

How Can I Sort? Kindergarten

Extensions/Additional Resources

Classroom Portals/Technology:

Discovery education:

- ④ [Learning about Sorting and Grouping](#) (The entire video is 15 minutes long, so you may wish to pick and choose relevant segments, such as "Alike and Different," "Using Your Senses," "Sorting By More Than One Attribute," and "Different Ways to Sort and Group.")

Literature:

- ④ "It's Science: Hot and Cold" By Sally Hewitt

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Curriculum Framework

Kindergarten
Second Quarter Physical Science

Grade Band Theme: Observations of the Environment

This theme focuses on helping students develop the skills for systematic discovery to understand the science of the physical world around them in greater depth by using scientific inquiry.

Topic: Properties of Everyday Objects and Materials

This topic focuses on the production of sound and on observing, exploring, describing, and comparing the properties of objects and materials with which the student is familiar.

Condensed Content Statements:

Some objects and materials produce sound.

- I can observe, explore, describe, and compare the properties of objects and materials.
- I can observe and ask questions about the natural environment.
- I can create sound in a variety of ways, such as tapping, blowing, and plucking.

Science Inquiry and Application

During the years of PreK-4 all students must become proficient in the use of the following scientific processes, with appropriate laboratory safety techniques, to construct their knowledge and understanding in all science content areas:

- I can plan and conduct simple investigations.
- I can employ simple equipment and tools to gather data and extend the senses.
- I can use appropriate mathematics with data to construct reasonable explanations.
- I can communicate about observations, investigations, and explanations.
- I can review and ask questions about the observations and explanations of others.

Time Frame: 4 weeks

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| Prior Knowledge | Current Content Elaboration | Future Application of the Concept |
|--|--|--|
| <p>(none at this level)</p> | <p>Sound can be made in many ways. Objects like cymbals, the tabletop, or drums can be tapped to produce sound. Objects like a bottle or a trumpet can be blown into to produce sound. A wide variety of sounds can be made with the same object. For example, a plastic bottle can be tapped or blown into. The connection between sound energy and the vibration of an object is made. Vibrations can be made visible when water splashes from a cymbal or triangle placed in water, or rice vibrates on the top of a banging drum. The concepts of pitch (low vs. high) and loudness are introduced. The pitch of sound can be changed by changing how fast an object vibrates. Objects that vibrate slowly produce low pitches; objects that vibrate quickly produce high pitches. At this grade level, sound is explored only through situations that can be observed and described (e.g., high and low notes, loudness, softness.) Note: Wave descriptions of sound and the propagation of sound energy are not appropriate at this grade level.</p> | <p>Student mastery will include understanding of the following: Sound is produced by touching, blowing, or tapping objects. The sounds that are produced vary depending on the properties of the objects. Sound is produced when objects vibrate.</p> <p>Grades 1-2: Exploring sound provides an experiential basis for the concepts of motion and energy. A variety of motions are explored. Forces are needed to change the motion of objects.</p> <p>Grades 3-5: Energy is introduced as something that can make things move or cause change. The concept of a medium for sound is introduced and disturbances in liquid and solid media are observed.</p> <p>Grades 6-8: The wave nature of sound is introduced.</p> |
| <p>Common Misconceptions:</p> <p>Hitting an object harder changes the pitch (note) of the sound produced. ("When I hit the drum harder, the note changed.") Loudness and pitch (note) of sounds are the same things. ("When I sing louder, the pitch (notes) change.") Music is strictly an art form; it has nothing to do with science. ("I play the recorder in music class so it has nothing to do with science.")</p> | | |

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| Expectations for Learning: Cognitive Demands and Visions into Practice | | | |
|--|--|---|---|
| Recalling Accurate Science (Quadrant A) | Interpreting and Communicating Science Concepts (Quadrant B) | Demonstrating Science Knowledge (Quadrant C) | Designing Technological/Engineering Solutions Using Science Concepts (Quadrant D) |
| Investigate sounds made with homemade instruments. | | | |
| <p>Identify three ways to make sounds from objects.</p> <p>(Example Questions: Is there another way to make sounds from objects? Explain.)</p> | <p>Compare different ways to make loud and soft sounds by tapping, blowing, or plucking objects.</p> <p>(Example Question: Describe how you can use the same object to make loud and soft sounds. Do you have to handle the object differently in order to produce the different volumes?)</p> | <p>Plan and implement a scientific investigation to determine, "How many different ways can sounds be made from an object?" (e.g., horn, cymbals, rubber band, guitar, plastic bottle)</p> <p>(Example Question: What process skills did you use in your investigation? Give an example.)</p> | <p>Design and construct an instrument that can make different sounds by tapping, plucking, or blowing.</p> <p>Give suggestions to other students about how their instruments may make different types of sounds.</p> <p>(Example Question: Explain how your instrument produces sound.)</p> |

