

GOOD VIBRATIONS

Background Information for Activity Leaders

Overview

Children will explore the properties of sound as it begins. Sound begins when something vibrates, and passes through various types of matter as energy.

Key Concepts

- **Sound** can travel as long as there is matter for it to travel through. The matter sound travels through is called the medium.
- The medium could be a **gas** (such as air), a **liquid** (such as water) or a **solid** (such as a string). Sound can travel through any form of matter: gases, liquids or solids.
- Sound waves set off vibrations that occur in the direction that the sound travels. Without vibrations in some form of matter, sound cannot travel. This is why sound cannot travel in outer space; in space there is no matter to vibrate.
- Every time someone talks to you, or you hear the beep of car horn, or the roar of a plane, vibrations are moving through the air, reaching your inner ear and registering in your brain as sound.
- The songs whales sing to one another are beautiful and travel many hundreds of kilometers as the sound waves travel through water.
- Sound can travel through solids such as rock, metals, and wood, or even through the ground we walk on. Native Americans used this property of sound as they tracked prey or enemies. The running animals set off vibrations which traveled through the ground and could be heard by trackers many kilometers away. By placing their ear to the ground, they found that they could hear the distant sound of animal hooves as they caused the ground to vibrate.

What to Expect

- Most children will not have given much thought to how sounds move, or to the concept that sound can originate in one place and then travel through matter such as air or water.
- Children will begin to comprehend sound by noticing how sound is transmitted through objects.

Common Misconception

- *Children may believe that, "Sound travels at the same speed through gas, liquids, and solids."*

The speed of sound depends on how close the molecules of matter are to each other. Molecules are packed together closest in solids. The molecules in liquids are not as tightly packed, and they are the farthest apart in gases. Sound, therefore, travels fastest in solids and slowest through a gas.

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Data Collection Sheet

Name: _____

Date: _____

WONDER What can you discover about sound as it travels through a solid?

RECORD Write down what you observe. Did sound travel through the material? If you want to test another material, record it in the empty row!

Data Table: How Sound Travels Through Matter

type of matter	material	result
gas	air	
liquid	water	
solid	glass jar	
solid	string	

CONCLUDE

What kinds of material or types of matter did sound travel through?

Describe how were you able to add a third line to your phone.

What difference did you notice in the quality of the sound as you added lines to your phone?

Does each additional line weaken or strength the sound vibrations? Explain.

Set Up the Expedition

Materials:

For the activity leader:

- **Good Vibrations** Learning Cards
- (1) large glass jar filled with water
- (1) tuning fork

For each group:

- (1) dropper
- (1) Styrofoam™ cup filled with water
- (2) metal spoons
- (2) Styrofoam™ cups

For each child:

- (1) **Good Vibrations** Data Collection Sheet
- (3) 5 meters of string

Prepare the demonstration:

1. Place the dropper and large water jar filled with water on the demonstration table.
2. Prepare a Styrofoam™ cup filled with water for each group.

Prepare the exploration:

1. Place two Styrofoam™ cups and the string on the table for every group of children.

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Activity Leader's Guide

Group Size: 4-6 children

Time: 45 minutes

Engage

- 1 Gather the children together.

Ask:

“What is a vibration?” Accept all answers. Then, ask children to vibrate their bodies. For younger children, demonstrate how to vibrate their body by shaking your head, arms and legs. Allow them to follow along.

Say:

“The sounds we hear are created when objects vibrate. The vibration has to travel from object to object and reach your inner ear for it to be heard.”

Ask:

“When we talk, what do the sound vibrations travel through?” Listen to the children’s suggestions. When children suggest “air,” remind them that air is made of many small particles that can vibrate.

- 2 Fill a large glass jar with water. Using a dropper, release a drop of water onto the surface.

Ask:

“What do you notice?” Children may notice that when the drop of water hits the surface, the water vibrates and forms waves. This effect is similar to a sound wave. Vibrating objects cause air particles around them to vibrate, creating a ripple of vibrating particles much like a ripple in the water. Children may also notice that when the ripple touches the sides of the jar, the ripple returns to the center, much like an echo. They may also notice that repeated drops create a larger returning wave.

