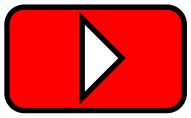
Science

Year 6

Sound Reflection and Absorption

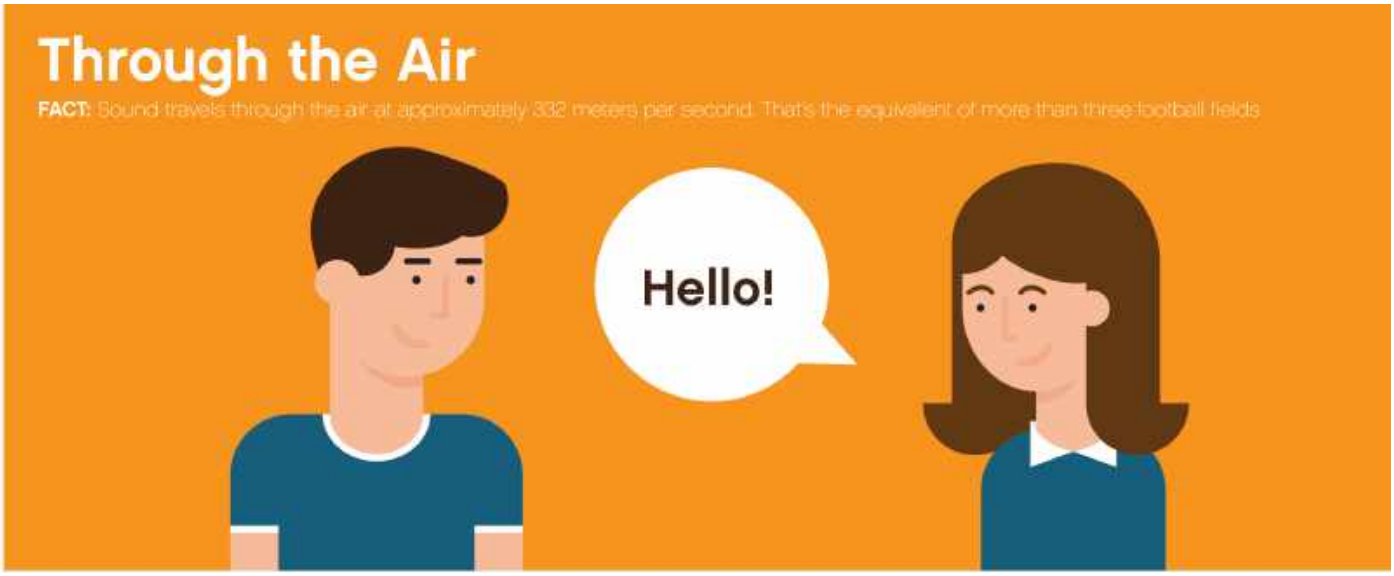



Instructions: These notes contain links to videos, tasks, experiments and interactive questions. When pressing these buttons a new browser window is launched with new contents. When ready close the web browser and continue where you left.



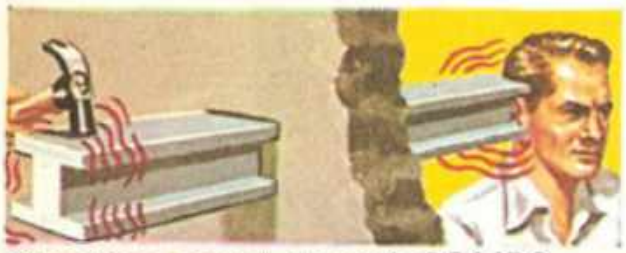

Sound Absorption and reflection

Sound can travel through different materials. It can travel through solids, liquids and gasses. Sound can travel faster in solids and liquids than in air.



Vibrations travel through LIQUIDS

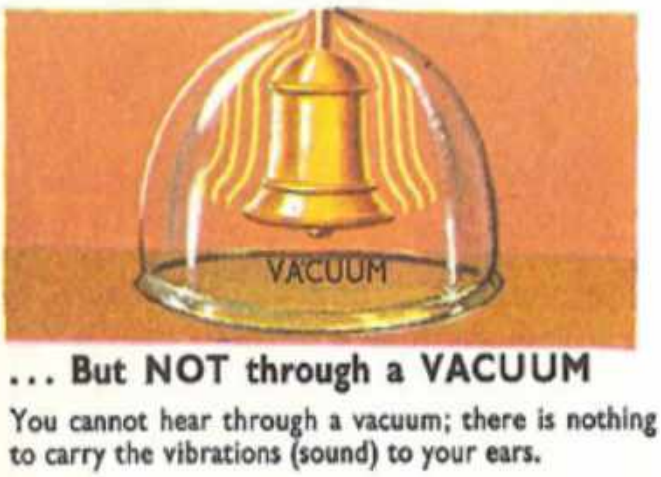
A liquid also transmits vibrations, making it possible to hear underwater, for instance.



