THE WHYNAUTS:

Episode 7: Energy is Everywhere

EDUCATOR GUIDE SUGGESTED GRADE LEVELS K-2

The whynauts

Per[o]t
Museum of Nature and Science

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INTRODUCTION

HOW TO USE THIS GUIDE

The Whynauts **"Energy is Everywhere"** Video explores how we use sound, light, and thermal energy in everyday life. This guide is designed to help you incorporate the video into a complete learning experience for your students. It is composed of three main sections:

The **Viewing Strategies and Tools** section includes suggested discussion questions and a pre- and post-assessment to track student learning.

The **Supplemental Activities** section includes four activities that can be used in any order or combination.

The **Additional Resources** section includes a glossary, reading list, and links to continue learning.

LEARNING OBJECTIVES

Students will be able to:

- Describe how we use our senses to detect different forms of energy.
- Identify examples of sound, light, and thermal energy in everyday life.
- Explain what happens to objects if you increase or decrease the amount of sound, light, or thermal energy.

TEKS ALIGNMENT

K.8A. Communicate the idea that objects can only be seen when a light source is present and compare the effects of different amounts of light on the appearance of objects.

1.8A. Investigate and describe applications of heat in everyday life such as cooking food or using a clothes dryer.

2.8A. Demonstrate and explain that sound is made by vibrating matter and that vibrations can be caused by a variety of means, including sound.

3.8A. Identify everyday examples of energy, including light, sound, thermal, and mechanical.

NGSS ALIGNMENT

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

BACKGROUND INFORMATION

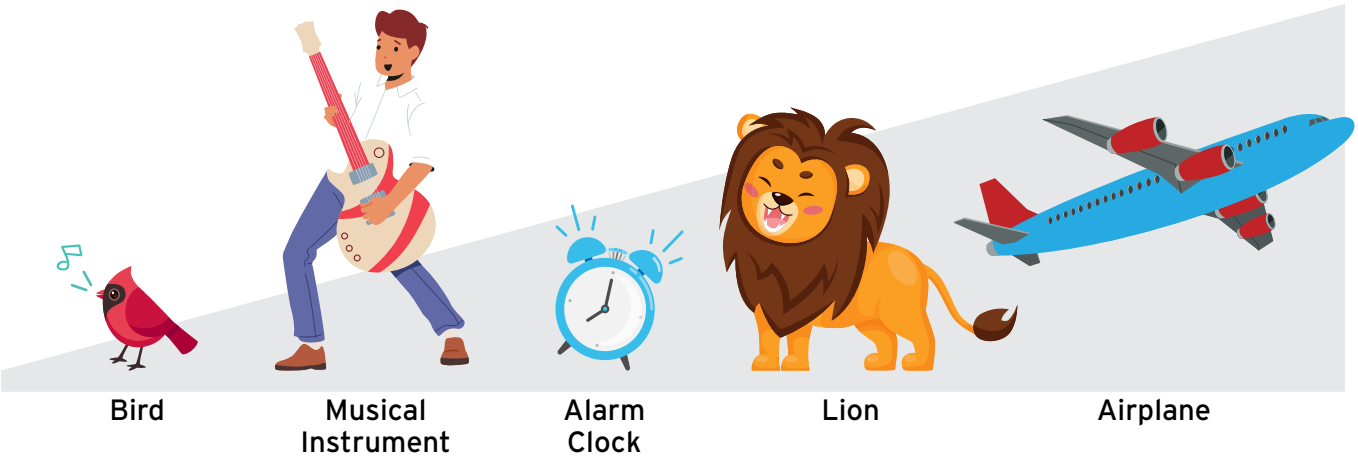
Forms of Energy

Energy is everywhere! Energy makes things happen – it takes energy to make things change and to make things move. Energy fuels our bodies, warms our homes, helps us see, and even lets us listen to music. There are many different forms of energy, including **sound energy**, **light energy**, and **thermal energy**.

We can use our senses to detect different forms of energy. Our **senses** help us get information about the world around us. Our five basic senses are **hearing**, **sight**, smell, taste, and **touch**. We can *hear* a musical instrument producing sound energy, we can *see* a light bulb producing light energy, and we can *feel* an oven producing thermal energy.

SOUND ENERGY

Sound energy is a form of energy we can **hear**. Sound is caused by **vibrations**, which happen when an object moves back and forth really quickly. When an object vibrates, it causes the air around it to vibrate too, creating sound waves that travel through the air or another material. When a sound wave reaches our ears, it makes our eardrums vibrate, which allows us to hear the sound. Some sources of sound energy include musical instruments, an alarm clock, and a lion.

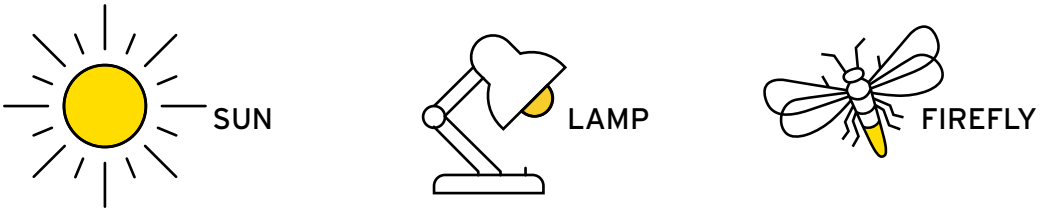


Changing the amount of sound energy affects **loudness**. **Increasing** sound energy causes bigger vibrations and a louder sound. **Decreasing** sound energy causes smaller vibrations and a quieter sound. The **pitch** of a sound depends on how fast the object is vibrating. When an object vibrates quickly, it makes a higher-pitched sound. When an object vibrates slowly, it makes a lower-pitched sound.

People often use sound energy to **communicate** or to send and receive information. For example, we can talk with someone to tell them about our day or sing a song to tell someone how we feel. An ambulance's siren produces sound energy that tells us when there is an emergency, and we should get out of the way. Other animals use sound energy to communicate too, like when a bird sings, or a dog barks.

