

Loud or Soft?

BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

Grade 1—Quarter 3

Activity 30

SC.B.2.1.1

The student recognizes systems of matter and energy.

SC.C.1.1.2

The student knows that there is a relationship between force and motion.

SC.C.2.1.2

The student knows that sound is caused by vibrations (pushing and pulling) to cause waves.

SC.H.1.1.3

The student knows that in doing science, it is often helpful to work with a team and to share findings with others.

SC.H.1.1.4

The student knows that people use scientific processes including hypothesis, making inferences, and recording and communicating data when exploring the natural world.

SC.H.1.1.5

The student uses the senses, tools, and instruments to obtain information from his or her surroundings.

ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

1. Ask, *During music time, what instrument does the teacher use to make sounds? (Accept all reasonable answers.) How does the teacher change the volume of the music? (uses more or less energy, plays with more or less force) When you sing, how do you make your voice louder or softer? (use more or less energy)*
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide an opportunity to identify areas that may require additional review before proceeding further with the activity.

Loud or Soft?

OBJECTIVES

Students produce and listen to various sounds and compare them according to their volume.

The students

- ▶ listen to and identify sounds as loud or soft
- ▶ infer how loud and soft sounds are produced
- ▶ describe the relationship of strength of vibration and volume of sound

SCHEDULE

About 40 minutes

VOCABULARY

loud
soft

MATERIALS



For each student

- 1 Activity Sheet 30
- 1 comb
- 1 pair safety goggles*
- 1 tongue depressor

For the class

- 1 cassette player*
- 1 cassette, *Sounds*
- 1 sht plastic, 30 cm × 30 cm
- 1 pair scissors*
- 1 roll waxed paper

For the teacher

1 pair gloves, disposable

*provided by the teacher

PREPARATION

- 1 Make a copy of Activity Sheet 30 for each student.
- 2 Listen to the portion of the *Sounds* cassette entitled Volume (Section 2). Notice that the same music is repeated. Place the cassette in the player ready to play at Section 2.
- 3 Cut a piece of waxed paper 8 cm × 12 cm (about 3 in. × 5 in.) for each student. Cut a piece of plastic 1.25 cm × 10 cm (about 0.5 in. × 4 in.) for each student.
- 4 Each student will need a sheet of waxed paper, a strip of plastic, a comb, and a tongue depressor.

BACKGROUND INFORMATION

The **volume** of a sound is its degree of loudness. Its degree of loudness can be controlled by varying the amount of force used, or energy required, to make an object vibrate and produce sound waves.

The volume of a sound depends upon the **amplitude**, or height, of its sound waves. Sound waves of **loud** sounds have a greater height than do sound waves of **soft** sounds. The more energy supplied to an object to produce a sound, the stronger the vibrations of that object, and the greater the amplitude of the resulting sound waves.

The units used to measure the volume of sound are called **decibels**. They were named



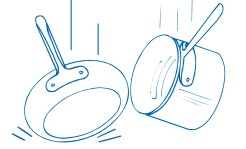
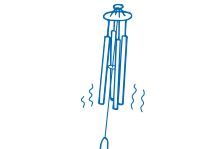
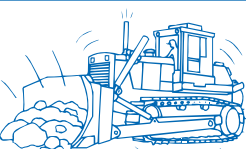

after Alexander Graham Bell. Absolute silence is measured at 0 decibels. The rustling of leaves measures about 20 decibels, a conversation about 60, and a thunderclap about 110.

Sounds above 90 decibels can cause temporary hearing loss. Sounds above 120 decibels may be painful to the ear and can permanently damage the eardrum.

▼ Activity Sheet 30

Loud or Soft?

Decide whether each picture shows a loud sound or a soft sound. Write *loud* or *soft* on the line.

 <p>_____</p> <p>soft</p>	 <p>_____</p> <p>loud</p>
 <p>_____</p> <p>loud</p>	 <p>_____</p> <p>soft</p>
 <p>_____</p> <p>loud</p>	 <p>_____</p> <p>soft</p>

Guiding the Activity

- 1 Tell students that you are going to play music on the cassette player. Instruct them to listen carefully and compare the sounds you play.

Play to the end of Section 2. (There will be one melody played twice—once at low volume and a second time at a higher volume.) Ask students, **What was different about the two pieces of music that you just heard?**

Write the words *loud* and *soft* on the board. Ask volunteers to describe examples of **loud** and **soft** sounds they hear every day.

- 2 Give each student a tongue depressor. Instruct students to tap lightly on a desk or chair with the tongue depressor (see Figure 30-1). Ask, **What do you hear?**

Additional Information

The first piece was soft and the second loud.

a soft sound

Guiding the Activity

Additional Information



▲ *Figure 30-1. Students produce soft and loud sounds by tapping on a desk with a tongue depressor.*

Tell students to tap hard on the desk or chair with the tongue depressor. Ask, **How does this sound compare to the first one?**

It is louder.

Instruct students to clap their hands together lightly. Then have them clap their hands hard. Ask, **How did these two sounds compare?**

The second one was louder than the first.

3 Instruct students to think about how loud and soft sounds are produced. Ask, **How did you produce a soft sound?**

by tapping or clapping lightly

Ask, **How did you produce a loud sound?**

by tapping or clapping hard

Ask, **What can you conclude about how loud and soft sounds are produced?**

The harder an object is hit, the louder the sound that is produced.

4 Give each student a comb, a piece of waxed paper, and a strip of plastic. Instruct students to cover the comb with the waxed paper as they did in Activity 29. Tell them to hum and blow gently on the waxed paper. Then have them hum and blow hard. Ask, **What happened to the volume when you blew harder?**

The volume increased.

