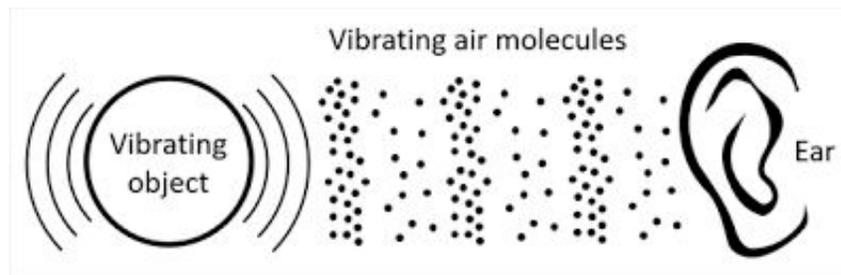


# Sound Vibrations with Taiko Drumming



## Overview

Sounds are all around us. Understanding how sound is produced makes it possible for us to manipulate it so we can decrease the number of unpleasant sounds created by things as diverse as airplanes and vacuum cleaners.

## Background

Sound is caused by a movement or vibration created by **force**. Some vibrations cause air to move, to create sound waves that we can hear. The **pitch** of the sound (how high or low the sound is), depends on how fast an object vibrates. The **volume** (how loud the sound is), depends on the degree of force used to make the object vibrate. When we increase the volume of a sound we are **amplifying** it.

With drums, we strike the skin to create a sound. The force that causes the vibration is the blow on the drum. The harder we strike, the louder the sound. You can manipulate the pitch of a drum in three ways: 1) tighten the drum's skin to make the pitch higher; 2) put a thicker skin on the drum to lower the pitch; and 3) strike the drum closer to the center to produce a slower vibration and lower pitch, which sounds more resonant.

## Education Standards

### TEK 5.6 Force, motion, and energy.

The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems.

The student is expected to:

(A) explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy

## Materials Needed

- different-sized, wide-mouthed jars without lids
- paper - tissue paper, letter paper, construction paper, other types of paper
- balloons
- rubber bands large enough to fit the mouth of the jar
- wooden sticks (chopsticks are ideal) or wooden spoons
- rice, small lentils or peppercorns
- paints, markers and other design material

## Vocabulary

Vibrations

Energy

## Students Objectives

- Understand the concepts and differences between force, pitch and volume.
- Explore the science of instrument design and construction.
- Explore the field of sound engineering.

## Activity

Discuss how force is needed to produce vibration and how different kinds of vibrations produce a variety of sounds. Demonstrate how force is used to make drums vibrate.

**Teacher Tip:** Before doing this activity, you may want to test the paper you will be using for drum skins to be sure it doesn't tear too easily. Try having the students work in groups of four when they are testing the drums.

Drums can be made with just about anything. Using the materials provided, design a drum.

1. To make a drum, place paper or a balloon over the mouth of the jar. (You might even try placing the paper down with a balloon on top of it.)

2. Place the rubber band around the mouth of the jar to secure the paper/balloon skin.
3. If you like, place some rice on the skin so you can observe the vibration as you apply force to the drum. Be sure to spend some time designing the exterior of your drum.

**Tap on your drums to produce sound. Ask students the following questions:**

- Is it different than that of other students' drums?
- Do different skins produce different sounds? What might cause these differences?
- Do different sizes of jars produce different sounds? What would happen if you filled the jars with something? Does it sound the same?
- Are different sounds produced when you strike different parts of the skin?
- What happens to the sound when you increase the force with which you strike the drum? Does the pitch or volume change?
- What happens when rice is placed on the drum? Can you see the vibrations? Does it affect the sound?
- What causes the rice to react differently when you strike the skin harder?

**Science connections:**

Various cultures throughout the world use drums as a way to communicate. Drum beats can signal warnings or transmit elaborate messages, much like Morse code, as long as the person receiving the message is within earshot. Have the students design their own drumming code so that they can send secret messages to their classmates.

## Extension

Drums have been used throughout history for religious, spiritual, technical, musical and recreational purposes. Have the students identify the types of drums used by their own culture and share the story of these drums with their classmates. They may even want to tell their story while beating a rhythm on a drum.

