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Virtual



CLASSROOM

Sound Thinking Lesson Guide

Lesson Guide | Description

Instructor: Paige Kelpine

Grade Level: 4 - 8

Subject: Physical Science

Students will investigate how sounds are made, how they travel, and how they are received.

Wonder Why:

Have you ever wondered why objects make different noises? Have you ever wondered what it takes to make a sound? What makes objects sound higher or lower? Louder or Softer?

Goal:

Students will learn how sounds are made, how they travel, and how they are received by doing investigations and visualizing sound.

Lesson Guide Agenda:

- ❖ Vocabulary
- ❖ Materials List
- ❖ Instructions
- ❖ Challenge
- ❖ Additional Resources
- ❖ Oklahoma Academic Standards

Lesson Guide | Vocabulary

Sound – Continuous and regular vibrations that travel through the air or another medium and can be heard when they reach a person's or animal's ear.

Noise – A sound; especially one that is loud or unpleasant or that causes disturbance.

Force – Strength or energy as an attribute of physical action or movement.

Pitch – The quality of a sound governed by the rate of vibrations producing it; the degree of highness or lowness of a tone.

Medium – An object or item that sounds can travel through.

Sound Thinking

Materials Needed:

Activity 1:

Various safe kitchen items -
suggested:

Different size bowls

Pan

Metal spoon

Large rubber band

Glass of water

Activity 2:

Metal or glass bowl

Plastic wrap

Pan

Spoon

Salt, sugar, dry rice, or sprinkles

Paper

Pencil

Colored Pencils

Cell phone with slow motion or other video
recording device

Safety Note: Do not use sharp objects for these investigations. If working with glass, make sure a grown up is present, and be careful.

Watch the “Sound Thinking” video before continuing to the investigations and activities.

Safety Note: Do not use sharp objects for these investigations. If working with glass, make sure a grown up is present, and be careful!

If you have any questions throughout this lesson, please email teachers@oerb.com.

We would love to hear from you!

Activity 1

Materials List:

Various safe kitchen items - suggested:

Different size bowls

Pan

Metal spoon

Large rubber band

Glass of water

Safety Note: Do not use sharp objects for these investigations. If working with glass, make sure a grown up is present, and be careful.

Lesson Guide | Instruction – Activity 1

Investigation 1:

1. Collect a few safe kitchen objects to make noise with.
2. Hit these objects together and test the different sounds.
3. Take a moment to think about what the objects making sound have in common.

Now let's look at how sounds are made!

How Sounds Are Made:

- Did you notice that to make sound with the objects you had to hit them or pull them?

A force must be applied!

- Think about other things that make sounds. Do these objects make sound when they get hit?
- What else is noticed about objects when they make sound?
- Was anything felt when they made a sound?
- Was there any visible changes?
- What would happen if it was slowed down and watched in slow motion?

Take some time to think about these questions and make predictions!

Sound Check!

- In order for a sound to happen, something has to be hit like a drum or hands or pulled like a rubber band or a guitar.

A Force Must Be Applied!

- When these objects are felt, or watched closely when the sounds are heard, they can be felt, and sometimes even see moving back and forth.

Now let's look at how objects make different sounds!

How Objects Make Different Sounds:

- Now that you know how to make a sound, can you make different sounds with the same object?

Louder and Softer Sounds:

- If two objects are hit together, louder and softer sounds can be made.
- To make a sound louder, hit it harder or apply more force.
- What would happen if you used less force, or don't hit the object as hard?

Take some time to think about these questions and make predictions!

Louder and Softer Sounds:

To make a sound softer, hit it with less force.

Give it a try!

Investigation 2 - Higher and Lower Pitch:

1. Hit two different sized metal bowls with the same force.
 - Will they have the same loudness?
 - Did you notice a difference in the pitch?
2. Stretch the rubber band around the bowl.
3. Pull the rubber band to make a sound.
 - How can the pitch of the rubber band be changed?
4. Hold the rubber band closer to the center of the bowl.
5. Pull the rubber band to make a sound.
 - Does it make a different sound?

Let's think about this concept!

Higher and Lower Pitch:

What was changed to make higher and lower pitches?

