

Investigation Seven – Sound Waves

Standard 06:

Students will understand properties and behavior of heat, light, and sound.

Objective 3:

Describe the production of sound in terms of vibration of objects that create vibrations in other materials.

Intended Learning Outcomes:

- 1 – Use science process and thinking skills
- 4 – Communicate effectively using science language and reasoning

**Standard
VI**

**Objective
3**

Background Information

The pitch of a sound is determined by the size (length, thickness) of the object making the sound. This is true of the voice boxes of animals. For example: women usually have shorter vocal cords than men and have higher pitched voices as a result.

Pre-Assessment/Invitation to Learn

1. Leader whispers the name of a different animal in each person's ear (e.g., cat, bird, dog, donkey, elephant, owl, pig, horse).
2. Each person takes a few seconds to practice the noise that his/her animal makes. One at a time, each person makes his/her sound and then arranges himself/herself in a line according to the sound of the animal's pitch – highest to lowest.
3. After the line has formed, draw a connection between the pitch of the animal's voice and the size of the animal. Pitch is determined by the length and thickness of the animal's vocal cords. Larger animals tend to have larger vocal cords.

Instructional Procedures

1. In student science journal, have each student describe what he/she observes as he/she watches the demonstration.
2. Stretch a balloon over one end of a soup can from which both ends of the can have been removed.
3. Rubber cement a small mirror to the rubber sheet, and set up the can so the sound may enter the can and vibrate the membrane with the mirror attached.
4. Aim a beam of light at the mirror so that it reflects to a screen or white wall.

Materials

- Juice can
- Large balloon
- Small mirror
- Rubber cement
- Rubber band
- Flashlight

5. Have students sing or talk into the can and see the sound patterns of his/her own voice.
6. Sing or talk softly, loudly, moderately; sing high, low or moderately in pitch. Try to measure the distance light travels up or down the wall.
7. Encourage students to think about what the rubber sheet was doing. Record observations in detailed scientific language in student science journals.
8. Discuss what is making the balloon move to make the light reflections move on the wall.

Curriculum Extensions

Science –

- Play different types of music from a CD into the can. Record what is observed. (ILO 1)
- Play different musical instrument into the can. Record what is observed. (ILO 1)
- Take the mirror off. By putting your index finger lightly on the balloon feel the vibrations. What do you feel when your voice is high and low pitched? What do you feel when your voice is loud or soft? (ILO 1)

Assessment Suggestions

- Have the students explain why the balloon moved when they talked into the can with a balloon on the end.
- Have the students explore what happens when you talk loudly, softly, high or low into the can with a balloon on the end.

Reference to Assessment Section:

Unit Test	Multiple Choice	Constructive Response	Performance Test
1	13,14,15,16	3	Musical Pop Bottles
2	12,13,14	2,3	Musical Pop Bottles

Resources

Books –

- Craats, Rennay. The Science of Sound. 2000.
- Madgwick, Wendy. Science Starters. Super Sound. 1999
- Parsons, Alexander. Make it Work! Sound. 1997.
- Ramsay, Heleva. Step-by-Step Science. Sound. 1998
- Farndon, John. Science Experiment. Sound and Hearing 2001.
- Wright, Lynne. The Science of Noise. 2000.
- Levine, Shar and Leslie Johnstone. The Science of Sound and Music. 2000.

Videos –

- Energy, Disney Educational, 1996.
- Sound, BFA – Phoenix, 1984
- Sound, Encyclopedia Britannica, 1992
- Sound Instruments, Charles E. Merrill Pub. 1987.
- Sound, Schlessinger, 2000 and 2002
- Sound, Disney Educational 1995.
- Sound, Aims Multimedia 2001.