- 3 Using the jar of water, have one child cover one ear with her or his hand, and place the other ear against the glass jar. Ask another child to hit two spoons together in the water inside the jar.

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Activity Leader's Guide

Ask:

“Do you hear a sound?” The children will notice that the sound the spoons make can be heard. Give other children an opportunity to try it.

Say:

“What did the sound travel through to get to your ear?” Point out that sound can travel through any type of matter. In the demonstration, it traveled through a liquid, a solid and a gas (the water, the glass jar and the air).

Explore

- 4 If you are working with more than 4-6 children, divide the children into groups. Distribute the Data Collection Sheet and the Learning Cards.

Say:

“You observed sound traveling through three different types of matter: first, glass (a solid), then air (a gas), and finally through water (a liquid). You are now going to take a closer look at sound traveling through a solid.”

- 5 Allow children enough time to complete the WONDER, EXPLORE, RECORD, EXPAND and CONCLUDE sections of their Learning Card.

Conclude

- 6 Gather the children together and ask the following questions:

“Can sound travel through the string? What type of matter is the string?” Sound traveled through the string, which is a solid.

“How were you able to add a third line to your phone?” First attach a string to another cup. Next tie that string to the string that stretches between the two original cups.

“How many lines could you attach to the string phone?” Accept any reasonable answers.

“What difference did you notice in the quality of the sound as you added lines to your phone?” The sound was not as strong; the quality of the sound decrease.

“Does each additional line weaken or strength the sound vibrations?” Each additional line ‘weakens’ the vibrations.

Expand

- 7 Ask the children to follow the EXPAND instructions on their Learning Card.

Ask:

“In what other ways was your group able to hear sounds through gases, liquids and solid objects?” Examples include tapping on a table, when your ear is on that table or using cup to listen through a door.

- 8 **Say:**

“Congratulations! You are ready to tell people about sound. You have earned your ‘Ask Me About Sound’ stamp.”

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Expedition Learning Card

? Through what kind of objects can sound travel?



gas
liquid
solid



Explore how sound can travel through gasses, liquids and solid objects.



1 WONDER What can you discover about sound as it travels through a solid?



Write or draw what you think on your Data Collection Sheet.

2 EXPLORE Build a phone on string.

1. Use a pencil to punch a small hole in the center of the bottom of each Styrofoam™ cup.
2. String the two cups together by making a knot, inside each cup, at each end of the string.
3. Place the open end of one cup to your mouth and talk.
4. Have you partner place the other end to their ear. Make sure that the string is stretched tightly between you and your partner.
5. Explore ways to add a third and a fourth line to your phone.
6. Take turns speaking and listening as you add the third and fourth line to your phone.
7. Observe any differences in what you hear as you add lines to your phone.



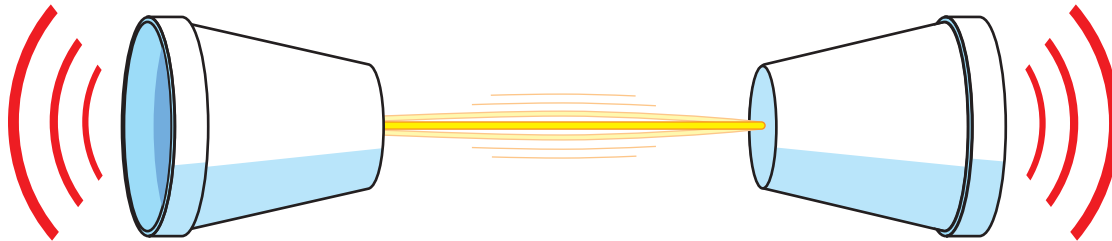
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Expedition Learning Card

- 3 RECORD** Notice which kinds of matter sound can travel through. Include the observations you made during the group demonstrations.

 Draw or write what you notice on your Data Table.

- 4 CONCLUDE** What kinds of matter did sound travel through?



- 5 EXPAND** Investigate other ways in which you can hear sound though a gas, a liquid and a solid object. Share what you discover with your group

Discovery

Why did we do that?

- Sound must travel through gasses, liquids and solids to be heard.
- Sound travels very quickly.
- There are many ways to demonstrate how sound travels.

Congratulations!

You have earned your "Ask Me About Sound" stamp! Now you are ready to tell people about sound!