LIGHT ENERGY

Light energy is a form of energy we can **see**. We also need light to see things. We can only see objects when light shines on them or when they make their own light. Objects that make light are called **light sources**. Examples of light sources include the Sun, a lamp, and a firefly.



Objects may look different depending on the amount of light energy. Increasing or decreasing the amount of light energy affects **brightness**. When there is more light, colors appear brighter, and it is easier to see details. When there is less light, colors appear darker, and it is harder to see details. Light passes through some objects, but not others. When light is blocked by an object or material, it doesn't let the light pass through, and creates a **shadow**.

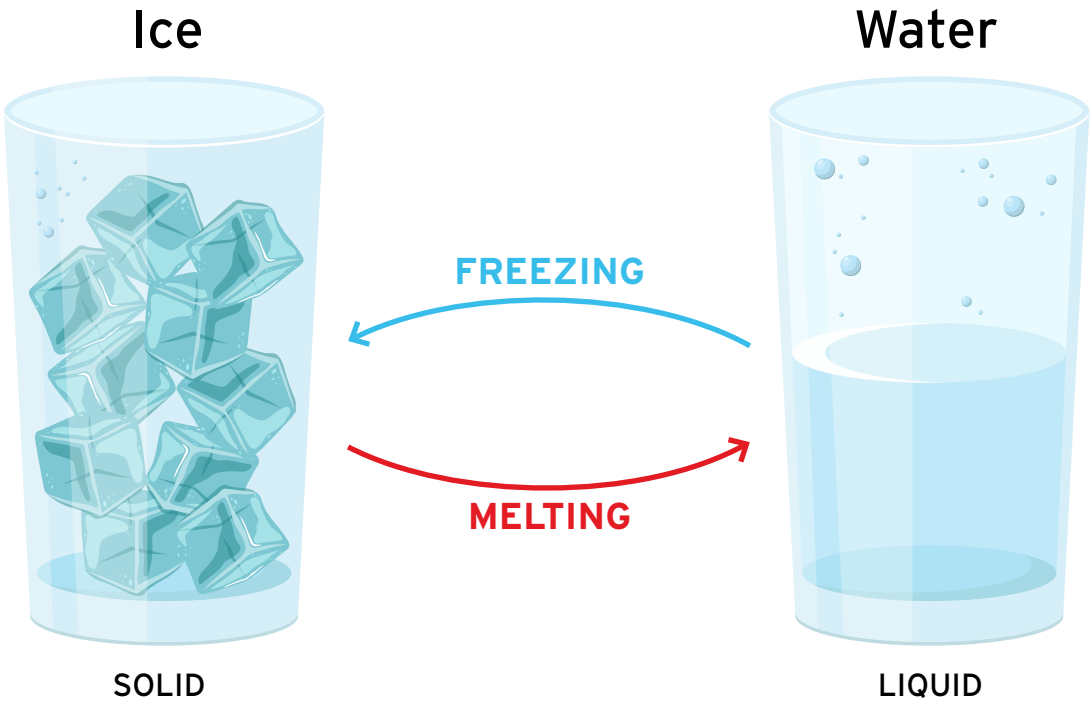
People use light energy to communicate too. For example, traffic lights turn different colors to let a driver know when to stop and when to go, and the crosswalk sign lights up to let us know when it is safe to cross the street. Other animals also use light energy to communicate, like when fireflies light up in different patterns.

THERMAL ENERGY

Thermal energy, or heat energy, is a form of energy we can **feel**. Thermal energy causes things to get warmer. Examples of objects with thermal energy include the Sun, a campfire, and a hair dryer.

Changing the amount of thermal energy changes an object's **temperature**, which is a measure of how hot or cold it is. We measure temperature using a tool called a **thermometer**.

Changing the amount of thermal energy can also cause matter to change. Increasing thermal energy causes things to heat up and may make something **melt** (change from a **solid** to a liquid). Decreasing thermal energy causes things to cool down and may make something **freeze** (change from a **liquid** to a solid).



VIEWING STRATEGIES AND TOOLS

DISCUSSION QUESTIONS

You can choose to have students watch The Whynauts "Energy is Everywhere" video in one sitting, or break it up into sections. Pause the video after each section for discussion and to check for understanding.

- **SECTION 1: SOUND ENERGY [BEGINNING – 6:29]**
  - What is an example of sound energy in your everyday life that wasn't in the episode?
    - An example of sound energy in my life is _____.
  - If you could learn to play any musical instrument, what would it be? Why? How do you think that instrument produces sound energy?
    - I would learn to play the _____ because_____.
    - It produces sound energy by _____.
  - What jobs do you think involve sound energy? Why?
    - A job that involves sound energy is _____ because _____.

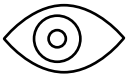
- **SECTION 2: LIGHT ENERGY [6:30-9:50]**
  - What is an example of light energy in your everyday life that wasn't in the episode?
    - An example of light energy in my life is _____.
  - How would you communicate if you could only use light energy?
    - To communicate using light energy, I would _____.
  - What jobs do you think involve light energy? Why?
    - A job that involves sound energy is _____ because _____.

- **SECTION 3: THERMAL ENERGY [9:51-END]**
  - What is an example of thermal energy in your everyday life that wasn't in the episode?
    - An example of thermal energy in my life is _____.
  - If you could learn to cook any dish, what would it be? Why? How do you think you would use thermal energy?
    - I would learn to cook _____ because _____.
    - I would use thermal energy to _____.
  - What jobs do you think involve thermal energy? Why?
    - A job that involves thermal energy is _____ because _____.

