

Grade 6 Science Test

Hear & Sound

Sound- is a transfer of energy from vibrating objects that travel through the air or other medium.

Vibrations – are called sound waves.

The reason we hear sound is because particles vibrate.

What are 2 types of waves? Transverse waves, Longitudinal waves

Transverse waves - are waves where the vibrations of the particles are PERPENDICULAR (right angles) to the direction the wave travels.

moving up and down with crest and troughs. **Light travels** through these types of waves.

Longitudinal waves are waves where the vibrations of the particles are PARALLEL to the direction the wave travels. **Sound** travels through these types of waves with compression and expansions of the particles.

Sound waves are compression waves. They are **also called longitudinal waves** because the air vibrates along the same direction as the wave travels.

Sound waves will lose energy as they travel which is why if you are **too far away from something**, you cannot hear it since the sound waves have lost energy and are **no longer bumping the particles around them.**

Sound waves can bend, this is called diffraction. (Why you can hear noises around corners)

Oscilloscope- is a device that shows sound waves on a screen. They record them vertically so its easier to see but remember that sound is longitudinal.

Sound waves can have different **amplitudes** or loudness. The waves can be big or small. **Big sound waves are louder and have higher amplitudes.** **Small waves are softer and have a low amplitude.**

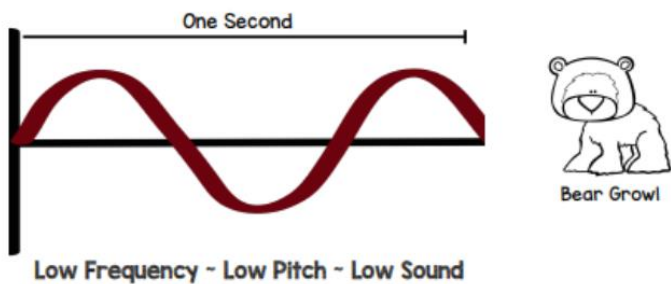
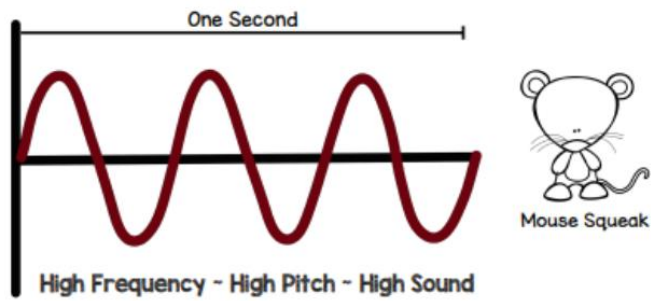
If you increase amplitude you make it louder
(Ex. Turn up volume)

If you decrease amplitude you make it softer
(Ex. Turn down volume)

Frequency - is the number of waves produces in one second.

It is the vibration or the pitch of sound- Measured in hertz (Hz)

Ex) 20 Hz means 20 waves pass in 1 second



The auditory system consists of 2 parts:

- 1) Ears
- 2) Brain

Pinna - is located on the outside of your head (outer ear) . It is what we see as the ear.

Ear Canal – short tube that direct sound to the eardrum.

Eardrum- a thin membrane that vibrates in response to sound.

Ossicles – Are 3 bones found in the middle ear.

(Direction sound travels Malleus → Incus → Stapes)

Cochlea – the inner ear, Shaped like a snail.

Auditory Nerve - Sends electrical signals to the brain.

Hearing Loss

1) Conductive hearing loss - means that the vibrations are not passing through from the outer ear to the inner ear, specifically the cochlea.

Some reasons may be build-up of earwax , an ear infection with fluid buildup, defective eardrum

2) Sensorineural hearing loss -is caused by the damage to the hairs in the cochlea, or damage to auditory nerve, or brain damage.

As humans grow older, hair cells lose some of their function, and hearing deteriorates.

Long-term exposure to loud noises, especially high-frequency sounds, is another common reason for hair cell damage.

As humans grow older, hair cells lose some of their function and cause hearing troubles.

Long-term exposure to loud noises, especially high-frequency sounds, is another common reason for hair cell damage.

Hearing loss can affect speech ability depending on when it occurs.

Vestibular- Means good balance

Example) As a child wobbles on one leg to get dressed, their vestibular system detects head movements, sending signals to the brain, which after processing, sends signals to the body, telling it how to respond & stay balanced.

Sounds needs to travel through a medium/substance of solid, liquid or gas. This is why there is no sound in space.

Sound in GAS

In gas particles, the particles are far apart from each other, and they flow freely around filling up the space of the room or container.

When there is a vibration in the air, the particles must travel farther to bump into the next particle and start it to vibrate. It doesn't take much to start a wave in gas, but it doesn't travel as fast and it loses energy after a certain distance too.

Sound in Liquid

In liquids, the particles are closer together than in air. Liquids can flow and they transfer the vibrations quickly from one particle to the next. Sound can travel four times faster in liquid than it can in air, but it takes more energy (louder sound) to start the vibration.

Sound In Solids

In a solid, the particles are packed tightly together and a solid does not change its shape.

Sound wave travels faster in a solid than in air as the particles don't have to travel very far before they bump in to the next particle and get it vibrating.

You need more energy to start the vibration at the beginning but then it travels even faster.

Sound waves travelling through a solid are 13 times faster than when they travel through air.

Measuring Sound

Decibels - a measure of how loud a sound is.

Damage to the eardrum depends on 2 factors:

1) How loud the sound is

2) How long we are around the sound.

Sounds greater than 85 decibels can lead to damage.

(Take 8 hours of listening to the sound)

Sounds 140 decibels can cause instant damage.

(Recall 20 Hz - 20 000 Hz is audible range for humans)

Ultra Sonic – Greater than 20 000 Hz (Dog whistle)

Infrasonic – below 20 Hz

Natural causes of infrasonic waves can be from: earthquakes, volcanos, icebergs or avalanches.