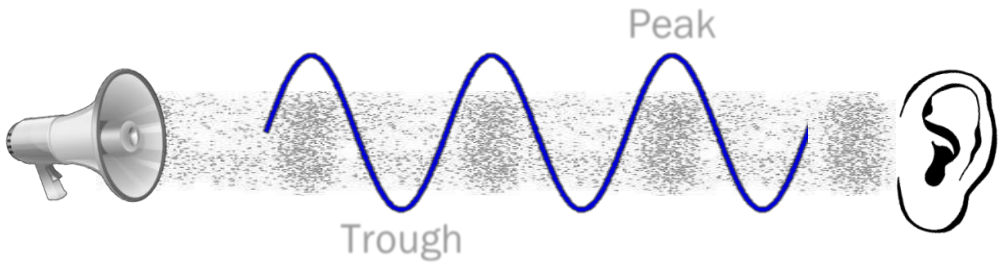
First Grade: Physical Science

WHAT'S THAT SOUND? How Sounds are Generated

Background Information

Many organisms have the ability to communicate with sound. Sound allows organisms to learn more about their surroundings. Sirens, ringing of phones, musical instruments, animal sounds, and the human voice are a few examples of using sound to communicate. Sound is produced when an object vibrates. As demonstrated in the diagram below, the vibrations cause the medium's particles, usually air, to move and allow the sound to travel in a singular direction. This longitudinal movement dictates the volume in which sound is heard; standing in the path of the longitudinal wave increases the probability, thus the volume, of hearing the emitted noise. This concept explains why it is difficult to hear sounds when positioned behind the source. A vibrating object makes sound, however sound also makes an object vibrate.



Performance Expectations

1-PS4-1 Waves and Their Applications in Technologies for Information Transfer

Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
https://www.nextgenscience.org/pe/1-ps4-1-waves-and-their-applications-technologies-information-transfer

Disciplinary Core Ideas

PS4.A: Wave Properties

Sound can make matter vibrate, and vibrating matter can make sound.

Science and Engineering Practices

Plan and conduct investigations collaboratively to produce evidence to answer a question.

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

Cause and Effect: Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Influence of Engineering, Technology, and Science, on Society and the Natural World: People depend on various technologies in their lives; human life would be very different without technology.

Objectives

- Students will identify multiple sounds.
- Students will explain the reason for various sounds.
- Students will determine relative distance that sounds travels.
- Students will explore how to play various percussion instruments.
- Students will explain how the instruments make sound.
- Students will visualize and explain the relationship between sound and particle movement.

Part I. What's that Sound?

Materials

- 2 sets of *What's That Sound* Cards
- Game Tokens – *such as macaroni noodles, cm cubes*
- Computer with Speakers
- *What's That Sound?* power point

Suggested Implementation

Review your rules of how to play the Sound Game. Distribute a card to each student. Play the *What's That Sound?* ppt. When you have gone through the entire power point, or longer if you wish, hold a discussion. Students may share their ideas about descriptions of sounds, their favorite sounds, and how they think sound works. You can find additional animal sounds at https://exploresound.org/listen-learn/.

Debrief Part 1

- *What is the purpose of each sound?*
- *Why did the horn honk?*
- *Why did the cat meow?*
- *Why did the bird squawk?*
- *Where do you need to be to hear the sound?*
- *Can you hear the_when you are close to it?*
- *Can you hear the_when you are far away from it?*

Part 2. Join the Band

Advanced Preparation

- Determine locations of stations.

Materials

- Join the Band Student Page
- Tambourine
- Sand Egg
- Triangle
- Castanet
- Tuning Fork
- Bells
- Rhythm Sticks
- Sound Shape
- Cymbal

Suggested Approach

Set up stations around the room. A different type of instrument will be at each station.

Distribute student pages and provide any needed directions.

Divide the class into groups. Each group will visit each station.

Allow plenty of time for exploration of how to play the instrument and observations about it. Students may record their information on their Join the Band Pages.

