ARIZONA SCIENCE CENTER
Never stop wondering.
Never stop imagining.

Light and Sound

Week 8: Grades K-2

Day	Topics	Related Standards
1	Sensing Energy	**Investigate** how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to **develop and support an explanation**.
2	Engineer an Instrument: Ask	**Use models** to provide evidence that vibrating matter creates sound and sound can make matter vibrate.
3	Engineer an Instrument: Imagine and Plan	
4	Engineer an Instrument: Create	
5	Engineer an Instrument: Test and Improve	

Light and Sound

Day 1: Sensing Energy

Teacher/Parent Background:

Students use their senses to explore light and sound energy. Although the ability to see, hear, touch, smell, and taste are senses that help us recognize our environment. Students will focus on using only their eyes, ears, and hands for sensing light, and sound energy.

Light energy comes from the Sun or a lamp that the eye can see. Students know that they use their eyes to see things. Because not all things give off light, playing a game will help clarify that concept. Have the students stand up if the object mentioned makes light and sit down if it does not: flashlight (up), crayon (down), campfire (up), lamp (up), grass (down), television (up), loudspeaker that makes announcements (down), flag (down), the Sun (up), etc. Nature makes beautiful light shows like a colorful rainbow or golden sunsets.

Sound energy comes from vibrating objects that our ears can hear and we sometimes can feel. Those vibrations travel through the air to our ears, where we hear them as loud or soft, high- or low-pitched, pleasant or annoying, long or short, having rhythm or not, etc.

Overview:

In this activity, students use their senses to detect, identify, and explore light, thermal, and sound energy. Students also identify safety equipment that can be used to protect their senses.

Related Standards:

Investigate how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to **develop and support an explanation**.

Key Terms:

- Light- The type of energy you can see.
- Sound- Energy you can hear.
- Energy- What is needed to do work or cause change.

Materials List:

- Pen/pencil
- Student Resources Handout

Activity Description:

1. Identify the two forms of energy being discussed in this lesson: light and sound.
2. Ask students if they have seen, heard, or felt any energy today. Introduce the idea that different forms of energy are all around us, and we use them everyday.
3. Brainstorm the following ideas: "How do we know light is present? We see it. How do we know sound is present? We hear it."
4. Let students know that they are going to use their senses to identify light and sound energy.
5. Instruct students to explore throughout their homes and/or outside. Following the energy walk, provide students with time to draw pictures of the energy-producing items they found.
6. Discuss student responses.Cover any safety considerations appropriate for observing a great amount of specific forms of energy.
7. Allow students to identify how the following items could protect them from energy: sunglasses will protect eyes from too much light, earphones/earplugs can protect ears from too much sound.

Closure:

Discuss the following questions with students:

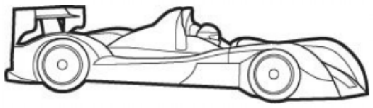
1. What sense did you use to detect sound energy? Students should identify using their senses of touch and hearing to detect sound energy.
2. Explain why you can feel sound energy. Students should describe how they are able to feel the vibrations sound energy makes.
3. Could you invent a musical instrument that would produce more than one form of energy? How? Student responses will vary.

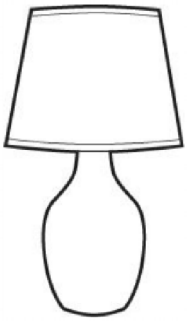
Extensions:

Energy Organizer! Students can go on a scavenger hunt around their home and/or outside to find different forms of energy. In addition, students can use a digital camera to take pictures of each object and then post them on a graphic organizer.

Student Resources

Part 1: Do you see light? Hear sound? Draw a line to match the sense used to identify the energy that each thing produces.

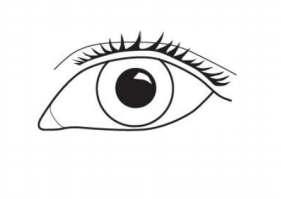




Part 2: Draw a picture of the energy that you observed on your energy walk.

