SUBJECT:
UNIT: Year 8: Sound waves

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While you were away.

Lesson one: Waves

1. How do sound waves travel?
2. What type of wave is a sound wave?

Lesson Two: Sound waves

1. What causes sound?
2. What type of material does a sound travel fastest in?

Lesson three: Speed of sound

1. What is diffuse reflection?
2. What is specular reflection?

Lesson Four: Amplitude and loudness

1. Define loudness?
2. How can you find the amplitude of a wave?

Lesson Five: Auditory ranges and frequency

1. Define frequency
2. What would the pitch be if the frequency was high?

Lesson Six: The ear and hearing

1. What vibrates in the ear?
2. What is the range of human hearing?

Lesson seven: Ultrasound

1. What is ultrasound?
2. When are ultrasounds used?

SUBJECT: Science

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Key Vocabulary

Sound
A form of energy that travels in a wave from a source.
Oscillation
A vibration of particles.
Echolocation
How some animal detect prey by emitting a high frequency sound wave and detecting when it is reflected.
Pitch
How high or low a sound is.
Loudness
How loud or quiet a sound is.
Amplitude
The distance between the mid-point of the wave and the peak.
Frequency
How many waves pass a singular point in one second.
Ultrasound
High frequency sound waves

Sound waves

Sound waves travel in straight lines and transfer energy. They are longitudinal waves

Travelling Sound

Sound is produced by oscillations and requires a medium (solid, liquid, gas) to travel through to a detector. Sounds travel fastest through solids as the particles are the closest together.

Reflection

When sounds reflect off an object they create an echo. The distance to the object can be calculated by using the equation speed = distance/ time. Some animals such as bats and beluga whales use this as echolocation to find prey.

Hearing Sounds

Humans detect sounds using their ears. The sound wave enters through the pinna (the external part of the ear) and travels to the ear drum which vibrates. This vibration is passed through the ossicles (small bones) and to the cochlea which amplifies the sound. This then passes to the auditory nerve which turns the vibration into an electrical signal and transmits this to the brain.
The range of human hearing is 20Hz to 20kHz.
Other animals have different ranges in hearing and can hear sounds that are undetectable to humans.

Ultrasound

Ultrasounds are high frequency sound waves that are undetectable by human ears. Ultrasounds are used by some animals for echolocation. However, humans also use ultrasounds to look at foetuses in utero, as well as cleaning equipment. Ultrasounds are used in medical imaging to create composite images, when the wave meets the boundary between two different materials the wave partially reflects. These reflections are then detected and an image can be created.

Ambitious Vocabulary

Longitudinal
Frequency Amplitude
Oscillation

Speed of Sound

The speed of sound in air is 330m/s. Sound travels faster or slower in different materials but using this value we can calculate distances to objects using process such as sonar.

Pitch and Loudness

Pitch

The pitch of a sound describes how high or low the sound is. This is related to the frequency of the sound wave. The frequency of a wave is defined as the number of waves passing a singular point in 1 second. The more waves passing, the higher the frequency. When the frequency is higher, the sound is high pitched. When the frequency is lower, the sound is low pitched.

Loudness

The loudness of a sound describes how loud or quiet a sound it.
This is related to the amplitude of the sound wave. The amplitude is defined as the distance from the mid-point of the wave to the peak of the wave, When the amplitude is larger, the sound is louder. When the amplitude is smaller, the sound is quieter.

Calculating the speed of sound

By creating a sound in front of an object such as a wall to create an echo we can calculate the speed of sound. By timing how long it takes the echo to return we can then use the distance to and from the wall and the equation speed = distance/time to find the speed of a sound.