Pre- and Post-Video Assessment

1. Match each form of energy to the sense we use to detect it:

SOUND ENERGY



SIGHT

LIGHT ENERGY

HEARING

THERMAL ENERGY

TOUCH

2. Draw or describe an example of each form of energy:

SOUND ENERGY	LIGHT ENERGY	THERMAL ENERGY

3. What do you think would happen if you added thermal energy to an ice cube? Why?

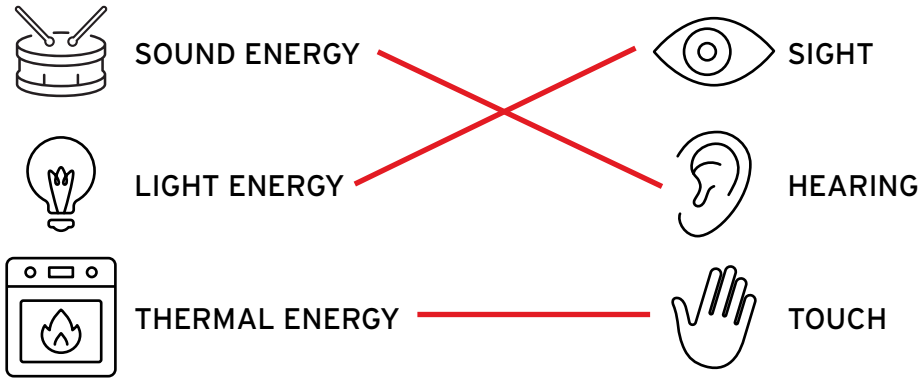
If I add thermal energy to an ice cube, I think

because

ANSWER KEY

Pre- and Post-Video Assessment

1. Match each form of energy to the sense we use to detect it:



2. Draw or describe an example of each form of energy:

SOUND ENERGY	LIGHT ENERGY	THERMAL ENERGY
Examples include: playing a musical instrument, a siren on an ambulance, a dog barking	Examples include: the Sun, a flashlight, fireflies sending signals	Examples include: using an oven to cook, feeling warm by a campfire, using a blow dryer to dry your hair

3. What do you think would happen if you added thermal energy to an ice cube? Why?

Sample answer: If I add thermal energy to an ice cube, I think it will melt because ice melts when you let it warm up.

SUPPLEMENTAL ACTIVITIES

Energy Sort

Sound Energy: Let's Start a Band!

Light Energy: S.O.S.!

Thermal Energy: Ice Investigation

Energy Sort

HOW DO WE USE OUR SENSES TO DETECT DIFFERENT FORMS OF ENERGY?

Objective:
Students will explore how we use our senses to determine what form of energy an object has or produces. They will then sort everyday objects based on if they produce sound, light, or thermal energy.

Materials (per group):
- Everyday object cards
- Energy table

Lesson Outline:

1. Review the five **senses**: **hearing**, **sight**, smell, taste, and **touch**. You may wish to engage students with a song such as "I have five senses."

2. Introduce vocabulary words with Total Physical Response (TPR), making a gesture for each word. Make a connection between our senses and different forms of energy.
- **Sound energy** – energy we can **hear** (and sometimes feel)
- **Light energy** – energy we can **see**
- **Thermal energy** – energy we can **feel**

3. Present different objects to the class and ask students what type of energy the object has or produces. Examples could include a speaker, projector, and hair dryer. How do they know that the object produces that form of energy?

a. Model using the sentence stem: _____ produces _____ (sound, light, or thermal energy), because I can _____ (hear it, see it, feel it is hot or cold).

4. Sort students into small groups and give each group a set of object cards. You can cut and laminate the cards ahead of time or ask students to cut out the cards themselves and paste them into the table. Instruct students to place each object under the form of energy it produces. While sorting objects, they should explain to their classmates why they chose to place each object in its category using the sentence stem.
- Possible misconceptions: Thermal energy is also known as heat energy. Students may think that only hot things can be classified as having thermal energy. Hotter objects have more thermal energy, and colder objects have less thermal energy.

5. Have students answer the questions listed or discuss them as a class.
- Ask students about the Sun and how they decided to sort it. Explain that the Sun provides both light and thermal energy that we can use in everyday life.
- Ask students if any other objects could be sorted into more than one form of energy. Encourage students to use the sentence stem above to explain their thinking.

Extensions:
- **ELAR** – Read a story and ask students to identify examples of sound, light, and thermal energy. Or, ask students to write their own story about an object that produces one or more of these forms of energy.
- **Math** – Ask students to count how many objects are in the energy table for each form of energy. Identify which form of energy has the most objects and which has the fewest. Find the difference between the numbers of objects in these two categories.

Energy Sort

HOW DO WE USE OUR SENSES TO DETECT DIFFERENT FORMS OF ENERGY?

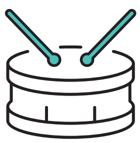
Materials:

- Everyday object cards
- Energy table

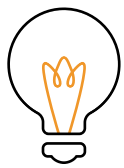
INTRODUCTION:

Energy is everywhere! Energy fuels our bodies, warms our homes, helps us see, and even lets us listen to music. Our **senses** help us get information about the world around us, and we can use our senses to detect different forms of energy produced by everyday objects. For example, we can ***hear*** a musical instrument producing **sound energy**, we can ***see*** a light bulb producing **light energy**, and we can ***feel*** an oven producing **thermal energy**.

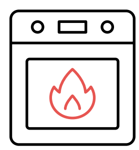
In this activity, you will sort objects based on if they produce sound, light, or thermal energy.



SOUND ENERGY



LIGHT ENERGY



THERMAL ENERGY

PROCEDURE:

