VIBRATIONS MAKE SOUND

BIG IDEA 10: FORMS OF ENERGY

BENCHMARKS AND TASK ANALYSES

SC.K.P.10.1 Observe that things that make sound vibrate.
The student:

- produces sound by creating vibrations (rapid back and forth movement) using a variety of objects (for example: plucking rubber bands on Geoboards).

SC.K.N.1.1 Collaborate with a partner to collect information.
The student:

- works with a partner to gather information during classroom investigations.

SC.K.N.1.2 Make observations of the natural world and know that they are descriptors collected using the five senses.
The student:

- uses five senses to make and discuss observations.
- tells which senses were used to make observations.

SC.K.N.1.5 Recognize that learning can come from careful observation.
The student:

- observes a variety of objects (living and nonliving).
- discusses observations of objects.
- states what was learned from observations.

KEY QUESTION

Does every vibration make a sound?

TEACHER BACKGROUND INFORMATION

All sounds are caused by vibrations. A vibration is a rapid back and forth movement. When there is no movement, there is no sound to be heard. Sound is a form of energy. Energy is needed to make a sound, such as striking a drum or blowing a flute. Vibrations make sound waves that are sent in all directions. Vibrations can also cause other things, which are nearby or touching, to vibrate. To hear a sound, the vibrating material must move back and forth at least 16 times per second.

MATERIALS

Teacher

plastic ruler

Per student

geoboard
rubber band
small paper cup

Per group

pennies
balloon
tuning forks
uncooked rice
empty coffee can or butter tub with a plastic lid
pie pan of water
paper towels
spoon

SAFETY

- Always follow OCPS science safety guidelines.

- Remind students to not place objects in their mouths.
- Choose objects that do not have sharp edges.
- Remind students to use rubber bands appropriately.

TEACHING TIPS

- These activities can also be taught in small, teacher-directed groups which would require fewer materials.
- Demonstrate how to gently strike a tuning fork.
- Allow free exploration with Geoboards and rubber bands prior to teaching this lesson.

ENGAGE

Extend the plastic ruler over the edge of a table. As students observe, hold one end of the ruler on the table with your hand and "pluck" the extended edge with your thumb. The ruler will make a sound. Ask: *What happened?* (Answers should include: a sound was made and the ruler moved). *How do you know the ruler made a sound?* (I heard it. I observed it.)

EXPLORE

Day One

Materials: RICE, PENNIES, COFFEE CAN, BUTTER TUB WITH LID, AND SPOON

Give each group a spoon and coffee can or a butter tub with a lid on top. Have students place a few grains of rice on the lid. Ask: *Do you see or hear anything? What could we do with the materials at our table to make a sound?* Allow students time to try their ideas and share their observations. Make sure that students share observations about the movement of the rice and not just the sounds. Allow multiple attempts until students are able to conclude, on their own, that they can use the spoon to hit the lid to create a sound and make the rice move. *What did you do that made the rice move? What did you do that made a sound? What happened? How do you know the rice moved?* (I saw it.) *How do you know there was a sound?* (I heard it.) Repeat process using pennies instead of rice.

Day Two

Materials: PAPER CUPS, GEOBOARDS, AND RUBBER BANDS

Prepare paper cups ahead of time with a rubber band stretched over the open end of the cup.
Give each student a cup and have them observe. Ask: *Do you see or hear anything?* Tell students to pluck the rubber band and observe what happens. Ask: *What did you observe while plucking your rubber band?* Allow multiple attempts until students are able to conclude, on their own, that the rubber band was moving and there was a sound. Ask: *How did it move?* (Back and forth) *How do you know it moved?* (I saw/observed it.)

Collect the cups and give each student a Geoboard and rubber band. Tell students to stretch the rubber band over the pegs on the Geoboard. Allow students to explore and share observations. Ask students: *Could we make the rubber band move? How? Could we make a sound using these materials? How?* Allow students to try their ideas and discuss their observations. Ask: *What did you try to make your rubber move? What happened? How did your rubber band move?* (Back and forth*) What did you try to make a sound? What happened?* Ask students: *Do you think we can use the rubber bands and the Geoboard to make a sound without moving either of them? How?* Allow students time to test their ideas and discuss results. Allow students to come to the conclusion that every time there is a sound there is a back and forth movement (vibration).

Day Three:

Materials: TUNING FORKS AND BALLOONS

Hold up a tuning fork. Ask: *Do you see any movement? Do you hear any sound?* Ask: *What could we do with this to try and make a sound?* The teacher tries their ideas. Ask: *Did you hear a sound? Did you see*

movement? How did the top of the tuning fork move? (Back and forth) *How do you know the tuning fork moved?* (I saw it, I felt it, and I heard it.) Demonstrate how to properly use a tuning fork by holding it at the base and gently tapping the tines on a solid object. Allow students time to explore with tuning forks. Ask: *What did you observe while using your tuning fork*? (Sound and back and forth movement should be two observations that they can verbalize.)

Blow up a balloon per group and tie off the end. Ask: *What do you think would happen if we touched the tuning fork to the balloon?* Allow students to gently tap the tuning fork on a solid object (edge of table) and then quickly touch the balloon. Discuss observations. *What happened when you touched the tuning fork to the balloon? Why do you think that happened?* (Sound and movement)

Day Four
Materials: TUNING FORKS, WATER, AND PIE PANS
Put approximately one inch of water in a pie pan. Hold up tuning fork and ask: *Do you see any movement? Do you hear any sound? What could we do to make movement or sound?* Test student ideas and discuss results. *What do you think would happen if I put tuning fork in the water?* Allow student responses and place tuning fork in water *without* tapping the tines. *What happened? Was there any sound? Was there any movement? What could we do to make sound and movement?* Allow student responses. Tap tuning fork on the table gently and quickly place into water. Make sure that you don't touch the sides or the bottom of the pan with the tuning fork because the vibration will stop. Ask: *What happened? How do you know that the water moved?* (I saw/observed it.) *How do you know there was a sound?* (I heard it.) Lead them to the conclusions that there was sound and movement of the water. Allow students to explore the water, pie pan, and tuning fork. Keep paper towels handy in case of a splash.

EXPLAIN
Have a class discussion addressing the following questions:
What are some ways that you made sound this week?
How did the rubber band move? (Back and forth) *How do you know it moved? (I saw/observed it.)*
What happened when you tapped the tuning fork on the table? (Sound and movement)
What did the pennies and rice do when you tapped the lid with a spoon? (Moved) *How do you know it moved?* (I saw/observed it.) *Do you have any ideas of how we could make a sound without a back and forth movement? Does every vibration make a sound? What have you learned about sound this week? How did you know that a sound was made?* (I heard it.) *What did you notice every time a sound was made?* (Movement)

EXTEND AND APPLY
Tell students to place their fingertips lightly over their throats. Ask: *Do you hear or feel anything?* Tell students to hum while holding their fingertips over their throats. Ask: *Do you hear or feel anything?* (Various answers should include that students felt movement in their throats and heard sound being produced.)

ASSESSMENT
As you observe your students, look for the following behaviors:
- Are they engaged in the activities?
- Are they able to tell you that a sound was made?
- Are they able to tell you that a back and forth movement made a sound?
- Are they able to tell you how they know something happened (I saw it, I heard it, I felt it, or I observed it)?