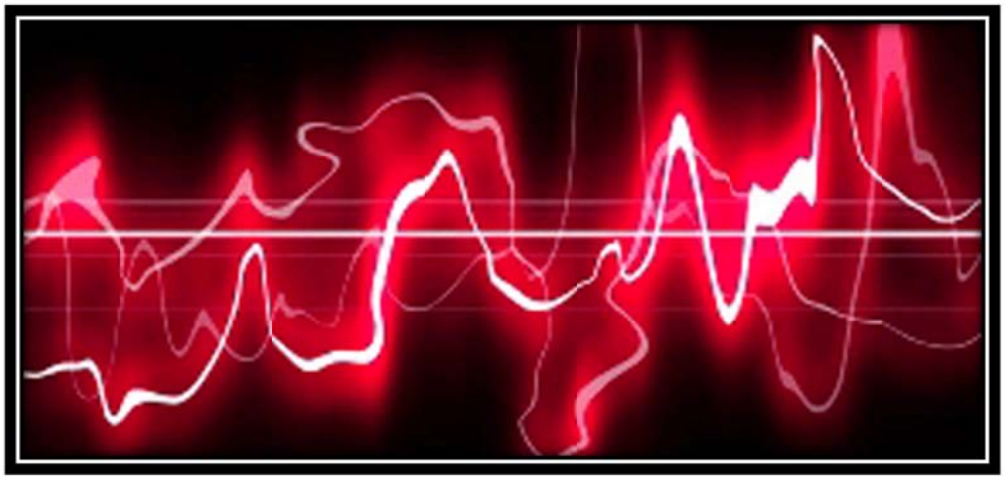
# PHYSICS OF SOUND

# GRADE 1

## ASSESSMENT PACKET

Sound is a fascinating form of energy. As you sit there reading this, there is energy flowing all around you in the form of light waves, sound waves, radio waves, heat and more. You are constantly being bombarded by energy. We're going to learn how to change the amplitude, pitch and volume to easily amaze your friends.



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This curriculum is aligned with the National State Standards and STEM for Science.

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# Educational Goals

Sound is a fascinating form of energy. As you sit there reading this, there is energy flowing all around you in the form of light waves, sound waves, radio waves, heat and more. You are constantly being bombarded by energy.

Energy is everywhere, all the time. Moving by waves at amazing speeds, sound energy brings you knowledge about the world around you. Does a tree make a sound if it falls without anyone there to hear it? This section will answer that question and many others.

Sound is a form of energy. Energy is the ability to move something over a distance against a force. But what does that mean?

Molecules are vibrating back and forth at fairly high rates of speed, creating waves. Energy moves from place to place by waves. Sound energy moves by longitudinal waves (the waves that are like a slinky). The molecules vibrate back and forth, crashing into the molecules next to them, causing them to vibrate, and so on and so forth. All sounds come from vibrations.

**Here are the scientific concepts:**

- Energy moves by waves.
- All waves begin as vibrating particles
- The particles vibrate back and forth. They do not move along the wave.
- Waves are the way energy moves from place to place. Waves are energy-mobiles.
- Particles in a wave are moving a distance against a force. They are having work done on them and they can do work.
- A transverse wave is a wave where the particle moves perpendicular to the medium.
- A longitudinal wave is where the particle moves parallel to the medium.
- Amplitude is the height of the wave.
- Ears can detect sound waves. Our brain interprets them.
- Since we have two ears we are very good at determining the direction of a sound.
- Our ears are also very good at telling the difference between sound frequencies.
- Sound is made by vibrating objects and can be described by its pitch and volume.

**By the end of the labs in this unit, students will be able to:**

- Design an experiment that shows that vibrating materials make sound, and sound can make objects vibrate.
- Use tools and materials to design and build an experiment that uses sound to communicate over a distance.
- Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- Measure and estimate the weight, length and volume of objects.
- Follow a set of written instructions for a scientific investigation.