Sound	Sound	Sound
Light	Light	Light

Part 3: Draw ways to protect your senses.

Too much light energy 	
Too much sound energy 	

Light and Sound

Day 2: Engineer an Instrument

Teacher/Parent Background:

Sound energy comes from vibrating objects that push air molecules. These air vibrations travel as sound waves to the listener's ear. If there is no air, such as in the vacuum of space, there is no sound. Sounds can be loud like a siren blaring or soft like a whisper. Sounds can be high pitched like an alarm or low pitched like a tuba. Sounds can also make musical notes, like a bird's song or person singing.

Overview: In this activity, students will create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.

Related Standards:

Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.

Key Terms:

- Sound- Energy that moves through the air and can be detected by the ear.

Materials List:

- Construction paper
- Variety of building materials such as:
  - paper rolls
  - aluminum foil
  - craft sticks
  - rubber bands
  - wax paper
  - balloons, etc.
- Scissors
- Glue/Tape
- Ruler
- Pencils

Activity Description:

1. Together with your student, brainstorm different sounds that we hear each day. If weather permits, this activity can be done outside so that students can listen for specific sounds. These sounds can be from nature or man-made.
2. Once students hear specific sounds, record what they hear on the Student Resource page. Once a variety of examples have been listed, ask students the following questions about the sounds:
    a. Where did the sound come from?
    b. What do you think the sound means?
    c. Do you think the sound means the same thing to everyone who hears it? Why or why not?
    d. Can sounds be used as a way to communicate a word or thought?
    e. What are some specific sounds that communicate a specific thought or word?
3. Introduce and discuss the design challenge: Create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.
4. Discuss the following criteria:
    a. The instrument should make a specific sound.
    b. The instrument should be made out of materials that are already at home.
    c. The student should be able to explain how the instrument works.
    d. The student should be able to identify and explain the word or thought they want the sound of the instrument to represent.

Extensions:

Watch and Learn!- What is Sound?

Student Resources

Goal: Design and build an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.		
ASK		
List Some Sounds Heard	**Where did the sound come from?**	**What do you think the sound means?**
Example: Growling	Dog	Dog is angry

1. What are some words or ideas you would like your instrument's sound to represent?

Light and Sound

Day 3: Engineer an Instrument

Teacher/Parent Background:

Sound energy comes from vibrating objects that push air molecules. These air vibrations travel as sound waves to the listener's ear. If there is no air, such as in the vacuum of space, there is no sound. Sounds can be loud like a siren blaring or soft like a whisper. Sounds can be high pitched like an alarm or low pitched like a tuba. Sounds can also make musical notes, like a bird's song or person singing.

Overview: In this activity, students will create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.

Related Standards:

Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.

Key Terms:

- Sound- Energy that moves through the air and can be detected by the ear.

Materials List:

- Construction paper
- Variety of building materials such as:
  - paper rolls
  - aluminum foil
  - craft sticks
  - rubber bands
  - wax paper
  - balloons, etc.
- Scissors
- Glue/Tape
- Ruler
- Pencils

Activity Description:

1. Remind students about the design challenge and constraints.
    a. Introduce and discuss the design challenge: Create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.
    b. Discuss the following criteria:
        i. The instrument should make a specific sound.
        ii. The instrument should be made out of materials that are already at home.
        iii. The student should be able to explain how the instrument works.
        iv. The student should be able to identify and explain the word or thought they want the sound of the instrument to represent.
2. Today students will work to imagine and begin to plan their instrument designs.

Extensions:

Watch and Learn!- TED-Ed The Science of Hearing

Student Resources

Brainstorm and design 2 solutions to the problem
Imagine
Idea #1
Idea #2

Choose the best solution and draw a plan of how to make it. Include which specific materials you will use.
Plan

Light and Sound

Day 4: Engineer an Instrument

Teacher/Parent Background:

Sound energy comes from vibrating objects that push air molecules. These air vibrations travel as sound waves to the listener's ear. If there is no air, such as in the vacuum of space, there is no sound. Sounds can be loud like a siren blaring or soft like a whisper. Sounds can be high pitched like an alarm or low pitched like a tuba. Sounds can also make musical notes, like a bird's song or person singing.

