St. John, Ut Queant Laxis*. He noticed that the first six lines of the hymn started with a tone that was progressively one step above the starting tone of the previous line. It came to him that the first syllable of each line could be used as a memory aid for the tone associated with it. The first six syllables were: *Ut Re Me Fa Sol La*. In Guido's day, the scale was hexatonal and this is all they needed. Over the years, the *Ut* was replaced by the French *Do*, and *Ti* worked its way in to support the diatonic scale.

The second innovation of Brother Guido was musical sign language. It is a series of hand signals meant to recall each of the tones of the scale. In his honor it's known as the Guidonian Hand. You don't see much of the Guidonian Hand these days.

## Musical Intervals

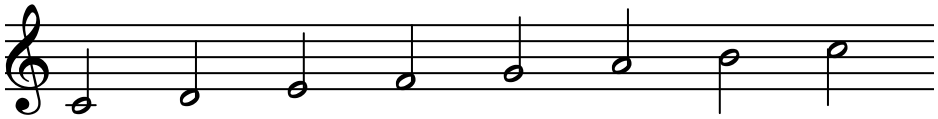
The frequency difference between two tones is called an interval. It's really tedious to talk about the difference between, say, G and D. Too many words. So, over the years, shorthand has developed to describe these intervals.

There are two ways by which musicians name musical intervals. The traditional way is called ***solfeggio***. Musicians simply call it solfege. It's the very familiar DO RE ME FA SO LA TI DO scale from Brother Guido. The great value of solfege is as a memory aid. When someone trained in solfege is told that the interval between two musical tones is, for example, LA, there is no doubt as to what is meant. It's also easy to sing these monosyllable sounds. Outside of the United States, the convention is that DO is always the tone middle C or the key of C. But solfege syallables are really hard to add and subtract and use in other kinds of analytical work. So a more modern way of naming intervals has developed.



Today, it has become customary to identify the tones in a scale in reference to the DO tone of the scale by using numbers. This convention is an essential part of any musician's language. The chart on the next page shows how both solfege and numerical intervals work on a "C" scale.

Here's how the intervals of one octave look on staff paper:



| Unison | Major | Major | Perfect | Perfect | Major | Major | Octave |
|---|---|---|---|---|---|---|---|
| Root | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th |

***Remember:***

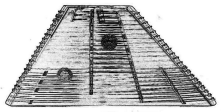
A musical interval describes the distance between two tones

Intervals are named by assuming the first tone begins a scale

## THE DIATONIC SCALE

| Tone | Scale Pattern | Solfege | Interval | Description |
|---|---|---|---|---|
| C | | DO | 1st | fundamental, root, unison |
| | W | | | |
| D | | RE | 2nd | major second |
| | W | | | |
| E | | ME | 3rd | major third |
| | H | | | |
| F | | FA | 4th | perfect fourth |
| | W | | | |
| G | | SO | 5th | perfect fifth |
| | W | | | |
| A | | LA | 6th | major sixth |
| | W | | | |
| B | | TI | 7th | major seventh |
| | H | | | |
| C | | DO | 8th | octave |

The "**W**" refers to a whole step between tones.
The "**H**" refers to a half step between tones.

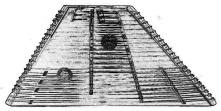


This is all very abstract. For most of us, it's hard to look at a number and hear a tone. Here is a chart that draws upon your musical memory to establish the sound of these numbers.

## SONG COMPANIONS TO THE INTERVALS

| Interval | Song Companion |
|---|---|
| **Unison** | ***Go Tell Aunt Rho - dy***<br>**ME ME RE DO DO** |
| **Major 2nd**<br>***DO to RE*** | ***I - rene Good Night***<br>**DO RE DO TI** |
| **Major 3rd**<br>***DO to ME*** | ***M - chael row the boat a - shore***<br>**DO ME SO SO SO LA SO** |
| **Perfect 4th**<br>***DO to FA*** | ***Here comes the bride***<br>**DO FA FA FA**<br>***This interval often begins a phrase. It sounds to the ear as a perfect 4th, but to remain in the key of the piece and be technically correct, the interval is an inverted 5th.*** |
| **Perfect 5th**<br>***DO to So*** | **Chorus from *Dark As a Dungeon***<br>***Where it's dark as a dung – eon***<br>***DO DO SO SO SO ME DO*** |
| ***DO to LA***<br>**Major 6th** | **Chorus from *The Sloop John B***<br>***We come on the sloop John B***<br>**DO LA LA LA LA**<br>***Just like the perfect 4th interval, this one Is a bit tricky. The interval between "we come" is a major 6th only if we ignore the the key of the music and the entire tune. Technically the interval is So to ME with Do lying between them.*** |
| ***DO to TI***<br>**Major 7th** | ***Beau - ti -* ful Dream - er**<br>**DO TI DO SO ME** |
| **Octave**<br>***DO to DO'*** | ***Some – where o - ver the Rain - bow***<br>**DO DO' TI SO LA TI DO** |

Western music also divides the octave into twelve degrees. That means between most of the diatonic intervals, there is a half interval as well. The names of these intervals are determined



based upon which tone of the diatonic scale has been altered up or down to reach the interval. It works like this.

If you lower, a 2nd, 3rd, 6th or 7th interval by a half tone . . . .

*it becomes a* ***minor 2nd, minor 3rd, minor 6th or minor 7th***.

If you lower a perfect 4th or perfect 5th by a half tone . . . .

*it becomes a* ***diminished 4th or diminished 5th***.

If you raise a perfect 4th or perfect 5th a half tone . . . .

*it becomes an* ***augmented 4th or augmented 5th***.

These changes to the diatonic scale looks like this on the staff:

| Unison Root | Minor 2nd | Minor 3rd | Dimnished 4th | Augmented 4th | Diminished 5th | Augmented 5th | Minor 6th | Minor 7th | Octave 8th |
|---|---|---|---|---|---|---|---|---|---|

Notice that a diminished 5th and augmented 4th are the same tone. That's also true for an augmented 5th and a minor 6th. When one tone carries two names, we say that the names are "*enharmonic*".

Take a good listen to the diminished 5th and augmented 4th. This one sound has two names. The interval has a special place on the scale. It's right in the middle of the octave. Six intervals are ahead of this interval in the diatonic scale and six follow it. You will also hear that this is an interval with great tension in its sound. It has a special name and that's "*tritone*." It has been ascribed all sorts of sinister powers. The old church fathers called it "*Diablo en musica*." That translates to "*the devil in music*". They forbade its use in church music. It is a powerful interval and effective when used sparingly. The tritone is very useful in creating harmonic tension in music.