Vibrations travel through SOLIDS

You can hear through a solid because it too transmits vibrations.

Sounds cannot travel if there is no medium (material). For example there are no sounds in space (there is a vacuum).



Questions Click button to answer a question about the speed of sound.

Click button to watch video about sound in space.

Click button to watch interactive video of an explosion in space.

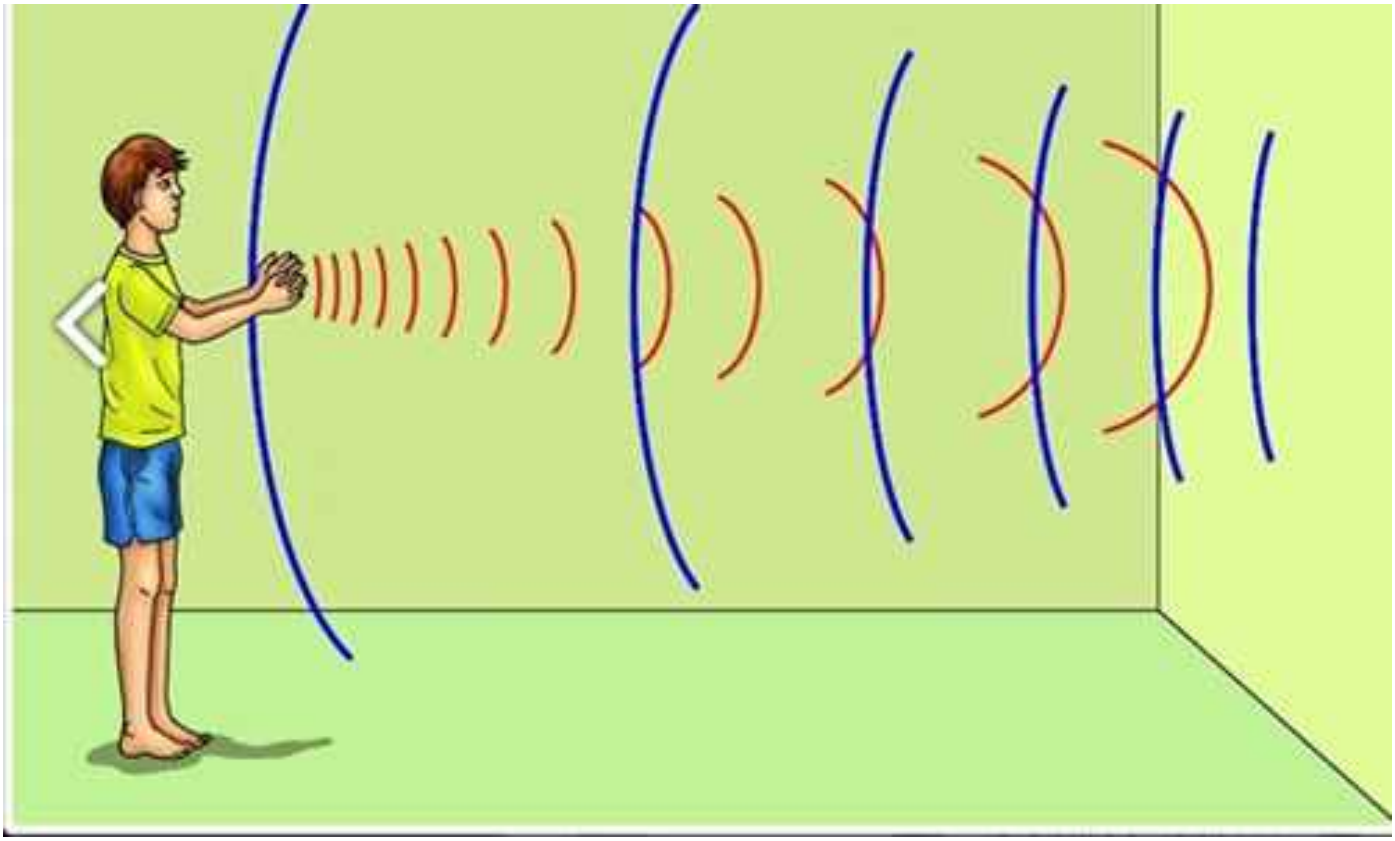
No sound in a vacuum

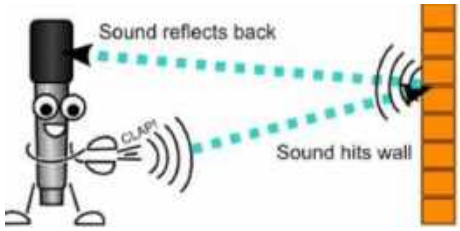
Sound can't travel in a vacuum.

The loud explosions from space battles in science fiction movies are not realistic.