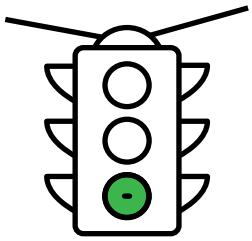
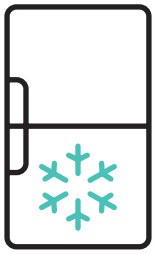
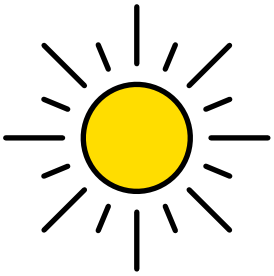
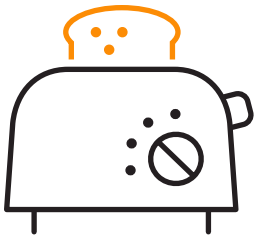
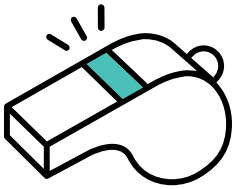
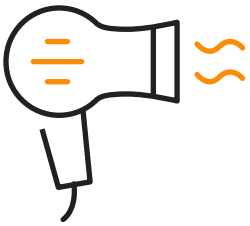
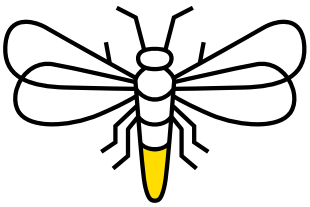
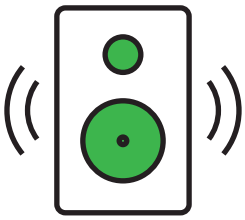
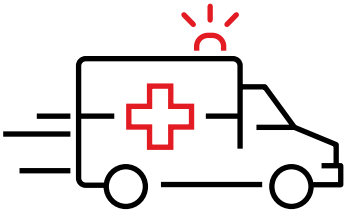
1. Look at the everyday objects on the cards. How do you sense each one?
   - Can you hear it make a sound?
   - Can you see light coming from it?
   - Can you feel that it is hot or cold?

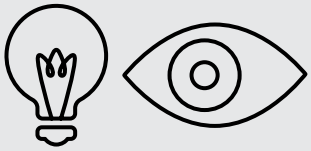
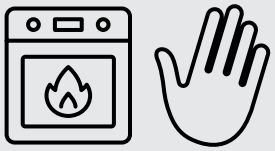
2. Sort each object based on the form of energy it produces. Use the sentence stem to explain why you decided to sort each object into its form of energy:

   ______________________ produces ______________________ energy,
   (object) (sound, light, thermal)

   because I can ____
   (hear..., see..., feel...)

EVERYDAY OBJECTS

Traffic Light 	Refrigerator 	Flashlight 
Sun 	Campfire 	Drum 
Toaster 	Whistle 	Hair Dryer 
Firefly 	Speaker 	Ambulance 

SOUND ENERGY	LIGHT ENERGY	THERMAL ENERGY
		

QUESTIONS

1. How did you sort the Sun?

I sorted the Sun as

because

2. How do you use light energy from the Sun in your daily life?

I use light energy from the Sun to

3. How do you use thermal energy from the Sun in your daily life?

I use thermal energy from the Sun to

4. What is another object that produces more than one type of energy?

Another object that produces more than one type of energy is

Sound Energy: Let's Start a Band!

HOW DO MUSICAL INSTRUMENTS PRODUCE SOUND ENERGY?

Objective:
Students will create and play a musical instrument that can produce sound energy. Students will then explore how the instrument's sound can be altered through basic actions.

Materials:

Guitar
- Empty box, such as a shoebox or small delivery box
- Rubber bands
- A ruler or stick
- Tape

Drum
- Empty container with a lid, such as a coffee can or oatmeal container
- Dowels, sticks, or unsharpened pencils to act as drumsticks

Panpipes
- Straws cut into pieces of various lengths (Straws with a wider diameter produce better sound!)
- Cardboard, cut into a wide sturdy strip
- Tape

Optional: Decorative materials, such as construction paper, markers, scissors, etc.

Background Information:
Musical instruments create sounds by making something **vibrate**. The **loudness** of the sound depends on the amount of sound energy. The **pitch** depends on how fast the object is vibrating.

STRING INSTRUMENTS

Musicians make strings vibrate by rubbing a bow against them or by plucking them. Plucking a string more firmly makes bigger vibrations and a louder sound, while plucking less firmly makes smaller vibrations and a quieter sound. Shorter and thinner strings vibrate faster and make a higher-pitched sound, while longer and thicker strings vibrate slower and make a lower-pitched sound. On some instruments, musicians can use their fingers to shorten the strings and play different notes.

PERCUSSION INSTRUMENTS

When a musician hits a drum, the skin of the drum vibrates. Hitting a drum harder makes bigger vibrations and a louder sound, while hitting a drum more gently makes smaller vibrations and a quieter sound. If the skin of a drum is tighter, it makes a higher-pitched sound, while if the skin of a drum is looser, it makes a lower-pitched sound. Drums of different sizes make different sounds depending on how fast they vibrate. Drums made of different materials will sound different too.

WIND INSTRUMENTS

Musicians blow into or across a wind instrument to make the air inside vibrate. Blowing with more force makes bigger vibrations and a louder sound, while blowing with less force makes smaller vibrations and a quieter sound. The pitch depends on the amount of air that is vibrating inside the instrument. Covering up one or more holes changes how much air is inside. If you only cover up one hole, not much air is left inside the instrument to vibrate, making a higher-pitched sound. If you cover up many holes, there is more air left inside to vibrate, making a lower-pitched sound.

Lesson Outline:

1. Review sound energy:

- How do we know if something is making a sound? What sense(s) do we use?
  It makes a sound we can hear, or vibrations we can feel; sense of hearing.
- What are some ways we use sound energy every day?
  Examples include waking up to an alarm, talking to others, or playing a musical instrument.
- How can a sound change?
  Loudness, pitch

2. Assign each student an instrument, or let them choose which instrument to make. Help guide students through constructing their instruments.

- Give students time to practice using their instruments and discuss how each one produces sound energy (vibrations).

3. Ask students how they think they could change the sound their instrument makes. How might they change the loudness? How might they change the pitch? Give students time to experiment.

- Encourage students to use the sentence stem: "If I _____, the sound _____."
- Discuss with students what they did and how the sound changed with their action. It may help to ask them to demonstrate their action for the class.
- Example observations may include:
  - If I stretch the rubber band more, the sound has a higher pitch.
  - If I hit the drum harder, the sound is louder.
  - If I make the pipe longer, the sound has a lower pitch.

4. Have the whole class form a band to show off what they learned! You can challenge the class band to play a song everyone knows or compose a song of their own. Ask each student to change their instrument's loudness and pitch at least one time during the performance.