Guiding the Activity

Have the students hold the strip of plastic between their thumbs as they did in Activity 29. Have them first blow gently and then harder. Ask, **What happened to the sound when you blew harder?**

Ask, **What made the sound louder?**

5 Instruct students to repeat the procedures with the comb and the strip of plastic. With both the comb and the plastic they should blow lightly and then hard. Tell students to pay attention to how it feels.

Ask, **What difference do you feel when you blow gently compared to when you blow hard?**

6 Ask, **What is another way that you can use the tongue depressor to produce a sound?**

If students do not suggest it, demonstrate how to hold down one end of the tongue depressor at the edge of a desk and snap the overhanging end to produce a sound (see Figure 30-2). Give students an opportunity to produce sounds by snapping the tongue depressor.

Ask, **What do you hear?**

Ask, **What do you see?**

Ask, **Why does the tongue depressor produce a sound when you snap it?**

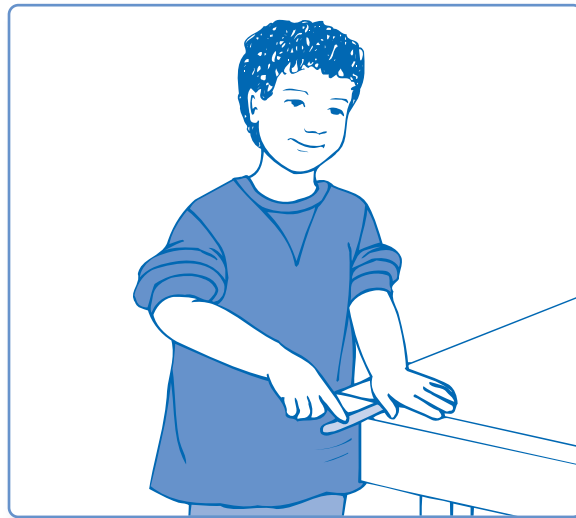
Additional Information

The sound was louder.

Blowing harder made the strip vibrate more.

Students should say that the vibrations feel stronger when they blow harder.

Accept all suggestions.



▲ **Figure 30-2.** *The tongue depressor must be held tightly to the desk.*

a thud followed by a reverberating twang

The part of the tongue depressor that hangs over the edge vibrates.

Its vibrations produce sound waves that travel through the air and reach our ears.

Guiding the Activity

7

Ask students, **What change in vibrations do you think you will see when you snap the tongue depressor gently and then hard?**

Instruct students to snap the tongue depressor gently and then hard. Tell them to listen to the sound produced and observe the vibrations.

Ask, **How do the sounds produced compare?**

Ask, **How do the vibrations compare?**

Ask, **How does changing the strength of the vibration change a sound?**

Additional Information

Accept all reasonable suggestions. Students may suggest that the vibrations will be stronger when the depressor is snapped harder.

Snapped gently, it produced a soft sound. Snapped hard, it produced a loud sound.

The vibrations were weak when it was snapped gently. They were strong when it was snapped hard.

Students should suggest that when vibrations are strong, the volume of the sound produced is loud. When vibrations are weak, the volume of the sound produced is soft.

8

Give each student a copy of **Activity Sheet 30**. Direct the students to identify the sound produced in each picture and decide whether it is a loud sound or a soft sound.

Discuss students' answers with the class. For each picture, discuss how the sound is produced and whether the vibrations that produce it are strong or weak.

Ask, **Which pictures show sounds made by strong vibrations?**

Ask, **Which pictures show sounds made by weak vibrations?**

the siren blaring, the pots and pans falling, and the earthmover digging

the leaves falling, the wind chimes ringing, and the chipmunk cracking a nut

REINFORCEMENT

To emphasize the relationship between the volume of a sound and the vibration strength of an object, have students touch the covering of the cassette player as you play the soft and loud versions of the melody on the tape.

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

CLEANUP

Have students return the tongue depressors to the kit. Collect the waxed paper, plastic strips, and combs yourself, wearing disposable gloves. (See Safety Note below.) Throw away the plastic strips and waxed paper. Wash the combs in warm, soapy water, dry them, and return them to the kit. Clean students' work surfaces. Replace the cassette in the kit.

Safety Note: Due to universal precautions with bodily fluids (in this case, saliva), you should wear gloves while collecting the plastic strips, waxed paper, and combs at the end of the activity. You should also wear gloves while cleaning any surfaces. Students should wash their hands after completing the activity.

SCIENCE AT HOME

Have a high-low hunt at home. What are some of the appliances, devices, or objects that make sounds (such as beeps, honks, whistles, buzzes, rings, hums, clicks)? Rank the sounds in order from softest to loudest. Share the lists in class.

Connections

Science Extension

Let students investigate how the volume of a vibrating tuning fork changes when its base is held against different materials—both hard materials (for example, a desk, table, chalkboard, wall, wastebasket, cardboard box) and soft materials (a folded bath towel, roll of paper towels, pillow, clothing, carpeting, foam rubber). Students will discover that the sound is much louder with hard materials and quieter with soft materials. Explain that the tuning fork makes the hard materials vibrate too, so the volume increases, whereas the soft materials absorb the sound.

Science and Health

Have each team make a simple stethoscope by inserting a funnel into one end of a 75-cm (2.5-ft) plastic or rubber tube. Let students listen to each other's heartbeat by placing the funnel on another student's upper chest and holding the other end of the tube close to his or her ear. Explain that the funnel "collects" sound waves and "focuses" them into a narrower space, making them louder. Borrow a real stethoscope for students to try so they can compare the sound it produces with that of their handmade device.

Science and Social Studies

Tell students that the decibel was named in honor of Alexander Graham Bell, who lived from the mid-1800s to the early 1920s. Ask students to find out what made Bell so important that the unit used to measure sound volume was named after him.

