



3-5 Physical Science 3-5 Nature of Science

Southern Nevada Regional Professional Development Program

How can sound cause an object to move?

INTRODUCTION

Our environment is full of sounds. Children learn at a very young age to distinguish between the sounds that they hear and what message each of those sounds conveys. The ability to discriminate between different sounds allows us to acclimate to our surroundings.

WHERE'S THE SCIENCE?

Sound needs a medium for which to travel through, whether it is a solid, liquid, or a gas. When sound travels from the **sound source** to the **sound receiver** it can travel through any medium but does so at different rates of speed. Sound will travel faster through a dense material, like a solid, with its particles close together. Liquids are denser than air, which has very loose particles.

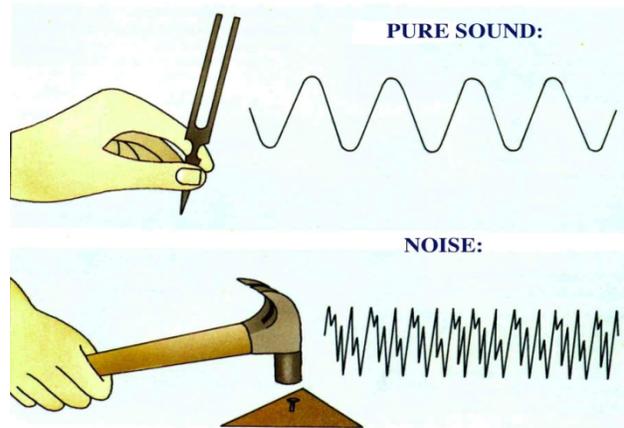
When a sound source moves back and forth quickly, we call that **vibration**. This vibration causes increased and decreased pressure on the molecules around the sound source. When the vibration reaches our ears (sound receiver) we perceive that as sound. This sound energy can be powerful and has the potential to move objects through vibration.

In this investigation the ping pong ball will bounce away from the rapid vibrating motion of the tuning fork, thus providing that sound is a form of energy produced by the vibration of matter. The vibrating tuning fork will cause the water to splash out of the cup.

MATERIALS

(per group)

- Tuning Fork (www.deltaeducation.com)
- Ping Pong Ball taped to a length of string
- Shoe or wooden block
- Plastic cup
- Water



PROCEDURES

1. Explain to the students that today they will be exploring sounds. Show them the tuning fork and model how to use it by striking it on the wooden block. Tell them that today they are going to investigate how sound can cause objects to move.
2. Distribute the tuning forks to each group. Give the students plenty of time to explore using the tuning fork. Discuss their observations after they have completed this initial exposure to the new tool.
3. Post the steps involved in the investigation and divide students into groups to perform the task. Remind them to include sketches and further questions in their science notebooks.
 - 1) Strike the tuning fork against a wooden surface or a shoe.
 - 2) Hold it against a suspended ping-pong ball.
 - 3) What is happening to the ping-pong ball?
 - 4) Record your observations and thoughts in your science notebook.
4. After the investigation is complete, gather the students at the carpet area to discuss their results. Tell them that they will now be investigating how the tuning fork behaves using a different medium,

water. Have them predict in their science notebooks what they think will happen when the tuning fork touches the water. Tell them to share their predictions with the person next to them. Ask some students to share their predictions with the class.

5. Post the next steps to their investigation and remind them to record their observations in their science notebook.
 - 1) Strike the tuning fork.
 - 2) Place just the ends of the tuning fork into the water.
 - 3) What do you notice? Record your observations and drawings in your science notebook.
6. Upon completion of this part of the investigation, call the students to the carpet area. Ask students to compare how the ping pong ball behaved compared to the water when both were struck with the tuning fork. Record observations and further questions.

Additional Resources

<http://fossweb.com/modules3-6/PhysicsofSound/index.html>

Interactive website on sound.

http://www.bbc.co.uk/schools/ks2bitesize/science/physical_processes.shtml

Interactive website on sound.

Vocabulary

Sound Receiver: Something that detects sound.

Sound Source: An object or material that vibrates in a way that makes sound.

Vibration: A rapid back-and-forth movement.

Nevada State Science Standard

P5C2 Students know the wave characteristics of sound. E/S

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L