Extensions:

- **Engineering Design** – Challenge students to design their own musical instrument that can make sounds of different volumes and pitches.
- **Career Connection** – Learn more about the instruments played by the Dallas Symphony Orchestra musicians or musicians in your area. Connect with a local musician so they can share their experiences producing and changing sounds using their instrument.

Sound Energy: Let's Start a Band!

HOW DO MUSICAL INSTRUMENTS PRODUCE SOUND ENERGY?

Materials:

Guitar
- Empty box, such as a shoebox or small delivery box
- Rubber bands
- A ruler or stick
- Tape

Drum
- Empty container with a lid, such as a coffee can or oatmeal container
- Dowels, sticks, or unsharpened pencils to act as drumsticks

Panpipes
- 3-5 straws cut into pieces of various lengths (Straws with a wider diameter produce better sound!)
- Cardboard, cut into a wide sturdy strip
- Tape
- Optional: Decorative materials, such as construction paper, markers, scissors, etc.

INTRODUCTION:

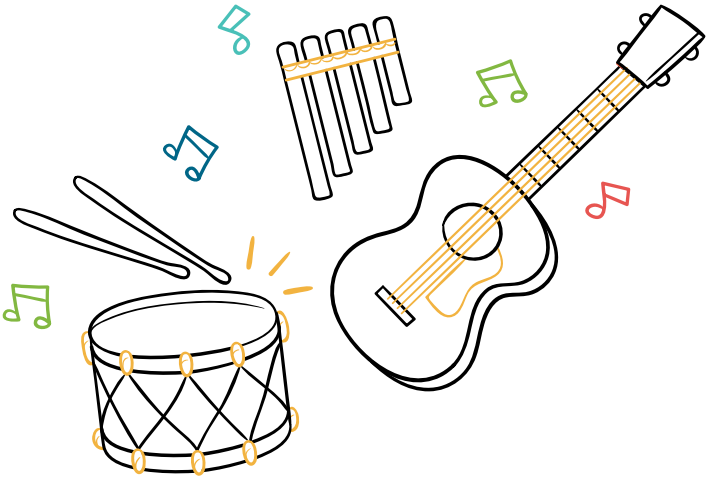
In this activity, you will construct a musical instrument and experiment with how it produces sound!

Sound energy is a form of energy we can **hear**. It is caused by **vibrations**, which is when something moves back and forth really quickly. Different musical instruments produce vibrations in different ways. When you play a string instrument, you make the strings vibrate. When you play a drum, you make the skin of the drum vibrate. When you play a wind instrument, you make the air inside vibrate.

Loudness is how loud or soft a sound is. Larger vibrations make a louder sound, while smaller vibrations make a quieter sound. **Pitch** is how "high" or "low" a sound is. Faster vibrations make a higher-pitched sound, while slower vibrations make a lower-pitched sound.

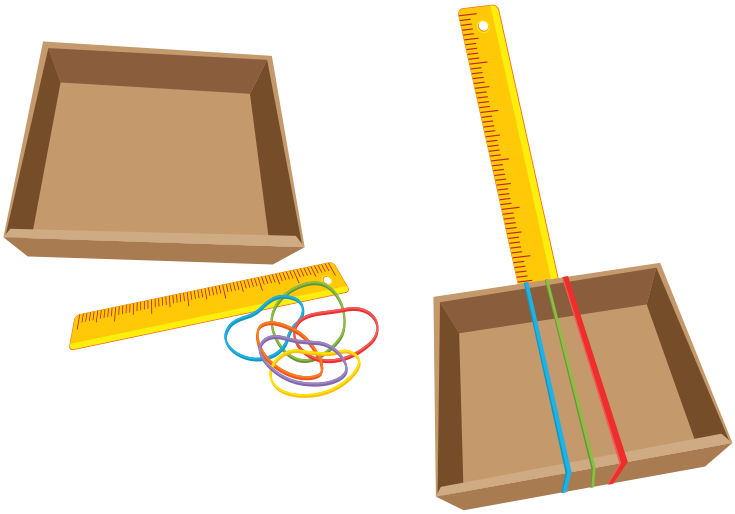
PROCEDURE:

1. Use the directions to construct a guitar, drum, or panpipes. Or, construct all three!
2. Experiment with your instrument. How can you use it to make vibrations? How can you change the sound's loudness? How can you change the sound's pitch?
3. Join with classmates, friends, or family members to start a band! Try to play a song you all know, or compose your own.



HOW TO MAKE A GUITAR:

1. Decorate your box using markers, construction paper, stickers, or other materials.
2. Wrap rubber bands around the box so that the bands stretch across the open top.
   Tip: You may want to use rubber bands of varying stretch or size so that each band will produce a different note!
3. Take a ruler or stick and tape it to the back of the box (this will act as the guitar neck).
4. Pluck the bands over the opening to play!

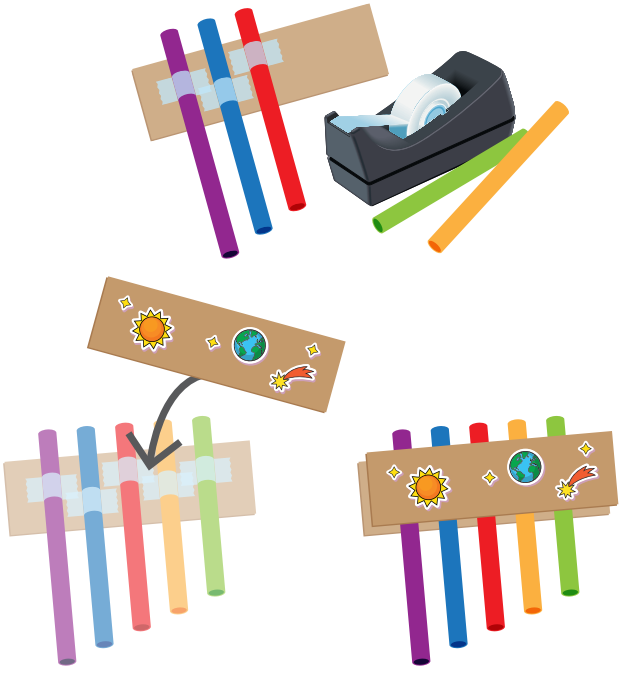


HOW TO MAKE A DRUM:

1. Take the empty container and decorate the sides using markers, construction paper, stickers, or other materials.
2. Make sure the lid is secure. Take whatever is acting as your drumsticks and beat away!