Overview: In this activity, students will create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.

Related Standards:

Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.

Key Terms:

- Sound- Energy that moves through the air and can be detected by the ear.

Materials List:

- Construction paper
- Variety of building materials such as:
  - paper rolls
  - aluminum foil
  - craft sticks
  - rubber bands
  - wax paper
  - balloons, etc.
- Scissors
- Glue/Tape
- Ruler
- Pencils

Activity Description:

1. Remind students about the design challenge and constraints.
    a. Introduce and discuss the design challenge: Create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.
    b. Discuss the following criteria:
        i. The instrument should make a specific sound.
        ii. The instrument should be made out of materials that are already at home.
        iii. The student should be able to explain how the instrument works.
        iv. The student should be able to identify and explain the word or thought they want the sound of the instrument to represent.
2. Today students will work to build their designs, as they planned, on Day 3.

Extensions:

Favorite Thing Energy Challenge!- Challenge students to identify one of their favorite objects and describe which forms of energy they see, feel, or hear, and how the energy is used:

1. Draw a picture of one of your favorite things

2. Name of favorite thing: _____

3. Which forms of energy do you see, feel, or hear when you play with or are around your favorite thing?

I hear _____

I see _____

I feel _____

Light and Sound

Day 5: Engineer an Instrument

Teacher/Parent Background:

Sound energy comes from vibrating objects that push air molecules. These air vibrations travel as sound waves to the listener's ear. If there is no air, such as in the vacuum of space, there is no sound. Sounds can be loud like a siren blaring or soft like a whisper. Sounds can be high pitched like an alarm or low pitched like a tuba. Sounds can also make musical notes, like a bird's song or person singing.

Overview: In this activity, students will create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.

Related Standards:

Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.

Key Terms:

- Sound- Energy that moves through the air and can be detected by the ear.

Materials List:

- Construction paper
- Variety of building materials such as:
  - paper rolls
  - aluminum foil
  - craft sticks
  - rubber bands
  - wax paper
  - balloons, etc.
- Scissors
- Glue/Tape
- Ruler
- Pencils

Activity Description:

1. Remind students about the design challenge and constraints.
    a. Introduce and discuss the design challenge: Create an instrument that will make a specific sound that can be used as a form of communication for a specific word or thought.
    b. Discuss the following criteria:
        i. The instrument should make a specific sound.
        ii. The instrument should be made out of materials that are already at home.
        iii. The student should be able to explain how the instrument works.
        iv. The student should be able to identify and explain the word or thought they want the sound of the instrument to represent.
2. Today students will test their instruments and improve them.

Extensions:

STEAM Challenge!- Create stained glass! This project will use your drawing and design skills to create stained glass hanging art from clear contact paper, colored tissue paper, and foil. When placed in sunlight, some parts of the design allow light energy to pass through and some parts reflect light energy.

1.Tear a few sheets of tissue paper into small shapes. Use different colors!

2.Tear a sheet of aluminum foil into small shapes.

3.Get a piece of contact paper.

4.Remove the paper backing. Put the sticky side of the contact paper face up.

5.Stick tissue paper and foil pieces all over the contact paper. Cover the whole surface!

6.Punch a hole in each top corner. Tie one end of the string to each hole.

7.Hang your stained glass in a window. Watch light energy pass through the tissue paper and reflect on the foil.

Student Resources

Test your design

- Did your instrument make a unique sound?

  YES NO

- Did you assign a word or thought to the sound?

  YES NO

Improve and retest your solution

Make any changes that are needed to your diagram/blueprint. If needed, sketch a new picture with design changes in the space below
Improve