

## Lesson Plan

**Grade Level:** 5-7

**Length of Class:** 45-50 minutes

**Objectives:**

- To assess the students' prior knowledge of sound energy.
- To improve their understanding of sound energy.
- To instill a knowledge of wave vibrations and sound production.
- To facilitate discussion regarding the factors affecting the quality of sound.

**Materials Needed:**

- Several 16 inch boards with a fixed peg on one end and an adjustable guitar peg on the other.
- One longer board (~24 inches) with attachment grooves.
- One flat plywood piece that can be attached to the longer board.
- One box that can be attached to the longer board.
- Pliers, side-cutters, wire.
- Slinky and rope (optional).
- Salt.
- Overhead with directions and worksheets. Overhead pens.

**Body of Lesson:**

**Hook:** (5-10 minutes)

Given that the guest speaker will most likely be a new visitor to the class, it would be appropriate to begin with a short, simple discussion. Questions such as "What is physics?" may lead to a general discussion about sound. The speaker could focus on UBC physics and what the objectives are for the day.

**Learning Activities:** (35 minutes)

1. Guest speaker introduces the topic of sound by facilitation of a short discussion. Students will be asked numerous questions in order to probe their prior knowledge of the subject. Student responses will be recorded onto the overhead/blackboard.
  - What is sound?
  - How is sound produced?
  - Why do we hear sound?
  - Examples of things that are made specifically to produce sounds?

- Brainstorm of musical instruments.
  - Probe understanding amongst:
    - a) Woodwind / Brass
    - b) Percussion
    - c) Strings
  - Explain above three categories.
2. Have 'normal' teacher divide class into small groups (size dependent on # of kids and on # of small instruments).

One small stringed instrument will be passed to each group. Students will be required to play/experiment with the objects. An overhead and a worksheet will be presented at this moment to guide them through their tasks.

- Using the string, how many ways can you make a sound? What are these?
- What differences are there between the thicker and the thinner strings?
- What differences do you note when the strings are tightened/loosened?

Students will then be asked to provide their answers to specific questions verbally to the class. For this, groups will be asked to choose a spokesperson.

3. Class will then return to their usual seats. We will then have a short discussion regarding what their findings suggest about sound production with strings. The presenter will then supplement students' responses with principles of physics.
4. Presenter will begin the demonstration. He/she will pluck the longer board's string. Students will be asked to remember the sound.

The first plate will then be added to the string. Plucking will produce a louder, fuller sound. Students will be asked to explain this phenomenon.

Plate vibration nodes will then be demonstrated with salt.

The box will then be added. Students will note/discuss the additional amplification produced by the air chamber.

**Closure & Summary:** (5 minutes)

1. Key points of sound production will be summarized.
2. Time permitting; students will be introduced to the physics outreach summer camps.
  - Mention of rockets, liquid nitrogen ice-cream, and the science of "ordinary stuff".
  - [www.physics.ubc.ca/~outreach](http://www.physics.ubc.ca/~outreach)