The size of the object! There were bigger versus smaller bowls, and longer versus shorter rubber bands.

Can you think of other ways to change the pitch of an object?

Sound Check!

- Sounds are made by applying a force.
- Sounds can be made louder or softer by applying more or less force.
- Higher and lower pitch sounds can be made by making objects smaller/shorter or bigger/longer.

Now let's look at how sounds travel!

How Sounds Travel:

- The energy used to apply the force was transferred to the object, then the object started to vibrate.
- Sounds need a medium to travel through. Sounds can travel through matter: solids, liquids, and gasses.
- Matter is made of particles. If the tiny particles of matter around any object is moving back and forth, the particles are also vibrating.
- When the sound source object hits the particles near it, there is a chain reaction all the way through the medium.

Investigate around your home and see if you can detect sounds as they travel through different media.

Sound Check!

Once an object is vibrating, it collides with the particles of matter around it, creating a chain reaction through the medium.

Now let's look at how sounds are received!

How Sounds Are Received:

- If an object vibrates when it is making sound, and the matter around the object is vibrating, what happens as sounds are detected by something?
- Make a prediction! What happens to the sound receiver when sounds are made?

Let's check out how sounds are received by doing the next activity!

Activity 2

Materials Needed:

Metal or glass bowl

Plastic wrap

Pan

Spoon

Salt, sugar, dry rice, or sprinkles

Paper

Pencil

Colored Pencils

Cell phone with slow motion or other video recording device

Safety Note: Do not use sharp objects for these investigations. If working with glass, make sure a grown up is present, and be careful.

Lesson Guide | Instruction – Activity 2

Activity 2:

1. Stretch the plastic wrap tightly across the bowl. Use a rubber band to wrap around the bowl to make the plastic wrap nice and tight.
2. Carefully pour some salt, sugar, rice or sprinkles on the plastic wrap.
3. Hold the pan and spoon near the bowl and **MAKE SOME NOISE!**

Think about what you see. What is happening to the receiver (the plastic wrap) when it is making sound?

Experiment by hitting the pan at different places around the bowl. Notice anything different?

Challenge:

Create a video (real time or slow motion) or make a drawing explaining what happens when sound is received by the plastic wrap on the bowl.

Make sure to include an explanation about what you think is happening and possible reasons why!

WANT TO WIN A PRIZE?

Share your picture or video with us by emailing teachers@oerb.com and on Facebook/Instagram by tagging us @oerbok.

Be sure to include your name, grade, school, and teacher!

The teacher with the most student submissions will win a \$100 Amazon Gift Card!

Lesson Guide | Resources

Check out these additional resources

1. Virtual Field Trip “Seismic Exploration”:

<https://vimeo.com/user25257321/review/87138446/4cfaa6d4d8>

2. Lab Time with Leo: “Traveling Sound”:

<https://vimeo.com/140064654/7ea5265bbc>

3. “Turn it Up!” Simulation link from OpenSciEd

<https://www.openscienced.org/wp-content/uploads/2019/10/sound.html?version=v2>

4. “Hitting the High Notes!” Simulation link from OpenSciEd

<https://www.openscienced.org/wp-content/uploads/2019/10/sound.html?version=v3>

Lesson Guide | Resources

Check out these additional resources

5. “Visualizing Sound in a Medium” Simulation link from OpenSciEd

<https://www.openscienced.org/wp-content/uploads/2019/10/sound.html?version=v4>

6. “Longitudinal Waves” Motion Simulation from Penn State University

<https://www.acs.psu.edu/drussell/Demos/waves/wavemotion.html>

7. Interactive Simulations from Phet Interactive Simulations

<https://phet.colorado.edu/en/simulations/category/physics/sound-and-waves>

Lesson Guide | Oklahoma Academic Standards

4 PS 3-2: Make observations to provide evidence that energy can be transferred from place to place by sound.

4 PS 4-1: Develop a model of waves to show that waves can cause objects to move.

MS PS 3-2: Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

MS PS 3-6: Support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

MS PS 4-2: Develop and use a model to describe that waves are transmitted through various materials.

If you would like to explore more Oklahoma Academic Standards for Science click [here](#).