

# Sound Science

## Raccoon Creek Explorers Activity #24

### Supplies:

- A few pieces of metal silverware.  
(Try to find a couple spoons and forks in different sizes).
- A 3ft piece of string or yarn
- A ruler, stick or spoon to strike the silverware with ( if you have help from a friend!), or a handy table, counter or chair you can gently strike the silverware against

### Vocabulary:

Amplitude - the strength of a sound wave, which is perceived as volume or loudness

Decibel - the unite used to measure volume.

Frequency - the number of completed wave cycles per second.

Pitch - how high or low a note or sound is. Pitch is determined by the frequency of the sound wave.

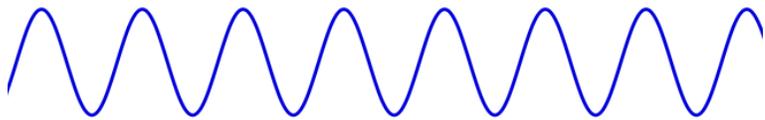
Sound Wave - the pattern of disturbance caused by energy traveling through a medium

Wavelength - the distance between two crests (high points) of a wave

#### Low frequency



#### Medium frequency



#### High frequency



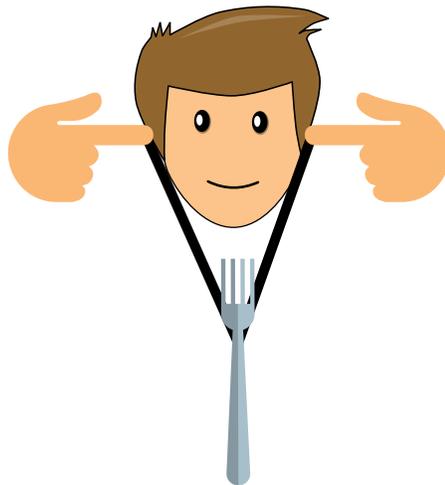
### Background:

Have you ever wondered what makes a sound? Well, plenty of things make sounds, but what exactly is sound? Sound is a kind of energy made by objects vibrating. These vibrations travel through the air, or through other mediums like water or solid things, in the form of waves. When vibrations are slow, it creates a low sound, when vibrations are fast, it creates a high pitched sound. The stronger the sound waves, the louder the sound. We measure volume with decibels. A whisper is around 30 decibels, while a jet engine is around 120!



## Let's Get Started:

- 1.) Find the middle of your piece of string or yarn and tie the piece of silverware there.
- 2.) Wrap the ends of the yarn around your index fingers and place them against your ears. Don't put your fingers in your ear to plug them, just place them gently against the opening. ( Instead of wrapping the yarn, you can also hold it over the end of your finger and place it between your finger and your ear).
- 3.) Bend slightly so the silverware is hanging loose and not touching anything.
- 4.) Have a friend or other helper tap the silverware with something hard, like a stick or ruler. If you are doing the experiment alone, you can gently swing and tap the silverware against a table or chair.
- 5.) Done correctly, you should hear a bell-like chime. Different sizes and shapes of silverware will have different sounds, so try out some different kinds! You'll notice that only the person holding the yarn to their ears can hear the chime, everyone else will hear a dull tap.



## Reflect:

Why is the sound different when you hold the yarn to your ear versus when you simply listen without the yarn?

Have you noticed anything else that affects the sound?

Does changing what you use to strike the silverware or changing how hard or soft you hit it make a difference?

**Apply:**

Can you think of any example in daily life where you encounter sound waves? Hearing aids, speakers and musical instruments all work by producing specific sound vibrations.

**Wrap-Up:**

Hearing people can detect sound waves through the sense we call 'hearing' when others speak, or when something makes a noise. Sound waves travel through the air into the ear, where they stimulate the ear drum, a thin piece of tissue stretched tight across the ear canal. As sound waves interact with the eardrum, it causes vibrations in the small bones in the inner ear. Vibrations in these bones send signals to the brain which are interpreted as sound.

However, people who are hearing impaired (as well as hearing people) can often feel the vibrations of sounds even if they can't hear them. Have you ever stood next to a really loud speaker playing bass, or perhaps the drum section of a marching band, and you could feel the sound in your chest or stomach? That's sound vibration! You can even 'see' sound waves by watching a speaker playing bass. You'll notice it moving and vibrating at different speeds depending on the sound it's playing.