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| Investigate how the stretch of plucked rubber bands affects the sound. | | | |
|---|--|---|--|
| <p>Recall that objects that vibrate quickly produce high notes and objects that vibrate slowly produce low notes.</p> <p>(Example Questions: How can you visually represent vibrations? How can you show quick vibrations that create high notes? How can you show slower vibrations that produce low notes?)</p> | <p>Pictorially represent the observations from the experiment.</p> <p>Compare the notes made from rubber bands that are stretched different amounts.</p> <p>Compare the speed of vibration to the pitch (higher/lower notes) of the sound produced.</p> <p>(Example Questions: Can you match the visual representations you created in the "Quadrant A" section of this investigation to the different sounds you heard in this section? Explain how you knew which visual representation matched each sound.)</p> | <p>Plan and implement a scientific investigation to determine, "How are pitch (higher/lower notes) and vibration changed as a rubber band is stretched further and further?"</p> <p>(Example Question: Do the results of this investigation change when you use different thicknesses of rubber bands?)</p> | |

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| Investigate how the properties of a drum affect the sound. | | | |
|--|---|---|--|
| <p>Recognize that sound is caused by vibrating objects.</p> <p>Recall that objects that vibrate quickly produce high notes and objects that vibrate slowly produce low notes.</p> <p>(Example Question: Can we see the vibrations of the drums? What materials can we use to help us see the vibrations more clearly?)</p> | <p>Pictorially represent the observations from the experiment.</p> <p>Compare the sounds made from drums with different properties.</p> <p>(Example Question: Describe the changes in pitch and volume created by each different material.)</p> | <p>Plan and implement a scientific investigation to determine, "How does changing a property of a home-made drum (e.g., width, depth, stretch of material) affect the vibration and the sound of a drum?"</p> <p>Teacher's Note: The vibrations can be made visible by placing rice on the head of the drum.</p> <p>(Example Question: What happens when we change more than one variable, or characteristic, of the drum?)</p> | |

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Curriculum Framework

Resources:

-
- "What Causes Sound?"
 - "How Does Sound Travel?"
 - "How Do We Make Different Sounds?"

Lessons

- Exploring Sound
- Making a Shaker
- How Sounds are Different
- Properties of Sound

Literature:

- Exploring Sound by Claire Llewellyn
- Listen! Learn About Sound by Pamela Hall
- Loud or Soft? High or Low? by Jennifer Boothroyd
- Clang Clang! Beep Beep! by Robert Burleigh

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Instructional Strategy Resource Guide (See Appendix)

Vocabulary

To strengthen science vocabulary skills teachers may select strategies from the *Instructional Strategies Guide: Enhancing Science Vocabulary Skills*. (Example: Pictionary, Scrabble, Sparkle, etc.)

Science Vocabulary Terms:

| | | | | |
|-------|--------|-------|------|--------------------|
| high | low | soft | loud | vibrate/vibrations |
| pitch | volume | pluck | blow | tap |

Enrichment

Activity: Students compare and contrast two different places that have sound using a Venn Diagram. (Examples: playground, hallway, gym, cafeteria, classroom, etc.)

To further extend lessons teachers may select enrichment centers found in *Instructional Strategies Guide: Enrichment Centers Grades K-5*.

