

Sound and Vibration

What is sound?

- Sound is caused by vibration.
- Vibration is a kind of motion. It is a fast back-and-forth motion.
- Objects that vibrate make sound. Sound always comes from a sound source that is vibrating.
- When the vibration stops, the sound stops.

How can objects be made to vibrate?

- Plucking (pluck rubber band)
- Hitting (strike xylophone)
- Blowing (blow whistle)
- Talking/singing/whistling is a special kind of blowing through our mouth.
- Hum and put your hand on your throat. What you feel is your vocal cords vibrating creating sound.

How does sound get around?

- When an object vibrates, it moves the air next to it. Air is made up of tiny molecules so small we can't see them without microscopes.
- Sound moves by these molecules bumping into each other. (Like kids only smaller.)
- Sound bounces off walls and other objects and keeps going until it runs out of energy. (echo, echo, echo, echo, echo)
- Sound moves in waves like when you throw a rock into a pond and the waves ripple out from the rock in all directions. (Use a Slinky with a student to demonstrate.)
- Waves come in all different sizes and shapes. This affects how loud and what kind of sound we hear.

How do we hear sound?

- Our ear is specially designed to hear sound through air.
- Our outer ear helps direct sound waves into our inner ear.
- Our ear drum vibrates, causing electrical impulses to be sent to our brain which we interpret as sound.

How fast does sound move?

- Sound through air moves at 741 mph. That's about one mile every five seconds. (How fast can you go?)
- You see lightning, and then hear thunder. You can tell how far away it is by counting the seconds between seeing it and hearing it.
- Sound moves through water about 4.5 times faster (3335 mph). Have you ever talked under water?
- There is no air in space, so there is no sound. Movies just add that for fun.
- Sound can move through solid objects. Native Americans put their ears to the ground to listen for approaching horses.

What makes sound quiet or loud?

- Volume is the word used to describe how loud or soft a sound is.
- The more energy put into a sound, the more vibrations are created. More vibrations will make the sound louder and go farther.
- In a sound wave, the taller the wave the louder the sound. We use the word “amplitude” to describe how tall a wave is. (Use a Slinky with a student to demonstrate).

What makes a sound low or high?

- Pitch is the word used to describe whether a sound is high or low.
- Frequency = pitch. Frequency is how often or frequent a sound wave moves up and down.
- The more frequent a wave moves up and down, the higher the pitch. (Slinky one more time!)

Length and Pitch

- The faster the vibration, the higher the pitch.
(faster = higher, slower = lower)
- Length changes speed of vibration. Short objects vibrate faster than long objects.
(short = higher, long = lower)
- Size changes speed, too.
(small = higher, big = lower)

Recorded Sounds

- Microphones can record sounds.
- Sounds can be turned digital by converting them into electrical pulses.
- A sound can be played back using speakers, and made louder using an amplifier.
- Computers can be used to change sounds. For example, you can change the pitch of a recording to be lower or higher.

Music

- Combining sounds together, we can make music!
- Time to... dance!