# Physics of Sound Grade 1 Evaluation

Teacher Section

**Overview:** Kids will demonstrate how well they understand important key concepts from this section. Some kids at this level are not reading quite yet, so you'll need to work together with them and observe them carefully as you go in order to understand what they know as they may not be able to tell you directly.

**Suggested Time:** 20-30 minutes

**Objectives:** Students will be tested on the key concepts:

- All waves begin as vibrating particles
- The particles vibrate back and forth. They do not move along the wave.
- Waves are the way energy moves from place to place. Waves are energy-mobiles.
- Ears can detect sound waves. Our brain interprets them.
- Since we have two ears we are very good at determining the direction of a sound.
- Our ears are also very good at telling the difference between sound frequencies.
- Sound is made by vibrating objects and can be described by its pitch and volume.
- Design an experiment that shows that vibrating materials make sound, and sound can make objects vibrate.
- Use tools and materials to design and build an experiment that uses sound to communicate over a distance.

# Physics of Sound Grade 1 Explorations

Teacher's Outline with Answers

**Teacher/Parent:** This is not a quiz. This is a chance for you to explore the key concepts with your student to you can understand what they know and where they still need work. Read each question aloud and do the action and invite the students to use the materials you have out to help them answer the questions. Answers given in parenthesis.

**Materials:**

- Bathtub or large pool of water
- Cork or other small floating object
- Two sheets of paper
- Tape
- Wood spoon
- Metal saucepan
- Glass bottle

**Questions to Explore Together:**

1. Touch your throat as you talk. What's going on in there? (You can feel your throat vibrating. Your vocal cords in your throat move as you speak making the air in your throat and mouth vibrate, and the vibrating air makes sounds.)
2. Take a glass bottle and blow over the top to make a sound. Now turn around so your back is facing the student and make the sound again. Walk away from them while making the sound, and then walk closer. What's going on here? (Sound travels through the air to reach our ears, and on windy days, the wind can blow sounds away from you do it's hard to hear. If sounds have traveled a long way, they lose some loudness, whereas sounds made closer to us seem louder.)
3. Hit the saucepan with the wooden spoon. Why do you hear a sound? (When you hit the pan, it vibrates. The air inside the pan vibrates also, and these air vibrations are called sound waves.)
4. Use the sheet of paper to make a paper cone and tape it together. There should be a small opening at one end and large opening at the other. Make two. Now take one of them and hold it to your mouth and speak as you give the student the other to hold to their ear. Why is there a difference in what you hear using the megaphone? (The cone at your ear is a hearing aid, and the one you're speaking through magnifies the sound. Since sound is directional, the more your ears are pointed toward the megaphone, the louder the sound is going to be.)
5. Using the cones from the previous step, walk around and try to bounce sounds off other surfaces. Which surface reflects sound waves the best? (When a sound wave hits something, it can be absorbed or bounce off the surface.)
6. Insert a hand into the water at one end of the tub and place the floating object at the other. Wave the hand back and forth in the water and notice how although the waves move along the surface of the water, the object only bobs up and down. The wave looks like its sliding across the surface of the water, but the cork stays put as the wave hits it. How is this like a sound wave? (Sound moves through the air like the wave moves along the surface of the water. The water on the surface doesn't move across the water with the wave, otherwise the cork would slide across the water when you wave your hand. The water stays in one spot and vibrates back and forth to make a wave show up along the surface. It's the wave that travels, not the air or the water particles.)

# Physics of Sound Grade 1 Evaluation

Student Worksheet

(Teacher: You'll need to go over the instructions with the kids and work with them on this part.)

**Overview:** You're going to show your teacher how much of this science stuff you already know. Choose one of the following activities:

a. Make up a short story about sound waves. You can act it out if you want to with costumes and everything.
b. Draw a poster that teaches the main concepts of what sound waves look like and how sound waves travel. When you're finished, you'll use it to teach your parent or teacher and demonstrate what you've learned.
c. Invent five different types of musical instruments and put on a show for your parent or teacher. Begin your act by describing how each one makes a sound, and how you can adjust it to change the sound. (You can use the instruments we've made in the science program if you'd like to.)