

Interdisciplinary Unit Title: Daily Lesson Plans

Lesson 1

Developed by: Carol Hayes, Judy Boyd, Tia Devine, LaTanyua Price

Grade Level: 4th

Subject Area(s): Science (Sound energy)

Standards Correlation:

4.P.4B.1 Plan and conduct scientific investigations to test how different variables affect the properties of sound (including pitch and volume).

Duration: 1 week

Lesson Objective(s):

I can use scientific tools to plan and conduct scientific investigations to test how different variables affect the properties of sound (Chart paper for KWL chart, post-it-notes, writing utensils.)

Materials: KWL chart, post-it-notes, student journals, computer, whiteboard
Procedure

Elicit	The students will work on the K of the KWL (K=Know) The students will work in groups of four to write on a post-it-note everything they know about sound energy. Each group will put their post-it-notes on the K side of the chart.
Engage	The students will watch a video http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/sound.htm This video explains sound energy that travels as a result of vibration. Key vocabulary to be added to the students journals: vibration, frequency, decibels, pitch.
Explore	Prompt students with the question: How can we plan a scientific investigation to test how sound vibrations travel through different matters? The students

	brainstorm ideas to test their investigations. The students record their ideas in their science journals.
Explain	Each group will share with the class their ideas to test their sound vibrations through different matter.
Elaborate	Students will use drawing paper to illustrate their designs. Students will explain their design to each member of their group. Each group will choose the design they think will better explain the question: how can sound vibration travel through different matter?
Evaluate	Each group will choose the design they think will better explain the question: how can sound vibration travel through different matter? The students will converse with each other during the learning activity and provide feedback to the group members. The teacher will ask for feed-back and observe how the group members are interacting with each other.
Extend	The classroom science library will have several non-fiction books on sound energy to help answer questions that might come up during the next phase of the lesson.

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(Week 1: Lesson 2)

Developed by: Carol Hayes, Judy Boyd, Tia Devine, LaTanyua Price

Grade Level: 4th

Subject Area(s): Science

Standards Correlation: 4.P.4B.1 Plan and conduct scientific investigations to test how different variables affect the properties of sound (including pitch and volume).

Duration: 1 week

Grouping: 6 groups with 4 students per group

Lesson Objective(s) I can plan scientific investigations to test how different variables affect the properties of sound. (Including pitch and volume)

I can conduct scientific investigations to test how different variables affect the properties of sound. (Including pitch and volume)

Materials: rulers, block of wood, four glass flask per two tables, plastic basins for water, rubber bands, tuning forks, lab books

Procedures:

Elicit	New Knowledge is built on existing knowledge. The students will break into their Think-Pair-Share groups to discuss the three states of matter. The teacher will explain that vibrations travel through matter.
Engage	The students will split into their lab groups. The students will decide which state of matter (solid, liquid, air) they will choose to conduct their vibration investigation.
Explore	Prompt groups of students with questions Such as what is your control? What variable will you change in your investigation? The students look over their logbooks and material and begin to construct their investigations. Some will construct kazoo's or mouth organs. Another group will investigate how sound travels through liquid. The last groups will use tuning forks to test the pitch on several objects such as a block of wood, desktop, or ruler.

Explain	The class will participate in a Gallery Walk to each table. Each group will demonstrate their investigation and give an explanation on their findings. (Objects with a greater thickness produce lower pitches. Greater lengths produce lower pitches. Using force when plucking a rubber band will result in a louder note. Gently plucking a rubber band will result in a softer sound.
Elaborate	The students will reflect on their experiment and discuss in their group circle if their hypothesis were right. What could they have changed about their investigation and what variable could they change next.
Evaluate	The group projects will be assessed by The Property of Sound rubric.
Extend	The students can watch planet-science.com and design a sound sandwich to see who in their group can be the loudest.

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Developed by: LaTanyua Price, Carol Hayes, Judy Boyd, Tia Devine

Grade Level: 4th

Subject Area(s): Science

Standards Correlation:

4. P.4B.2: Analyze and interpret data from observations and measurements to describe how change in vibration affects the pitch and volume of sound.

MCK-1.6 Explore a variety of pitched and unpitched instruments as well as other sound sources, including body percussion.

D4-7.3 Explore movement and create a brief movement phrase that demonstrates an understanding of a concept or idea from another discipline or everyday life.

D4-3.3 Respond to the accompaniment in a dance and identify the mood it creates (for example, sound, music, spoken text).

Duration: 1 week Lesson 3

Grouping:

Lesson Objective(s):

Students explore and describe sounds made by the vibrations of ruler.

Students observe and describe the movements of different lengths of the ruler.

Students relate the vibrations of different lengths of the ruler to the sound produced.

I can analyze and interpret data from observations and measurements to describe how change in vibration affects the pitch and volume of sound.

I can explore a variety of pitched and unpitched instruments as well as other sound sources, including body percussion.

I can explore movement and create a brief movement phrase that demonstrates an understanding of a concept or idea from another discipline or everyday life.

I can respond to the accompaniment in a dance and identify the mood it creates (for example, sound, music, spoken text).

