

SCIENCE BACKGROUND – SOUND 5.2



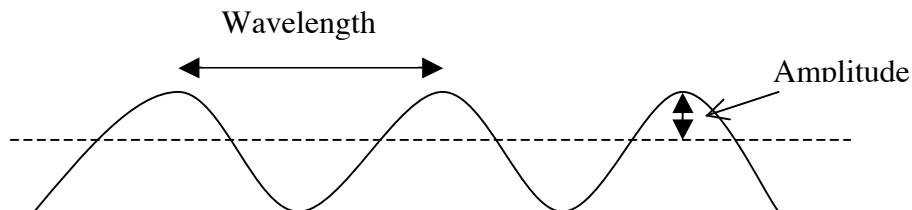
Some starters...

- Any sound that you hear is a disturbance of molecules that reaches your ear, vibrates your eardrum and stimulates nerves that tell your brain there's a noise.
- When we shout, we vibrate the molecules harder than when we whisper and the noise is louder.
- Pitch, (high or low sound) is caused by the speed at which the sound maker vibrates. On a guitar, a fat string vibrates more slowly than a thin one, so its pitch is lower than that of the thin string.
- Resonance is a term that refers to the natural speed at which an object vibrates. We've all been in a room in which if we hummed a certain note, the room would seem to echo more or vibrate with our sound. This is especially easy to do in a tiled room, like a restroom. (Try it!)

More Technical Stuff

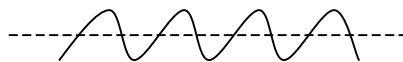
Sound travels in a wave pattern. Imagine a still puddle or pool. If you touch the water, you send ripples in all directions. These are little waves and this is a good model of how sound works. When we speak, we make waves in the air or other molecules around us.

Here's a model of a wave:



Now let's make some sense out of this. Each wave has a cycle. Beginning at one point and ending at that same position. The length of the wave is called.., the **wavelength**. If you look at the diagram, the distance from the top to the next top is the wavelength.

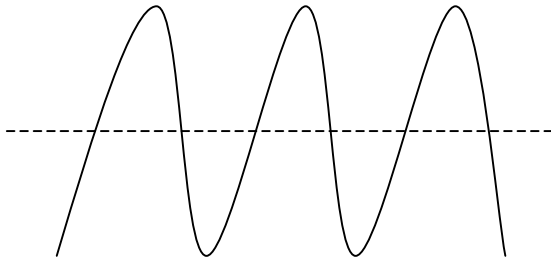
Sound travels at a certain speed. If we made the wavelengths shorter they would vibrate molecules faster and make a higher pitched sound. A whistle vibrates very fast and makes short wavelengths. Take a look:



The rate at which waves hit an object is known as **frequency**. The shorter the wavelength, the more waves hit per second and the higher the frequency. You can think of it like this: How *frequently* do the waves hit. If they hit very often in a short time, they hit with a high **frequency**.

Amplitude

The volume of a sound comes from its amplitude. Things that vibrate the air very hard, like a firecracker, have a large amplitude. Here's what that might look like:



Some other cool things about sound

- Sound needs molecules to travel. In space, where there are no molecules, there is no sound.
- Sound travels best through materials that have molecules that are close together. If you put your ear to a door or to a wall, you can hear sounds from the next room better than you can through the air of the room. This explains why a stethoscope or a string and cup telephone can work.
- Sound waves bounce off objects (and vibrate them too). If we yell at a brick wall, some of the sound wave bounces back to us – this is an echo.
- Some animals have much more sensitive ears than we do. Bats, dogs, whales and elephants have incredible hearing ranges many times as wide as our own. They can hear much higher pitches and much lower pitches. Those same pitches vibrate our eardrums, but our brains don't process those frequencies, so we don't "hear" the sounds.