Debrief Part 2

- *What did you hear when you played the instruments?*
- *What did you notice about the instruments?*
- *What did you see?*
- *How do think they work?*
- *Were other people able to hear the instruments?*
- *Why do you think other people could hear the instruments?*

Part 3. Salty

Advanced Preparation

- Cut around the edges of baggies. These will be held taut to the top of the cup with a rubber band.
- Determine who will attach plastic to top of cups with rubber bands.

Materials

- 1 Cup per Group
- 2 Salt Packets per Group
- Tuning Fork
- 1 Quart Plastic Bag per Group (Use the piece of the bag that does not have a label on it.)
- 1 Rubber Band per Group
- Hand Lenses
- Other materials to test – Ensure they will vibrate and not stick to the plastic.
- Coloring Supplies
- Drawing Paper or Whiteboard

Suggested Implementation

Begin by having students share what they noticed about the instruments from the previous lesson. Distribute the tuning forks among the groups. Encourage groups to discover how to use a tuning fork. Discuss as a large group their ideas. If needed, demonstrate how to use a tuning fork. Provide a cup to each group or plastic covered (refer to your advanced planning decision). Each group will need a packet of salt. Students then pour a packet of salt on top of the plastic. Allow time for students to observe with hand lenses and share with one another what happened. Chart their observations. Distribute the tuning forks. Again, allow ample exploration time for using the tuning fork and the results of touching the tuning fork to the plastic covering. Elicit and chart their observations. (Note: You may wish to have the materials available for the discussions so students may connect experiences to the discussion.

Debrief Part 3

- How did the salt act/behave when the tuning fork touched the covering?
- What are some words we could use to describe this? (bounce, dance, jump, move...)
- What else did you notice?
- Was this the same or different than when you didn't use the tuning fork?
- Share what you saw.
- What do think is needed for sound to happen?
- What is made when vibrations happen?

Provide a whiteboard/paper to either pairs or groups of four. Now they will describe how sound happens. Again encourage words, drawings, and diagrams. Groups then share and explain their ideas.

- What do you think the vibrations cause?
- What do you think the sound causes?
- Can there be sound without vibrations? Use evidence to explain your idea.

Resources

https://www.ducksters.com/science/physics/sound_wave_characteristics.php
(longitudinal wave picture included)

http://www.kbs.msu.edu/wp-content/uploads/2017/02/NGSS-Interactive-Read-Alouds.pdf

- Lowery, L. (2012). *What Makes Different Sounds?*
  On their walk home from school, twins Jane and Jim explore why sounds can be startling (like sirens), soothing (like music), or mysterious (like eerie creaking in an empty house). Readers are introduced to the roles vibration, pitch, and volume play in how rustles, rumbles, and rat-a-tat-tats are made and transferred to their own ears.
- Waring, G. (2009). *Oscar and the Bat: A book about Sound.*
  When Oscar hears a blackbird singing in the meadow, Bat swoops in to talk to him about sound. A sudden thunderstorm and a visiting cow give Oscar lots of opportunities to learn about sounds that are loud or soft, near or far, deep or high.
- Showers, P. (1961). *The Listening Walk.*
  On a listening walk with her father, a little girl awakens to the many unexpected sounds of their neighborhood.
- Rosinsky, N. (2002). *Sound: Loud, Soft, High, and Low.*
  Non-fiction book that breaks down the concepts of sound and how sound travels for young learners. This colorful book about all of the different ways that sound is made.

Assessment

The following single point rubric can be used to assess student understanding. For each of the criteria listed below, either circle the proficient description or add notes to a box indicating why the student's performance was either lacking or exceptional.

Areas that need improvement. **Developing Performance**	Criteria for **Proficient Performance**	Evidence of exceeding standards. **Advanced Performance**
	Can provide examples of sound and the relationship between sound and distance.	
	Can explain how percussion instruments make sound.	
	Can provide evidence about the relationship between sound and particle movement.	