Content Statement-Related Enrichment Centers:

- Create an Instrument (3)

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| Classroom Portals/Technology: | | |
|--|--|---|
| <p>Discovery Education: (http://streaming.discoveryeducation.com/)</p> <ul style="list-style-type: none">• “Science Facts and Fun: Everything is Something” (Segment 1)• “Peep and the Big Wide World: A First Look: Sound”• “Making Your Own Musical Instruments”• “How Sounds Are Different”• “The Wonder of Sound” | <p>SMART: (Search the Smart Exchange site (http://exchange.smarttech.com) for these specific titles:)</p> <ul style="list-style-type: none">• “High/Low” (SMART Notebook Lesson)• “Making Sound” (for use with Senteo interactive response system)• “Plane or Train? Sounds Go Up and Sounds Go Down” (SMART Notebook Lesson)• “Pitch Sort Lesson” (SMART Notebook Lesson)• “Sound” (published by SMART Technologies) | <p>Websites:</p> <p>BBC Sorting and Using Materials:</p> <ul style="list-style-type: none">• http://www.bbc.co.uk/schools/scienceclips/ages/5_6/sorting_using_mate/shtml |

Exploring Sound Kindergarten

Suggested Time Frame:

2 days

Materials:

- paper or plastic cup
- string
- tuning forks (if available)
- paper clips
- rubber bands of different widths and lengths
- rulers (wooden and plastic)
- clip boards
- rice, tin cans, bolts and anything else that will make a sound
- science journal
- chart paper
- *Post It* Notes

Vocabulary:

High sounds
Low sounds
Soft sounds
Loud sounds
Vibrating

Process Skills:

Compare
Communicate
Hypothesize
Design
Experiment
Observe
Control Variables
Draw Conclusions
Safety
Infer

Condensed Content Statement:

Some objects and materials produce sound.

Sound is produced by touching, blowing, or tapping objects.

The sounds that are produced vary depending on the properties of the objects.

Sound is produced when objects vibrate.

Lesson Summary:

Students will further investigate, observe, and record data about sound.

Exploring Sound

Kindergarten

Teacher Background:

Sound is made when something vibrates. Vibrating occurs when something moves again and again and again. Sometimes a vibration can be seen and sometimes it cannot. Sounds travel through the air in waves. The sound waves move away from what is being vibrated. You cannot see sound waves but when they reach your ear, tiny bones in your ear vibrate. Then you hear sound. Sounds have different pitches; some are high and some are low. The pitch has to do with how fast or how slow something vibrates. The faster something vibrates the higher the pitch. The slower something vibrates the lower the pitch. Sound is measured in decibels. A whisper is about 20 decibels, talking is about 50 decibels and a loud yell measures about 180 decibels. A space rocket is very loud. It measures about 200 decibels. The sound vibrations (waves) travel through the air in all directions until they hit something. When the sound waves hit our eardrums, we hear sound.

Teacher Notes

- The following lessons can be used in an open inquiry format where the students discover concepts about sound by using various materials that are provided. These investigations can be set up as centers or as small group investigations. This may be determined by the supplies that are available. Some teachers may prefer to do these lessons in a more structured way. Teachers can choose the lessons and the format for their delivery, based on the needs of their classroom.
- In this lesson, students will be conducting an investigation to discover all they can about sound. Students will be exploring how things make sound and how the sound travels to their ears. There are five centers.

Engage (Warm-up)

1. Have students complete the "What I Know" section of a KWL chart to find out what students already know about sound and record answers on chart paper. Then have students write one question for the "What I Want to Know" on a *Post It Note*, share it with the class, and attach it to the chart.
2. Be sure to discuss any safety procedures when using lab equipment.

Explore (Instructional Strategies)

Exploring Sound

Kindergarten

1. These centers are suggestions for the exploration of sound, but give students the opportunity to create their own experiments and ways of exploring sound.
 - Tap a ruler on the edge of a desk. Change the length of the ruler. How does this change the sound? Try this with a plastic ruler. Try it with a wooden ruler. How are the sounds similar? How are they different?
 - Stretch a rubber band over the ends of a ruler and place a pencil under the rubber band on the ruler. Pluck the rubber band. What do you observe? How can you make changes to the sound? Try a rubber band of a different thickness. Does the sound change? How is the sound getting to your ear?
 - Make a paper cup telephone. Tie a paper clip onto a string. Make a hole in the bottom of a paper or plastic cup. Thread the string through the hole, allowing the paper clip to keep the string from pulling through the hole. One student holds the cup up to their ear while another student holds the end of the string. A third student snaps the string. What happens? How is the sound made? Can you change the sound? What happens if you make the string longer or shorter?
 - Experiment with a tuning fork. Tap the tines on a rubber eraser. Tap it on the end of a desk, on a book, on a clip board. What do you observe? What do you hear? Have a student tap the tuning fork on the table as another child puts his ear on the other end of the table.
 - Students can experiment with dropping things onto a clipboard (or another hard surface). Make predictions about what sound the different objects will make, as they fall on the clipboard. Does a bigger object make a louder sound? What about dropping a piece of paper onto the clipboard? A pencil? A bolt? How does the distance that the objects drop affect the loudness? Experiment with dropping the same object from different distances. Find two different objects in the room that make similar sounds when dropped.