HOW TO MAKE PANPIPES:

1. Cut a piece of cardboard into a wide strip that can be easily held in your hands (about 6 inches long and 3 inches wide). Decorate one side of the cardboard using markers, construction paper, stickers, or other materials.
2. Cut the straws into pieces of different lengths.
   Tip: It's helpful to have multiple options so you can choose the notes you like best!
3. On one side of the cardboard strip, tape your chosen straw pieces so that there's enough room between each piece and that the tips of the straws are visible above and below the strip.
4. To play the panpipes, blow ACROSS the opening of the straws as if you were blowing out a candle on a birthday cake. Note that blowing INTO the straws will not produce the best sound.



QUESTIONS

1. How did you use your instrument to make vibrations?

I made vibrations by

2. How did you change the sound's loudness?

I changed the sound's loudness by

3. How did you change the sound's pitch?

I changed the sound's pitch by

Light Energy: S.O.S.!

HOW CAN WE USE LIGHT ENERGY TO COMMUNICATE?

Objective:
Students will design a communication system that uses light energy to send a message over a distance.

Materials (per group):
- Flashlight
- Construction paper (2-3 different colors)
- Scissors
- Optional: meter stick or measuring tape

Lesson Outline:

1. Review **light energy**:
- How do we know if something is producing light energy? What sense do we use? We can see it, or it helps us see other things; sense of sight.
- What are some ways we use light energy every day? Examples include: to see at night; to watch tv and movies.
- How can we use light to change the way something looks? Objects appear brighter when there is more light; objects appear dimmer when there is less light.

2. Discuss ways that people **communicate**, or send messages to each other. What forms of energy do they rely on?
- How is sound energy used to communicate? Examples include: an ambulance siren, talking, music.
- How is light energy used to communicate? Examples include: a stoplight changing colors, a crosswalk sign turning on, fireflies lighting up in patterns to send messages.

3. Have students pretend they are in a situation where they need to send a basic message to someone using light energy. The goal is to create a communication system that is easy to see from far away and easy to understand. Split up the class into small groups, and give each group one set of materials. Give the class free time to work on their communication system, and check in on each group to provide assistance and feedback as necessary.

Sample systems may include:
- Using the different colors of paper to represent different messages and holding them in front of the flashlight.
- Blocking out the light with the paper at different intervals (similar to Morse code).
- Cutting out shapes representing the message and holding them in front of the flashlight, so that the receiver sees a shadow of the shape.

4. After each team has created their communication system, they will test it to see if their system works. Half of the group members will try to send a simple message (ex. "Hello, we need help!") to the other half of the group from a determined distance. Then, group members should switch roles.

5. Give students time to answer the reflection questions. Then, ask each group to share out what they learned.
- What communication system did you create? How does it work?
- Did your communication system work when you tested it? Why or why not?
- Is there anything you would change about your communication system?

Extensions:
- Have students repeat the activity using sound energy. Give them a selection of materials that can make sound, but instruct them not to speak. Ask students to compare and contrast using light and sound to communicate their message.
- **ELAR** – Read a book about bioluminescent animals (animals that produce their own light). Have students create their own character based on the animal and write a story about how they use light to communicate.

Light Energy: S.O.S.!

HOW CAN WE USE LIGHT ENERGY TO COMMUNICATE?

Materials (per group):

- Flashlight
- Construction paper (2-3 different colors)
- Scissors

INTRODUCTION:

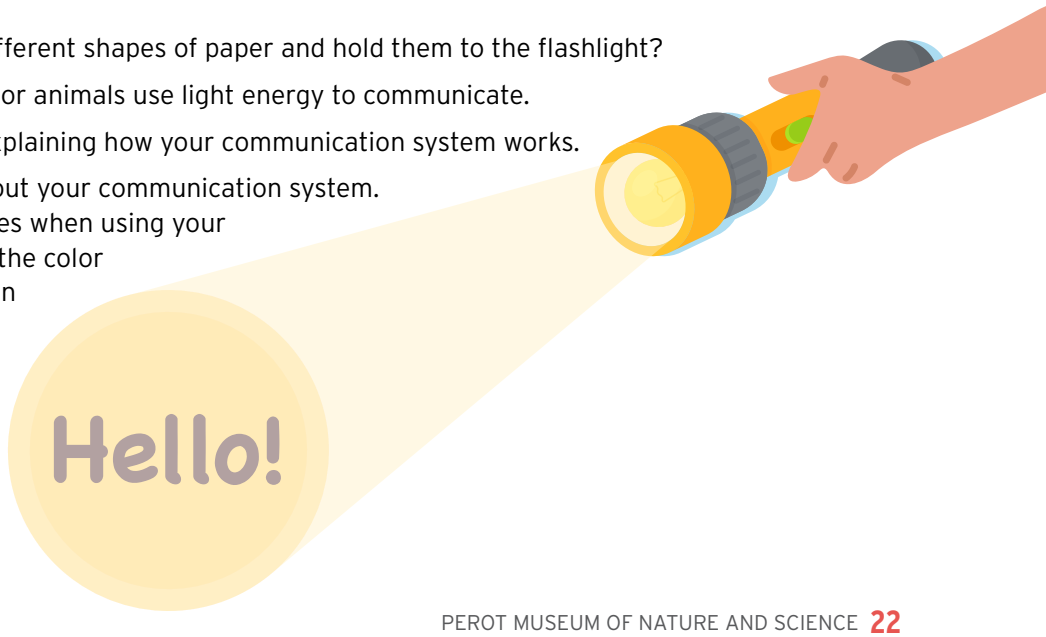
Light energy is a form of energy we can **see**. Objects that make light are called **light sources**. Examples of light sources include the Sun, a flashlight, and a campfire.

