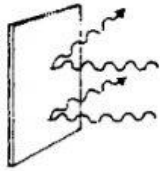
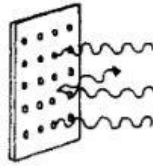


## Echoes and Soundproofing



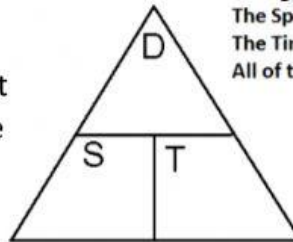
hard surface—sound waves bounce off which cause multiple echos called reverberations.



soft materials - stop sound reflections (reverberations). holes - trap sound waves. soft materials with holes, or irregular surfaces help stop echos. sound waves absorbed.

1. What is acoustics? Acoustics is the study of **light sound**.
2. Why would a reverberation be a problem when using a gym for a concert? A reverberation is when sound **bounces off is absorbed by** a wall or another surface in the room. Because the sound **bounces off is absorbed by** the surface it **dissapears echos back into the room is no longer a problem**. The wave reflected wave **interferes does not interfere** with new sounds in either constructive or \_\_\_\_\_ interference.
3. What would an acoustical engineer consider when designing a concert hall? How could reverberations be reduced? The engineer would consider the materials on the **walls, floor, ceiling, and what the foundation was made of**. Reverberation could be stopped by putting **hard soft** materials on the surfaces. Things that are **hard soft** with **smooth irregular** surfaces are best. For example it would be better if the floor was made of **carpet cement**, and the walls **were painted covered with fabric**. The ceiling might have tiles that **are smooth have holes in them** to absorb sound.
4. What are some characteristics of materials that are good for sound proofing? **Smooth rough hard soft regular surface surface with holes**.

5. Describe echolocation and how bats use it to locate food. The bats sends out **sound light** waves, its brain can use the **time distance** for the sound to return to create shapes.



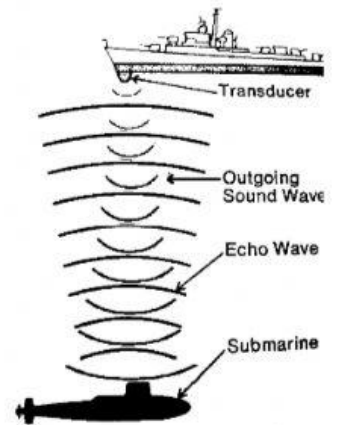
**drag and drop into the triangle**

The Speed of sound is known.

The Time it takes for the sound to reflect is measured.

All of the Distances are calculated.

6. What is sonar? it works like echolocation except it is done by **humans animals**. The machine send out **sound light** waves the **time distance** for the echo to return is measured, **distance speed of sound** to the object can be calculated. With many **distances speeds** the shape can be created.



7. Explain how ultrasound is used to produce images of internal structures in the body. Sound waves are sent out be the **ship animal doctors machine**, the sound waves are **absorbed reflected back**, the time for the reflection is measured, the distances are calculated and a shape is created with that information.
8. When is it better to use ultrasound and when is it better to use X-rays for detecting medical problems? **Sound waves X-rays** can be harmful to people. It is better to use an **X-ray ultrasound** when a very clear picture is necessary for treatment. It is better to use **ultrasound X-ray** if the procedure has to be repeated more than once because repeated exposure to **X-ray ultrasound** can cause cancer.