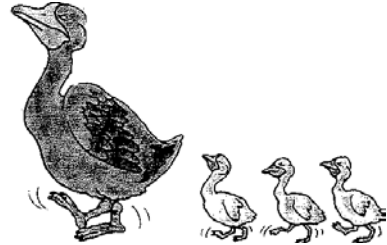


Quackers

Description: Students build a simple noisemaker and use it to explore some of the properties of sound.

Groups: Lower elementary, working as individuals.

Time Required: About 15 minutes.



Key Questions: What causes sounds? How can we make sounds louder?

Content Areas Addressed: Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science through history and within society.

Heat, electricity, light, and sound are forms of energy.

Vibrating objects produce sound. The pitch of sound varies by changing the rate of vibration.

Teacher Background: All sounds are the result of vibrations. Sound waves are initiated when matter vibrates. A vibrating object makes the air around it vibrate. Sound is a wave motion of many molecules moving together in a substance. Each molecule vibrates, moving back and forth, forward, backward, and so on. As many molecules move in this way they collide with other molecules, and transfer energy to the molecules nearby. The molecular motion that began with the molecules nearest the source spreads to molecules farther and farther away, so the sound wave travels outward in all directions from the source.

Sound can only travel through a material or a medium. It cannot travel through empty space. Sound travels faster and with less reduction of so in substances which are denser. This means it is heard louder in a solid or a liquid than a gas. A simple string will not produce a very loud sound, but attaching it to a cup helps to amplify the sound produced by the string. Adding water to the string fills the air spaces in the string, making it denser and enhancing the vibration.

Science Process Skills: Listening, observing, and making models.

Discovering STEM Program

Materials: Paper cups, string, toothpicks, water, container for water, needles with large eyes, items for decorating instruments such as feathers, roly eyes, small pompoms, glue and the like.

Procedure: Have students make a small hole in the center of the bottom of a paper cup with the toothpick or a pencil point. Next, they cut a piece of string about 30 cm in length and insert one end of the string through the hole in the cup. Then they tie the other end of the string around the toothpick, with the toothpick on the outside of the cup. (The toothpick secures the string and prevents it from being pulled back through the hole in the cup.) Students should hold the string close to the cup in one hand and the cup in the other hand. Now they are to squeeze the string tightly between the thumb and index finger, and pull, holding the string firmly but allowing it to slip through the fingers. Ask the students if they hear anything. If not, suggest that they squeeze a little tighter and try it again.

Now have students dip the string in water to wet it, then pull it through their tightly held fingers again. They should hear it quite well now.

The activity can be extended by using different size cups, cups of different materials, or different types of string. For young children, it would be fun to let them decorate their instruments with a feather, eyes, and a pompom.

Why does the noisemaker make sound? (The string vibrates and the vibration is transferred through the cup.)

What is the role of the cup? (It acts as an amplifier.) What is the role of the water? (It fills the air spaces in the string, making it denser, enhancing the vibration.)

Resources:

Arizona Museum of Science & Technology, Sound, Scholastic Book Co., 1997

Berger, Melvin, All About Sound, Scholastic Inc., 1994

Darling, David, Sounds Interesting. Dillon Press, New York, 1991

Glover, David, Sound and Light

Jennings, Terry J., The Young Scientist Investigates Sounds, Chicago: Children's Press, 1989

Sound, a Third Grade Unit/Kit supporting the Battle Creek Area Common Core Science Curricular, developed by the Baffle Creek Area Mathematics and Science Center, 1997