Increasing or decreasing the amount of light energy affects **brightness**. When there is more light, colors appear brighter, and it is easier to see details. When there is less light, colors appear darker, and it is harder to see details. Light passes through some objects, but not others. When light is blocked by an object or material, it doesn't let the light pass through, and creates a shadow.

We can use light energy to **communicate** – or send and receive information. For example, traffic lights turn different colors to let a driver know when to stop and when to go, and the crosswalk sign lights up to let us know when it is safe to cross the street. Some animals, like fireflies, light up in different patterns to communicate.

PROCEDURE:

1. Imagine you are stuck on an island, and the only materials you have are those listed above. You can see a boat off the coast some distance away, but you need to send the crew a message to get rescued. Using your materials, can you create a communication system to send a message to the boat?
   - Here are some starting ideas for making your communication system:
     - How does the light change when you place a piece of construction paper in front of it? How does it change with different colors?
     - What happens if you cut out different shapes of paper and hold them to the flashlight?
     - Think about how other objects or animals use light energy to communicate.
   - You may want to create a key explaining how your communication system works.
2. With a partner, take turns testing out your communication system. Take notes on how the light changes when using your communication system, such as if the color or brightness changes, or if you can see the light at all.



QUESTIONS

1. How does your communication system work?

My communication system works by

2. Did your communication system work when you tested it? Why or why not?

My communication system **DID / DID NOT** work because
(circle one)

3. Is there anything you would change about your communication system?

I would change

Thermal Energy: Ice Investigation

HOW DOES CHANGING THE AMOUNT OF THERMAL ENERGY AFFECT MATTER?

Objective:
Students will investigate how thermal energy affects matter by placing cups of ice in different locations and observing how each cup of ice melts.

Materials (per group):
- 3 cups or containers
- 3 cups of ice
- Graduated cylinder or measuring cup
- Optional: thermometer

Lesson Outline:

1. Review **thermal energy**:
- How do we know if something has thermal energy? What sense do we use? It feels hot or cold; sense of touch.
- What are some ways we use thermal energy every day? Examples include: using an oven or campfire to cook, using a heater to warm up your house in winter, using a blow dryer to dry your hair.
- How can we use thermal energy to change matter? Adding thermal energy can make something melt; removing thermal energy can make something freeze.

2. Tell students that they will be doing an investigation using thermal energy. Discuss the different steps scientists take when investigating something:
- Ask a question
- Make a hypothesis
- Do an experiment and collect data
- Come up with a conclusion based on the data collected

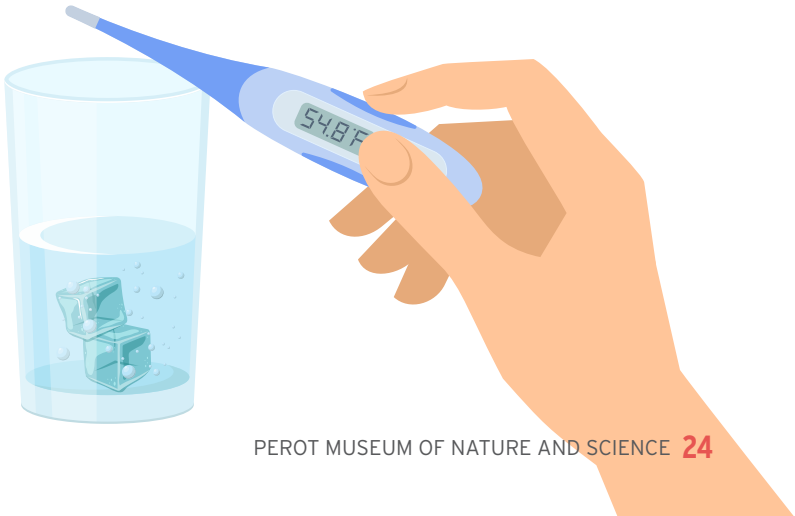
3. Introduce the question: How can increasing or decreasing the temperature affect how fast ice cubes melt? Have students record the question in their investigation workbook or science journal.

4. Divide students into small groups. Ask them to work with their group to think about which ice cubes they think will melt faster: ice cubes placed outside in the Sun, outside in the shade, or inside in the classroom (or choose your own locations with a range of temperatures). Have them record their hypothesis using these sentence stems:
- "My hypothesis is that the ice in _____ (location) will melt fastest because _____."
- "My hypothesis is that the ice in _____ (location) will melt slowest because _____."

5. Guide students through the experiment using the steps in the investigation workbook.

6. Discuss the results of the investigation as a class and help students make a conclusion. How did increasing or decreasing the temperature affect how fast the ice cubes melted?

Extensions:
- **Math** – Have students make a bar graph showing how much melted water was in each container after 5 minutes.
- **Art** – Have students repeat the experiment using crayons placed on paper instead of ice in a cup. Ask them to compare and contrast the resulting artwork in each location.



Thermal Energy: Ice Investigation

HOW DOES CHANGING THE AMOUNT OF THERMAL ENERGY AFFECT MATTER?

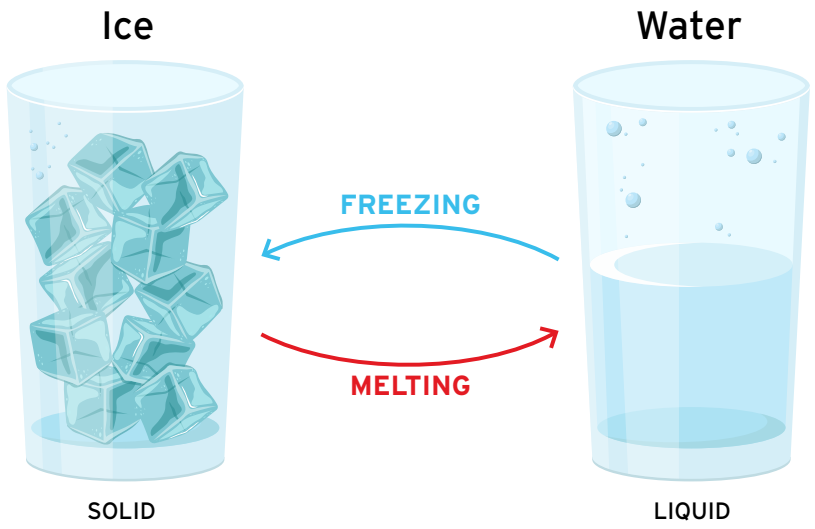
Materials:

- 3 cups or containers
- 3 cups of ice
- Graduated cylinder or measuring cup
- Optional: thermometer
- Ice Investigation workbook

INTRODUCTION:

Thermal energy, or heat energy, is a form of energy we can **feel**. Thermal energy causes things to get warmer. Examples of objects with thermal energy include the Sun, an oven, and a hair dryer.