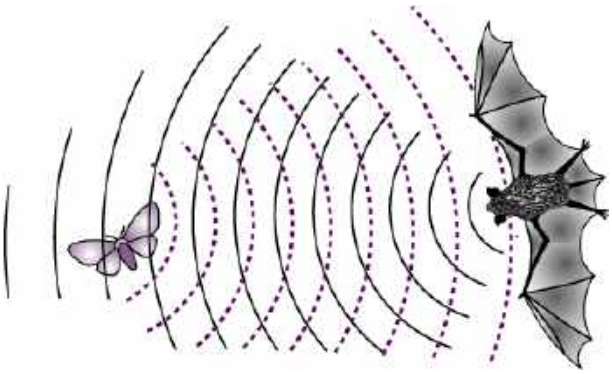
If you were actually watching a space battle from a distant space ship, you would hear *total silence*.

Reflection of sound: Sounds can bounce back from objects (reflect). Large flat objects highly reflect sounds. Rough irregular objects deflect sound in different directions. When we hear reflection of sound it is called an echo.

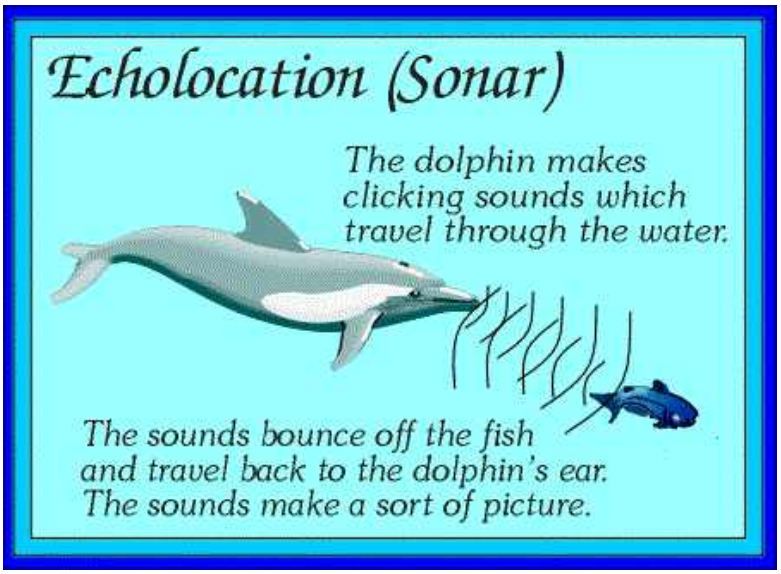




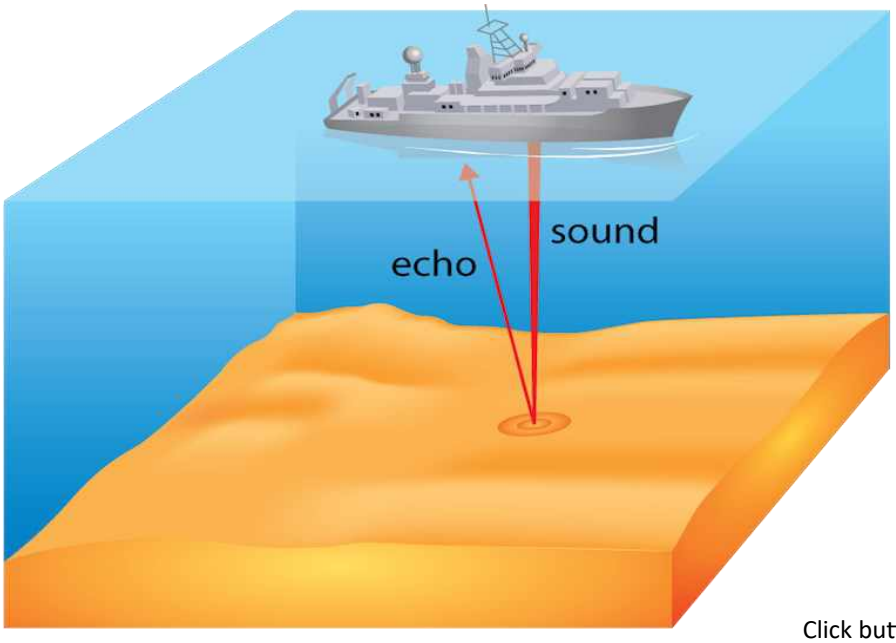
Reflection of sounds (echoes) are used by bats to catch insects in the dark. Dolphins use it to catch fish.