Interdisciplinary Connections

Discuss and chart volume, mood, and rhythm of various genres of music.

Assessment

1. How do things make sounds?
2. What things affect how high, low, loud, and soft a sound is?
3. Does a loud sound cause quicker or slower vibration than a soft sound?
4. Predict whether a new sound will be loud or soft? High or low?
5. Compare the sound you made with another sound.

Exploring Sound Kindergarten

6. What might happen if you: lengthen the string, shorten the string, hit the tuning fork harder, etc.?

Reteach Ideas

Collect various objects that produce sound. Have children listen and describe the sounds they hear. Have students write about the sounds that they hear. Encourage students to use the words, loud, soft, high and low. Students share the information they found with their classmates. Any of these investigations can be repeated for children who need remediation.

Closure

1. Encourage students to share the results of their investigations with others. Teacher circulates asking higher level questions. Teacher reviews the information that students recorded.
2. Bring the whole group back together. Generate a list of discoveries made by students. Have students share explanations as other students ask and answer questions.
3. Ask children to now write everything they know about sound in an "Exit Ticket" format.
4. Complete the "What I Learned" section of the KWL chart.

Extensions/Additional Resources

Classroom Portals/Technology:

Discovery Education

 [Peep and the Big Wide World A first Look: Sound](#)

Website:

 BBC School Science: Sound and Hearing Game
http://www.bbc.co.uk/schools/scienceclips/ages/5_6/sound_hearing.shtml

Literature:

 [Sounds all Around](#) by Wendy Pfeffer

 [Ah, Music](#) by Aiki (Storytown-Second grade)

 [Zin! Zin! Zin A Violin](#) by Lloyd Moss

 [Music DK Eyewitness Books](#)

Making a Shaker Kindergarten

Suggested Time Frame:

1 day

Materials:

- Small paper plates for each student with holes punched around the edge
- Yarn long enough to sew around the edges of the plate, with one end taped
- Beans
- Musical instruments (Ask the music teacher or instrumental teacher for a loan. If this is not possible, use photographs.)

Vocabulary:

Whole
Part
Instrument

Process Skills:

Design
Experiment

Condensed Content Statement:

Some objects and materials produce sound.

Sound is produced by touching, blowing, or tapping objects.

The sounds that are produced vary depending on the properties of the objects.

Sound is produced when objects vibrate.

Lesson Summary:

Students will observe musical instruments and discuss their parts. Then they will use different parts to make a shaker.

Making a Shaker Kindergarten

Teacher Background

Students demonstrate an understanding of the composition of physical systems and the concepts and principles that describe and predict physical interactions and events in the natural world. This includes demonstrating an understanding of the structure and properties of matter, the properties of materials and objects, chemical reactions and the conservation of matter. In addition, it includes understanding the nature, transfer and conservation of energy; motion and the forces affecting motion; and the nature of waves and interactions of matter and energy. Students demonstrate an understanding of the historical perspectives, scientific approaches and emerging scientific issues associated with the physical sciences.

Teacher Notes

If it is possible, engage your school's Instrumental Music teacher to help you in sharing a variety of musical instruments and how they make sounds. If this is not a possibility, ask the school's Vocal Music teacher to share the variety of percussion instruments available and allow the students to investigate how sounds are made.

Engage (Warm-up)

Share a few instruments and discuss their parts and their function. (Ex. The mouthpiece is to blow into. The keys change the sound. The tube helps make the sound louder. The pegs change the pitch of the strings, etc.) Show how rice/bean vibrate in shaker or drum.

Explore (Instructional Strategies)

1. Show the class the paper plates, beans and yarn. Ask: What musical instrument could we make with these parts? Allow some time for ideas.
2. Explain how to make the shaker.
 - a. Line up the holes on the plates. (You may want to start "sewing" each plate before giving them to the children.)
 - b. Sew most of the plate.
 - c. Put in a scoop of beans.
 - d. Finish sewing.
3. Play a favorite song and let the students accompany with their shakers.

