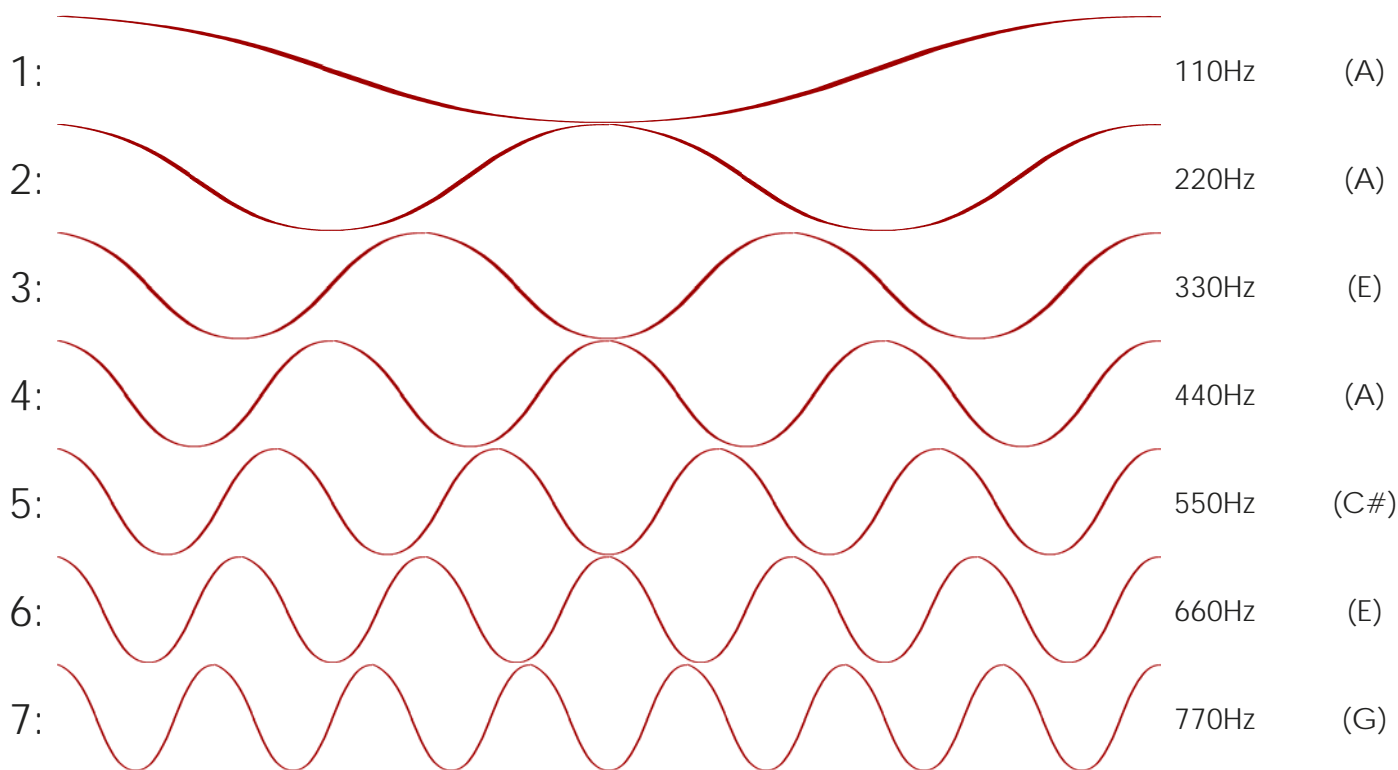


## Overtones and Fundamentals

When you think you're hearing a single note, you're usually hearing several notes.



When we strike a string (such as on the piano or guitar), it vibrates from one end to the other, creating a wave, and we hear the note the wave creates. That note is called a "fundamental." The shorter and/or faster the wave, the higher the note.

For example, any string vibrating at a speed of 440 waves (cycles) per second creates the same sound as the "A" above middle C. (That's why the note is known as "A 440".)

However, every string that vibrates from end-to-end also vibrates from the middle to the end. In other words, there is a wave that takes up the whole string but there is another wave at the same time that only takes up half the string, so it can have two full waves on the same string. It may not be a surprise, then that the string is also vibrating with three full waves on the same string...and four...and five...and six...and seven...

These additional, shorter waves (called "overtones") do, in fact, make a sound, but they are usually over powered by the original, largest, lowest-sounding wave. Below is an example of the different waves happening at the same time on the same string playing a low "A".