Watch video about sound reflection and absorption.



Ships use sound echoes (reflection) to scan the ocean bed. With this technology the captain of the ship can know the depth of sea, locate submarines or find large fish.



Click button to watch a video about Echoes.

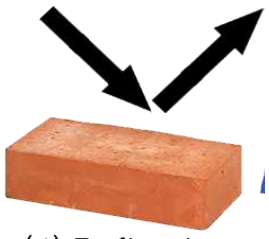
Doctors use a special type of sound called “ultrasound”. This sound reflects inside the body and with special equipment doctors can see (with sound) an inside picture of the body.

Click button to watch a video about Echolocation.

Questions

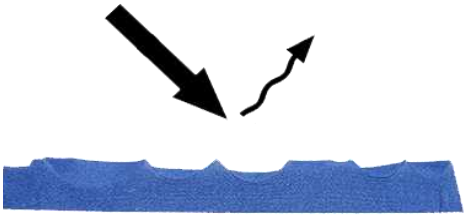
Question about echoes.

Absorption of sound: some materials, such as foam, can reduce the level (loudness) of sound by absorbing it. These materials are used into music studios to reduce sound reflection on walls.



(1) Reflection

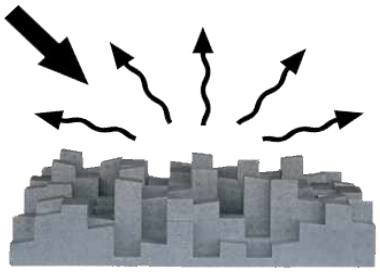
On large flat objects sound can reflect (bounce) very easily.



(2) Absorption

Some materials can absorb sound. The reflected (bounced) sound is less.

Click button to watch video about sound absorption.



(3) Diffusion

Materials with irregular surfaces diffuse sound. This means that the sound is reflected in many directions (scattered). This will also result in reduction of sound level.

Controlled reflection, absorption and diffusion of sound are used for soundproofing places or things.

Tasks

Find the words.

Pointed foam sheets used for soundproofing.

This photograph shows a recording studio. Look at the wall, it is covered with pointed foam sheets. This will help reduce sound echoes by absorption and diffusion.

Echoes and acoustics

▶ *Sydney Opera House in Australia is famous for its stunning design, but some orchestras have complained about its acoustics.*

- **An echo** is the reflection of a sound. You hear it a little while after the sound is made.
- **You can only hear** an echo if it comes back more than 0.1 seconds after the original sound.
- **Sound travels** 33 metres in 0.1 seconds, so you only hear echoes from surfaces at least 17 metres away.
- **Smooth hard surfaces** give the best echoes because they break up the sound waves the least.
- **Acoustics** is the study of how sounds are created, transmitted and received.
- **The acoustics** of a space is how sound is heard and how it echoes around that space, whether it is a room or a large concert hall.
- **When concert halls** are designed, the idea is not to eliminate echoes altogether but to use them effectively.
- **A hall with too much echo** sounds harsh and unclear, as echoing sounds interfere with new sounds.
- **A hall without echoes** sounds muffled and lifeless.
- **Even in the best** concert halls, the music can be heard fading after the orchestra stops playing. This delay is called the reverberation time. Concert halls typically have a reverberation time of two seconds. A cathedral may reverberate for up to eight seconds, giving a more mellow, but less clear, sound.

Click button to watch a summary video of the topic.

Tasks

Write about the main points of this topic.