Making a Shaker Kindergarten

Interdisciplinary Connections

See Grade 2 TE Lessons.

Write a 'how to' list describing the steps to make a shaker. This can be done in a step-by-step chart with students illustrating each step of the process. An example of the chart is included with this lesson.

Assessment

1. What part of the shakers makes the sound? How do you know?
2. What might happen if we used paper clips inside the plates instead of beans?
3. If you could design a shaker instrument, what materials would you use and why?

Closure

1. What function did each part have?
2. How could we make a shaker that has a different sound?
3. What else could we use to fasten the plates?
4. What else could hold the beans?
5. What other objects could we put inside?
6. How would the sound change if we used metal? Plastic? Wood?

Extensions/Additional Resources


Classroom Portals/Technology:

Discovery Education:

[Making Your Own Musical Instruments](#) (4:01)



Website:

 "Curious George Video: Wind Chimes" (<http://pbskids.org/curiousgeorge/video/#3>)

Literature:

 [Making Music](#) by Dana Meachen Rau

 [Percussion](#) by Wendy Lynch

Name _____



How I Made My Music Shaker



| First, | Next, | Last, |
|--------|-------|-------|
| | | |

How Sounds Are Different Kindergarten

Suggested Time Frame:

1 day

Materials:

- numerous non-fiction books on sound
- chart paper
- 8 ½ x 11 paper
- *Post It* notes

Vocabulary:

- pitch
- volume
- vibration

Condensed Content Statement:

Some objects and materials produce sound.

Sound is produced by touching, blowing, or tapping objects.

The sounds that are produced vary depending on the properties of the objects.

Sound is produced when objects vibrate.

Lesson Summary:

In groups, students will peruse/read non-fiction books on sound looking for ways sounds are different. The teacher will read one of the books out loud then the students will create a flip book using information they learned.

How Sounds Are Different Kindergarten

Teacher Background

Sound is made when something vibrates. Vibrating occurs when something moves again and again and again. Sometimes a vibration can be seen and sometimes it cannot. Sounds travel through the air in waves. The sound waves move away from what is being vibrated. You cannot see sound waves but when they reach your ear, tiny bones in your ear vibrate. Then you hear sound. Sounds have different pitches; some are high and some are low. The pitch has to do with how fast or how slow something vibrates. The faster something vibrates the higher the pitch. The slower something vibrates the lower the pitch. Sound is measured in decibels. A whisper is about 20 decibels, talking is about 50 decibels and a loud yell measures about 180 decibels. A space rocket is very loud. It measures about 200 decibels. The sound vibrations (waves) travel through the air in all directions until they hit something. When the sound waves hit our eardrums, we hear sound.

Teacher Notes

Volume is the intensity of sound; loudness/softness

Pitch has to do with how fast or how slow something vibrates; high/low, key

Engage (Warm-up)

1. In groups, students will peruse/read books on sound looking for ways sound is different..
2. As the students find interesting facts on sound they will write three down on Post It notes and place their most interesting fact on the board.
3. The teacher will share student's facts with the whole class

Explore and Explain (Instructional Strategies)

1. The teacher will read one of the books on sound, emphasizing information on pitch and volume.
2. The students will fold a sheet of 8 ½ x 11 paper horizontally
3. Opening the paper, they will cut 3 evenly spaced slits up to the fold to create 4 flaps
4. On the flaps the students will write: loud volume, soft volume, high pitch, low pitch
5. Students will lift each flap and draw a picture of an item that makes that sound.

How Sounds Are Different Kindergarten

Extension/Expansion/Elaboration/Interdisciplinary Connections

As a class, come up with a definition for volume and pitch and write them in their journals.

Assessment

1. What is the difference between pitch and volume?
2. Can you give examples of each?

Closure

Have students share their flip-books with at least two classmates. Collect the flip books and evaluate for understanding of volume and pitch.

Extensions/Additional Resources

Classroom Portals/Technology:

- 🌐 Discovery Education: [How Sounds Are Different](#) (video segment)

Literature:

- 🌐 [All About Sound](#) by Lisa Trumbauer (Rookie Read-About Series)
- 🌐 [Sounds All Around](#) by Wendy Pfeffer, Holly Keller
- 🌐 [Sound](#) by Darlene R. Stille
- 🌐 [Hearing Sounds](#) by Sally Hewitt

Properties of Sound - Kindergarten

Condensed Content Statement:

Some objects and materials produce sound.