Materials:

1 Record Sheet: Vibrating Ruler-What I Hear and See

(for every 2 students)

1 plastic ruler with centimeter scale, 30 cm (12in) long

1 heavy hardback book (dictionary), about 2.5 cm (1in) thick, from the classroom

(For the class)

1 sheet of newsprint

1 marker

Procedures:

Elicit	Review with the students the sound they heard in Lessons 1 and 3 by asking them how the size of the tuning forks and nails affected the sounds they produced.
Engage	Show the students the ruler and ask them to think about how the ruler could produce sounds. Each pair of students will pick up one ruler, one book, and two copies of Record sheet.
Explore	Students will explore making sounds with the ruler. Then suggest that they extend one end of the ruler over the edge of the table, pluck it, and listen. Which sounds come from the ruler hitting the table? Which are produced by the ruler making the air vibrate?
Explain	Explain to the students why the ruler makes the sound that it makes according to the air vibrating and show how to hold the ruler down firmly with a books so the ruler will not hit the table.
Elaborate	1. Ask the students to recall the experiments in the first two lessons and

	<p>think about whether the ruler might make sounds of high or low pitch when a long piece of it extends over the edge of the table. Why do they think so?</p> <ol style="list-style-type: none"> 2. Have the students write their predictions about the sound produces by a long, medium and short piece of the ruler on their record sheet under the “Predictions and Reasons” , under “What I Hear.” 3. Ask students to make predictions about how they think the ruler will vibrate when a long, medium, and short piece extends over the edge of the table. They should make their predictions in the column labeled “Predictions and Reasons,” under the heading “What I See’ on Record Sheet. 4. Ask students to work with their partners to investigate the sounds produced by plucking different lengths of the ruler. Have them record what they see and hear. Have them write notes in their science notebooks about what they see and hear. 5. After students finish exploring the behavior of various lengths of the vibrating ruler, have them return their materials to the distribution center. Tell the students to wash their hands. 6. Ask students to use the information they have collected to complete Record Sheet. An example of the completed record sheet is shown in Figure 4-2.
Evaluate	<ol style="list-style-type: none"> A. The students are to share what they discovered as they listed to different pitches and saw the rulers vibrating. Questions such as the following may help start the discussion: <ol style="list-style-type: none"> 1. What did you hear when you compared the sound produced by a long piece of the ruler with the sound of a short piece? 2. What did you observe when you compared the vibrations of a long piece and a short piece of the ruler? B. Introduce “The Elephant’s Rumble,” in this lesson in this guide and pgs. 14-15 of the Student Investigations book, by asking students to make a list of animals and the sounds they make. Then challenge them to brainstorm ways they think animals produce these sounds. <p>Concepts:</p> <ol style="list-style-type: none"> 1. Do students understand that sound is produced by vibrations? 2. How do students distinguish between pitch and volume? 3. Do students recognize the effect that changing the length of the ruler has on the pitch?
Extend	<ol style="list-style-type: none"> 1. Read Elephants Calling, by Katharine Payne, to the class. 2. Ask students to find objects other than rulers that can be placed over the edge of the table and plucked to make sounds of different pitches. Challenge students to match the pitches of two different vibrating objects. 3. Challenge students to find out more about how different animals hear and about the complex communication systems that some animals use. 4. Invite a policeman or policewoman to bring dog whistles and a dog to

	the classroom. Ask the visitor to share and discuss the “silent whistle” with students.
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Those Amazing Musical Instruments!: Your Guide to the Orchestra Through Sounds and Stories (Naxos Books)
by Genevieve Helsby "Sounds Are All Around" / Science and Technology 4

Sound and Your Body
Sound—More Than Meets the Ear
Elephants Calling, by Katharine Payne

Lesson 4 Making Sounds with Rulers
Lesson 6 Vibrations We Can't See
Lesson 9 Making Sounds with String
Lesson 12 How Do Different Strings Sound?

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Developed by: Carol Hayes, Judy Boyd, Tia Devine, LaTanyue Price

Grade Level: 4

Subject Area(s): Science and Social Studies

Standards Correlation: **Science 4.P.4B3** Define problems related to the communication of information over a distance and design devices or solutions that use sound to solve the problem.

Standard 4.S.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

Social Studies 4-5.2 Explain the motivations and methods of migrants and immigrants, who moved West, including economic opportunities, the availability of rich land, and the country's belief in Manifest Destiny.

Duration: Week 3, Day 3

Grouping: Students will work in groups of 3

Lesson Objective(s): Students will be able to follow instructions to build a simple telegraph.

Materials: Seven sets of the following:

- 2 pieces of wood---2X4 cut in 1 foot and 6 inch sections
- 9 small wood screws or nails
- 2 large iron nails---2-3 inches long
- 4 flat strips of bendable metal----3 should be 4" long and 1 should be 7" long
- 20 feet of insulated electrical wire (22-30 gauge)
- 2 flashlight batteries ---- D cell
- 1 diode
- Screwdriver and Hammer

Procedures:

Elicit	Review with students the previous day's lesson regarding the electrical telegraph invented in 1837 by Samuel Morse, along with the Morse Code used to transmit messages. The teacher will advise the students that they will be
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	given the opportunity to work together to build their own telegraph.
Engage	The teacher will display the following website on the SmartBoard which will give the information and procedures to build a telegraph: http://www.w1tp.com/perbuild.htm . After the teacher goes over each step, the students will be placed in groups of three to build their own telegraph from the materials provided by the teacher.
Explore	The students will use their model telegraph to send messages to each other using their Morse Code sheets.
Explain	Each group of students will explain to the teacher how their telegraph model is able to work.
Elaborate	Students will make up their own “Morse Codes”.
Evaluate	Students will be assessed as to how well they followed the procedures in building a functioning telegraph.
Extend	Students will be grouped according to ability levels in order to gain help from peers.