



**Overview:** *This lesson allows students to use their small motor skills to experiment with sound and vibration.*

**Theme:** How Does It Work?

**Grade Level:** 2<sup>nd</sup> - 7<sup>th</sup> grades

**Concept:** Exploration

**Time needed for lesson:** 90 minutes

**Objectives:** Through the process of experimentation, students will follow directions to explore the properties of energy and matter by manipulating vibration. These experiments will demonstrate the relationship between music and science. The students will work in groups to share the results of their investigation.

**Essential Question:** What is the relationship between music and vibration?

**Preparation for lesson:** The teacher will review the definitions of vibration, sound waves and energy and how they relate to the eardrum.

**Lesson Activities:**

1. Demonstrate various instruments (e.g. drum, thunder tube, Tibetan singing bowl, chimes, etc.) to portray sound and vibration. Discuss with students how vibration creates the tones of the instruments. Students can time the length of tones from instruments using a stopwatch.
2. Teacher draws 2 different sound waves on the board, one to illustrate a musical tone, the other to illustrate noise. How are these two lines different?

3. Teacher begins experiment with sound waves using 3' long cardboard tubes. 2 tubes are taped together and one end is placed next to a wind-up clock. One student volunteers to record length of tubes on the board.



Several students are asked to listen for the ticking. 2 more tubes are added, again the length is recorded and students listen for the ticking. This process is repeated until the sound is

no longer audible or you run out of tubes! The tubes lengths can be added together to calculate entire length.

4. Students are evenly divided into groups in which each group is given a set of instructions and materials to perform different sound and vibration experiments. Ask the students to read the directions before beginning their experiments.

5. The teacher explains that after they assemble their experiments they will be expected to present it to the entire class. They should explain how and why it works.

6. Students will individually journal their outcomes from their experiments.

**Extension of lesson:** Students could research the design and construction of musical instruments.

**Materials needed:** Cardboard tubes, thin plastic wrap, small candle, a saucer or dish, sand or soil, yogurt cups, string, scissors, 8 identical empty bottles, water, pencil, nylon fishing line, a piece of wood about 1" thick and 2-3' long, nail, hammers, small bucket, weights (such as small stones), 2 small pieces of wood, wire coat hangers, tape, wind-up alarm clock.

**Vocabulary:** Energy, experimentation, vibration, eardrum, sound waves, molecules, predictions, investigate, sound, pitch

**Benchmarks:**

*Science:*

Properties of matter and energy - Energy can produce changes in properties of objects such as changes in temperature.

Experiment - Experimenting is a method of discovering information. It requires making observations and measurements to test ideas.

Interpret and Communicate - Communicating is the process of describing, recording and reporting experimental procedures and results to others.

Inquiry - Students must have the opportunity to ask a question, formulate a procedure and observe phenomena.

*Physical Science:*

Energy can be transferred in many ways.

Make predictions based on patterns in experimental data.

Share results of an investigation in sufficient detail so that data may be combined with data from other students and analyzed further.

*Music:*

Language of Music - Define and use correct terminology to discuss the elements of music: Pitch (high & low).

Understanding relationships between music and disciplines outside the arts.

*Language Arts:*

Group Interaction - The student will use effective communication strategies in pairs and small group context.

**Whole child:**

*Thinking/Cognition:* Students are discovering information through experimentation, making observations and measurements to test ideas and interpreting and communicating information within the group.

*Feelings/Emotions:* Students experience surprise and discovery through experimentation process.

*Doing/Physical:* Students are assembling, attaching, measuring, listening and blowing using small motor skills to perform experiments.

*Creating/Intuition:* Students use intuition to make predictions based on patterns in experimental data.

<b>Teacher Assessment</b>	<u>No</u> <u>Yes</u>				
1. Did the student follow the directions given for each experiment?	1	2	3	4	5
2. Was the student actively collaborating within their group?	1	2	3	4	5

3. Did student successfully describe, record and report results of experiment to others?    1    2    3    4    5
4. Through the experimentation process, did student demonstrate their understanding of the relationship between sound and vibration?    1    2    3    4    5
5. Through the experimentation process, did student demonstrate their understanding of pitch?    1    2    3    4    5
6. Was student engaged in the introductory experiment?    1    2    3    4    5



### **Student Self Assessment**

1. What was your groups' assignment?
2. How did your group decide to approach your task?
3. As a group member, how did you contribute?
4. What did you learn?
5. What do you still wonder about?
6. If you were to do it over, what changes would you make?