Sound is produced by touching, blowing, or tapping objects.

The sounds that are produced vary depending on the properties of the objects.

Lesson Summary:

Students will identify and describe different sounds and how each sound is made. They will use simple materials and objects to explore the properties of sound in terms of volume and pitch and record their discoveries in tables.. This lesson engages students in active learning experiences that build understanding of the properties of sound. Scientific inquiry is occurring as students are learning content. Teachers point out the inquiry strategies as students discover the properties of sound and share their findings with the members of their group.

Estimated Duration: Three hours

Commentary:

This lesson provides many opportunities for student discovery of objects and the sounds which they make. Teachers who have used this lesson commented on how well students experienced and understood cause and effect.

Pre-Assessment:

Prepare 10 items that create a sound. Use objects common to the classroom and considered to be familiar to students. The objects should be out of view of the students as you create sounds. Objects may include, but are not limited to these: a bell; a string instrument; a glass with some water and a glass with a different amount of water to be struck to ring on the side of the glass; a radio; recording of a woman's high voice; recording of a man's low voice, choir bells and a loud whistle. The objects chosen must easily reflect the properties of sound: high/low pitch and soft/loud volume. Recording the sounds prior to class for play back for this assessment will facilitate later use during the lesson.

1. Instruct students to listen carefully to each sound that the objects make.
2. Direct students to record their answers in words or a picture, or both words and pictures.
3. Have students describe the sounds in as many ways as they can.
4. If the object making the sound is known, the student will also record it.



Properties of Sound - Kindergarten

Instructional Tip:

The word “pitch” refers to a sound being high or low. The word “pitch” is associated in this lesson with the rate of vibration of the source producing the sound. Other words, such as “tone” and “notes” may also be used when describing pitch. Collaborate with the music teacher to determine how this lesson can be integrated with the music class.

Scoring Guidelines:

Exceeds expectation: Student will correctly use the terms “high or low” “soft or loud”, for the characteristics of pitch and volume for 10 of the objects that are sounded.

Meets expectation: Student will correctly use the terms “high or low” “soft or loud” for the characteristics of pitch and volume for seven of the objects that are sounded.

Does not meet expectations yet: Student will incorrectly misuse the terms “high or low” “soft or loud” for the characteristics of pitch and volume or not be able to provide descriptions for the objects that are sounded.

Post-Assessment:

1. Provide each student with approximately 40 cm of kite string.
2. Ask students to make their strings sing using the information they have learned during exploring. They may pluck or pull to vibrate the strings.
3. Assess students using the following actions and questions:
 - a. Describe how the sound changed. What caused this change? (louder, the sound is now moving through the students jaw to the ear instead of through the air)
 - b. Shorten the string by winding it up on your finger. How has the sound changed? (higher)
 - c. Without changing the length of the string, pluck the string with lots more energy. How has the sound changed? (louder)
 - d. Unwind the string to make it longer. Pluck it gently. Describe the sound using two words. (low and soft)

Instructional Tip:

Keep the string clean and direct students to place one end of the string between their front teeth and pull the other end outward from their face. They will wind the far end up on their finger. Demonstrate with a string by keeping the string at a longer length for the beginning. Demonstrate plucking for best results. Only the student can hear the sound from his/her string.

Scoring Guidelines:

Exceeds expectation: Students will be able to correctly describe the properties of sound using the terms “high or low”, “soft or loud”, after four actions to create sound with the string.

Meets expectation: Students will be able to correctly describe the properties of sound using the terms “high or low” and “soft or loud”, after three actions to create sound with the string.

Properties of Sound - Kindergarten

Does not meet expectations yet: Student will incorrectly respond or misuse the terms “high or low” “soft or loud”, after they create sound with the string.

Instructional Procedures:


Day One

Pre-Assessment


Background information

Sound is produced when an object vibrates. Common musical instruments have strings or columns of air that vibrate to produce sound. Musicians learn to change the pitch of the sound by adjusting the size of the vibration. For example, most commonly, women’s voices are capable of producing higher pitches than men’s voices. A violin is capable of a higher pitch than a cello or bass. Different pitches are created from sirens on emergency vehicles where the pitch starts low, goes higher then lower and repeats the pattern.