Changing the amount of thermal energy can cause matter to change. **Increasing** the amount of thermal energy can change a **solid** to a liquid – this is called **melting**. **Decreasing** the amount of thermal energy can change a **liquid** to a solid – this is called **freezing**.



Changing the amount of thermal energy also changes an object's temperature. The **temperature** of an object tells us how hot or cold it is. We measure temperature using a tool called a **thermometer**.

In this activity, you will investigate how changing the temperature affects how fast ice melts.

PROCEDURE:

Use the "Ice Investigation" workbook to work through the steps of your investigation!

My Ice Investigation

Name(s): _____

My Question:

My Hypothesis:

Think: Where is hotter: in the Sun, in the shade, or in the classroom?

Write: Use the sentence stems to make a hypothesis.

My hypothesis is that the ice in

will melt ***fastest*** because

My hypothesis is that the ice in

will melt ***slowest*** because

My Experiment:

Step 1: Put 1 cup of ice in each of the three containers.

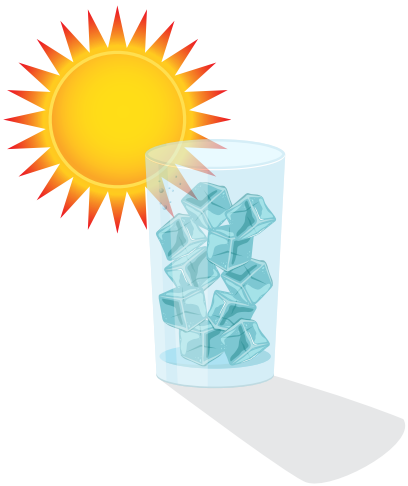
Step 2: Put one of the containers in a sunny spot outside, one in a shady spot outside, and one inside an air-conditioned room. Record the temperature of each spot in your data table, or describe in words how it feels.

Step 3: Wait for 5 minutes.

Step 4: Make some observations. Draw what you can see in each of the containers in the data table.

Step 5: Separate the water from the remaining ice and measure it. Record the measurements in the data table.

IN THE SUN



IN THE SHADE

INDOORS

My Data Table:

Place	Temperature	Observations and Drawing	Amount of Water

My Conclusion:

Answer the following questions using your data table:

1. Think about the places where you put the containers. Which place was the hottest?

The hottest place was _____

_____

_____

2. Which container had the most water after 5 minutes?

The container with the most water was _____

_____

_____

3. Why do you think there was more water in that container?

I think there was more water in that container because _____

_____

_____

_____

_____

_____

4. Was your hypothesis correct? Why or why not?

My hypothesis **WAS / WAS NOT** (circle one) correct because

_____

_____

_____

_____

_____

_____

ADDITIONAL RESOURCES

GLOSSARY

Brightness – how bright or dim an object appears; depends on the amount of light energy

Communication – sending or receiving messages or information

Decrease – to go down; get quieter, dimmer, or colder

Energy – the ability to do work; what makes things move and change

Freezing – process when matter changes from a liquid to a solid

Hearing – a sense used to get information about how something sounds; we hear with our ears

Increase – to go up; get louder, brighter, or warmer

Light energy – a form of energy we can see

Light source – anything that makes light, whether natural or artificial

Liquid – state of matter in which particles are moderately packed together; liquids take the shape of their container

Loudness – how loud or quiet a sound is; depends on the amount of sound energy

Melting – process when matter changes from a solid to a liquid

Pitch – how high or low a sound is

Senses – how people and other animals get information about the world around them; our senses include hearing, sight, smell, taste, and touch

Shadow – a dark area made when an object blocks light

Sight – a sense used to get information about how something looks; we see with our eyes

Solid – state of matter in which particles are tightly packed together; solid objects keeps their shape

Sound energy – a form of energy we can hear, caused by vibration

Temperature – a measure of how hot or cold and object is

Thermal (heat) energy – a form of energy we can feel that makes things warmer

Thermometer – a tool used to measure temperature

Touch – a sense used to get information about how something feels; we feel with our skin

Vibration – when an object is moving back and forth really quickly; vibrations produce sound

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ONLINE RESOURCES

PEROT MUSEUM

FORMS OF ENERGY & SENSES

- DKfindout!
  - Energy
  - Sound | Light | Heat
  - The Senses
- Nemours KidsHealth
  - Teacher Resources
  - All About Your Senses: Experiments to Try
  - Your Eyes | Your Ears | Your Skin
- U.S. Department of Energy | For Teachers
- U.S. Energy Information Administration
  - Energy Kids
  - For Teachers

SOUND ENERGY

- Acoustical Society of America | Explore Sound
  - Elementary Students
  - Educator Resources
- Dallas Symphony Orchestra
  - DSO Kids
  - Teacher & Parent Resources

LIGHT ENERGY & THERMAL ENERGY

- Culinary Institute of America | Educator Resources
- Let's Go Solar | How Solar Panels Work
- NASA Space Place | The Sun
- Solar Futures Toolkit

STEM CAREERS

- IF/THEN Collection
  - Tiffany Panko, Deaf Health Lab Director
  - Danielle Robertson, Vision Scientist
  - Jenny Briggs, Fire Scientist
- Skype a Scientist

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