

HELLO

ARE YOU THERE?

GRADES 3–6

CLYDETTE RISPONE

OVERVIEW:

In this lesson students will explain the concept that sound travels through solids, liquids and gases and will discover that sounds travel best through solids, then liquids and least well through gases.

ITV SERIES:

Dr. Dad's Ph³: Sound/Radio Broadcasting

LEARNING OBJECTIVES:

The students will be able to

- ❖ explain that sounds travel through solids, liquids, and gases
- ❖ demonstrate how a vibrating string can carry sound
- ❖ discuss how sound is stopped when the vibration is stopped
- ❖ demonstrate how sound can be carried and controlled over distance

VOCABULARY

solid
liquid
gas
vibration

MATERIALS:

FOR EACH GROUP OF FOUR STUDENTS

- ziplock bag of air
- ziplock bag of water
- ziplock bag of sand

FOR EACH PAIR OF STUDENTS

- two paper cups
- 15-20 feet of heavy string
- two paper clips
- pencil

HELLO...ARE YOU THERE?

BACKGROUND

All sound is produced by vibrations of matter. Most of the sounds we hear travel through the air; however, sound can also be transmitted through solids and liquids. Sounds travel at different speeds through different materials. Sound is unable to travel through a vacuum because there is no matter to vibrate.

Solids, liquids, and gases all conduct sound but at different speeds. Sound travels faster through solids and liquids than gases. Native Americans would place their ears to the ground because they would hear horses' hooves approaching quicker than if they listened for the sound to be carried in the air. While swimming you can hear the sound of a boat motor more easily under water than above water.

PRE-VIEWING ACTIVITIES:

Review the concept of solids, liquids and gases. Ask students to give examples of each. Ask: "How is sound made?" (vibrations) "Can vibrations travel through solids, liquids, and gases?" Accept all responses. Explain that they will do an activity to discover if, indeed, sound can travel through solids, liquids, and gases.

Ask one member from each team of four to get the three ziplock bags filled with sand, water, and air. Instruct three of the group members to place one of the bags on the desk top. Instruct the fourth member from each group to tap on the desk with his or her hand while the other three students place their ears to one of the ziplock bags. Students will rotate the bags among the group and take turns tapping on the desk to see if the sound is traveling through the different materials.

Encourage students to discuss the following questions among themselves: 1) Did the sound travel through the solid, liquid and gas? 2) Were the students able to hear the sound clearer through the solid, liquid, or gas? Allow for each member of the team to listen for the tapping sound. Hold a group discussion to allow each group of four students to share their findings with the general group.

FOCUS FOR VIEWING:

Point out to students that they will see a variety of solids being used to make sounds.

VIEWING ACTIVITIES:

Start the video where Dr. Dad says, "I got an idea" **Stop** the video at the end of this segment (right before Olivia's challenge). Approximate running time 2:16

POST-VIEWING ACTIVITIES:

Review the video with the students. Ask: "What was needed for each of the objects to produce a sound?" (vibration) After having seen the video, ask the students if they think a string could transmit sound. Pass out one 10-15 foot string for each pair of students. Have the students stretch out the string and test to see if the string will conduct sound. Remind the students of the video and ask if there is any way to enhance the sound. Accept all responses.

Pass out the cups and two paper clips to each pair of students. Direct the students to use a pencil to poke a hole in the bottom of each of their cups.

HELLO...ARE YOU THERE?

Next, the students should push the string through the end of the first cup and tie the string to the paper clip. The paper clip should now be inside the cup to keep the string from coming out. Repeat these steps with the second cup.

Explain to the students that in order for their “telephone” to work they must keep the string between the two cups taut. Remind them that when it is their turn to speak they should speak directly into the cup. Meanwhile the listener should place his or her ear directly into the cup.

At the end of the lesson students should be allowed to share their experiences with the telephone. Did the cup enhance the sound? Did anything change the sound? (not keeping the line taut and straight, losing sound) Are there any other variations to try?

ACTION PLAN:

Invite a guest speaker in to discuss how sound is carried over telephone lines.

EXTENSIONS:

CENTER

Set up a center in the room with various materials to allow students to try variations on their telephones.

MATH

Try different lengths and thicknesses of string. Have students graph the results.

WRITING/LANGUAGE ARTS

Have the students research different ways of communication. Example: Native Americans used smoke signals, blind use Braille, letter writing, radio before television, etc. Have them write reports and present their information orally to the class.

SCIENCE

Watch the video Dr. Dad’s Ph³: Sound/Radio Broadcasting in its entirety. Have the class take Olivia’s Challenge.