Besides pitch, volume is another property of sound that is important. Volume, in this case, means the loudness of the sound or intensity. One factor is the energy that is put into making the object or instrument vibrate. Plucking harder makes it louder. When comparing the same pitch, the greater the amplitude of the wavelength, the more energy it has and the louder it sounds. This lesson is going to use music to begin the study of these two properties.




high and soft

A diagram showing a wave with a high frequency and a small amplitude. The wave consists of approximately four full cycles within the frame.

high and loud

A diagram showing a wave with a high frequency and a large amplitude. The wave consists of approximately four full cycles within the frame, with a much larger vertical height than the 'high and soft' wave.

low and soft

A diagram showing a wave with a low frequency and a small amplitude. The wave consists of approximately two full cycles within the frame.

low and loud

A diagram showing a wave with a low frequency and a large amplitude. The wave consists of approximately two full cycles within the frame, with a much larger vertical height than the 'low and soft' wave.

Engage

Day Two

1. Choose and read a book that has a character that is playing a musical instrument or a book about musical instruments. String and woodwind instruments are well suited. This helps tie the lesson into a real-world context.
2. After reading ask: “How does a person create sound with the instrument?” and “How would you describe the sound of an instrument when it is being played?”
3. Allow for thinking and sharing with small groups of students.
4. List the students’ ideas on chart paper to review after explore time.

Instructional Tip:

It is expected that the students have had a prior learning experience with grade-level indicator number one exploring how things make sound.

Explore

Properties of Sound - Kindergarten

Day Three

5. Display and read aloud these questions which students will answer during the sound explorations.
 - What is vibrating?
 - How can the sound be changed?
6. Instruct students to identify what they observe and hear at each of the three stations, by describing on paper using words and pictures.
 - one large, one small box each with two thicknesses of rubber bands (students pluck near their ears to hear.)
 - one large, one small box with striker (like a drum)
 - three glasses- with no water, little water and more water
7. Direct students to use the materials at each station to answer questions.
8. Have students use words and/or pictures to answer each question. (Prerequisite knowledge: student can explain what is vibrating, air or the rubber band)
9. Make students aware of time allowed for completion. See “Differentiated Instructional Support.”
10. Use these guiding questions while facilitating small groups at each station:
 - a. What will you do to make that box, glass, rubber band vibrate?
 - b. How does the sound change when you pluck each rubber band?
 - c. Did you observe a change in the sound as you struck each glass?
 - d. How are you going to record what you observed on your paper?
 - e. Why do you think the sound changed?

Instructional Tip:

Gather materials for easy access before moving to the explanation phase.

Explain

11. Have students share what they discovered.

| Pitch | Volume |
|-------|--------|
| High | Soft |
| Low | Loud |

12. Use the terms pitch and volume to facilitate student responses by reviewing the appropriate terms.
13. Write the words on the board in a chart.
14. Have students add missing information about pitch and volume.
15. Use the materials in each set from the activity to demonstrate volume caused by using more energy and conclude the activity by emphasizing that this can change the pitch and volume.

Properties of Sound - Kindergarten

Expand

Day Four

16. Review the chart made during the engagement phase of the lesson.
17. Use a Cause and Effect Organizer (see Attachment A) where students can summarize their discoveries about each station.

| Cause | Effect |
|--------------------|--------|
| Bigger rubber band | Lower |
| Less water | Higher |
| Tapped harder | Louder |

