Curiosity Guide #805
Speed of Sound

Accompanies Curious Crew, Season 8, Episode 5 (#805)

String Sound

Investigation #2

Description

Do you like your sounds loud or soft? What affects the volume of a sound? Find out!

Materials

- 1 meter of fine silk thread
- Tuning fork
- Striking hammer
- Funnel with attached eye on the lip if possible
- Scissors
- Measuring tape
- Tape

Procedure

1) Strike the tuning fork with a hammer. Then hold the tuning fork an arm's length away. What do you notice?
2) Measure and cut a thread one meter in length.
3) Insert one end of the thread through the narrow end of the funnel, pull the thread partway through, and tie a tight knot around the eye of the funnel. If there is no eye, tape the thread to the outside of the funnel.
4) Pull the string taut through the narrow end of the funnel and tie the other end of the string tightly around the base of the tuning fork.

5) Strike the tuning fork with a hammer again, but this time let the tuning fork hang down and suspended by the funnel. Then place the funnel over your ear. What do you notice?

My Results

Explanation

At first, the struck tuning fork was very difficult to hear when the tuning fork was vibrating in the air. However, when the tuning fork was hanging, the sound was not only clearer, but also louder. This is an example of how sound can travel more efficiently through a solid compared to simply traveling through the air. Striking the tuning fork causes a vibration that oscillates, or wiggles back and forth, causing nearby particles to also vibrate. The vibration transfers the energy from particle to particle. If the particles are closer together, like in a solid such as the funnel, they bump into each other much more quickly than if the particles are further apart, like in a gas such as the air.

Elastic Properties: The stronger the bonds between particles, the more the objects keep their shape, so the particles vibrate and return to their shape more quickly. This is referred to as the elastic properties of an object. Solids have higher elastic properties than liquids or gases, and different solids have different elastic properties. Generally, the higher the elastic properties, the faster sound can travel through the object.

Imagine this. We are surrounded by many different sounds: the birds singing in the trees, the neighbor's lawn mower, and especially the TV we're watching. Each sound is a vibration that starts with a disturbance. The vibration transfers energy in waves through particles of matter that we interpret as sound. The particles bump into each other and transfer that pressure wave over distance. The speed the sound travels is affected by the material's elasticity, what state of matter the material is, its density, and even its temperature. Sounds interesting!

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