18. Bring students together and do the following demonstrations for changes in volume and pitch.
19. Strike a tuning fork gently with a rubber mallet. When the students cannot hear a sound, place it closer to their ears. Repeat until each student can describe the sound with a pitch and a volume word. Repeat the process with a tuning fork of a different pitch. See if the students can describe the appropriate change in pitch and volume relative to the former sound. The proximity to the sound affects the volume.
20. Choose the tuning fork that is most easily heard. Make a point of striking it harder to increase the volume. Have students explain what happened using the new vocabulary words. If a piano is available in your classroom the same can be done with a key. The amount of energy put into the fork affects the volume.
21. Strike a tuning fork and let it resonate for a moment then place it with the handle on the table or desk. The sound will be louder because a greater sized surface is vibrating affecting the volume. Ask, "How has the sound changed?"
22. Gather students closely around the small shallow pan of water. Gently strike the tuning fork and place in the center of the water perpendicular to the surface. The ripples are apparent-as "small waves of energy".
Ask students to describe their observations of what they observed in the pan and the sound that the tuning fork made before it was placed in the pan. Explain the observations using "small waves of energy". Demonstrating intent, increase the amount of energy in striking the tuning fork. The water will bounce out because the waves are so high (more energy). How did the sound change and why did the water bounce out of the pan?
23. Instruct students to record their observations of the demonstrations, adding to the cause and effect chart.
24. Ask if they can think of anything else that changes how high or low, or how soft or loud the sound is.
25. Use questioning strategies to help students understand that sound is produced by using different materials and that it can be changed in a variety of ways. We use words to describe those changes: pitch, high, low, volume, soft, loud.

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| Cause | Effect |
|---------------------|--------|
| Longer tuning fork | Lower |
| Shorter tuning fork | Higher |
| Tapped harder | Louder |
| Less energy | Softer |
| Big table | Louder |
| Far away | Softer |
| More energy | Louder |

Day Five Post-Assessment

Differentiated Instructional Support:

Instruction is differentiated according to learner needs, to help all learners either meet the intent of the specified indicator(s) or, if the indicator is already met, to advance beyond the specified indicator(s).

- Provide a pacing guide for students so that they understand about how much time they should spend on each set of materials. Allow for more time for the first set. Write the starting time on the board and the time when they should be done with the first set (or set a timer).
- Carefully group students so students will have an appropriate buddy that will both help and challenge the student.
- Some students may need your support by checking the thoroughness of each station as they progress through all three, others will appreciate the independence of moving at their own pace with guidance from the clock or the time noted on the chalkboard.
- Provide a lab sheet with the objects already drawn so that the student only needs to draw in the water or the rubber bands showing the differences.
- Use whole-class “cause and effect” charts.

Extensions:

Students need to understand the relationship between volume and the amount of energy in the sound. Plucking harder on a string instrument is another way to help students to conceptualize this. Also dropping a heavy book versus a lighter book from the same height will demonstrate the change in volume when there is more energy. Which takes more energy to lift? Drop and have them explain why the volume was louder with the bigger book.
Library Tip: Discuss ideas with the school librarian and check out books for classroom use during this exploration time.



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Homework Options and Home Connections:

- Students can bring in a musical instrument from home or an object that makes an unusual sound.
- Students can construct a musical instrument using materials they have at home.
- If a family member plays an instrument, suggest that the child have him/her play the instrument changing the pitch while the student explains the change in using the words “higher” and “lower”.

Materials and Resources:

The inclusion of a specific resource in any lesson formulated by the Ohio Department of Education should not be interpreted as an endorsement of that particular resource, or any of its contents, by the Ohio Department of Education. The Ohio Department of Education does not endorse any particular resource. The Web addresses listed are for a given site’s main page, therefore, it may be necessary to search within that site to find the specific information required for a given lesson. Please note that information published on the Internet changes over time, therefore the links provided may no longer contain the specific information related to a given lesson. Teachers are advised to preview all sites before using them with students.

For the teacher: Tuning forks with different pitches and a shallow bowl or pie pan filled with water.

For the student: Kite string or darning string cut into 40 cm lengths/per child; various sizes of small boxes with sturdy sides e.g. jewelry–type cardboard boxes (Some boxes will be used with rubber bands and some inverted and taped on the bottom to create the sound. They need to be very similar to each other so that the size is the variable not the composition of the material.); rubber bands of different widths that fit well around the boxes, (Each box needs two rubber bands with the same widths.); glasses, jars, beakers of various sizes with different amounts of water and one with no water; strikers for the glasses and boxes without rubber bands e.g., hard plastic drink stirrers or unsharpened pencils.

Vocabulary:

- pitch
- volume
- vibration

Technology Connections:

- Direct students to use a variety of materials to construct musical instruments building their understanding of the unique properties of each.
- Locate an oscilloscope from a parent or secondary school. Students can make observations of the change and pitch shown on the oscilloscope.

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Attachment A Cause and Effect

How does it sound?

| Cause | Effect |
|-------|--------|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |
| 8. | |