



SCIENCE:

KINDERGARTEN-ENERGY



Energy

Energy Is Everywhere

TEKS

K (6) Force, motion, and energy. The student knows that energy, force, and motion are related and are a part of their everyday life.

(A) The student is expected to use the five senses to explore different forms of energy such as light, heat, and sound.

(C) The student is expected to observe and describe the location of an object in relation to another such as above, below, behind, in front of, and beside.

Content Objective

I can use my senses to explore heat, light, and sound energy.

Science

Science Process Skills

K (1) Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices.

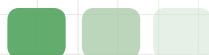
(A) The student is expected to identify and demonstrate safe practices as described in the Texas Safety Standards during classroom and outside investigations, including wearing safety goggles, washing hands, and using materials appropriately.

K (2) Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations.

(E) The student is expected to communicate observations with others about simple descriptive investigations.

K (4) Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world.

(B) The student is expected to use senses as a tool of observation to identify properties and patterns of organisms, objects, and events in the environment.



Energy

Mathematics

K (7) Geometry and spatial reasoning. The student describes the relative positions of objects.

(A) The student is expected to describe one object in relation to another using informal language such as over, under, above, and below.

(B) The student is expected to place an object in a specified position.

English Language Arts and Reading

K (5) Reading/vocabulary development. Students understand new vocabulary and use it correctly when reading and writing.

(A) Students are expected to identify and use words that name actions, directions, positions, sequences, and locations.

K (15) Writing/expository and procedural texts. Students write expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes. Students are expected to dictate or write information for lists, captions, or invitations.

K (21) Listening and speaking/listening. Students use comprehension skills to listen attentively to others in formal and informal settings. Students continue to apply earlier standards with greater complexity.

(A) Students are expected to listen attentively by facing speakers and asking questions to clarify information.

K (22) Listening and speaking/speaking. Students speak clearly and to the point, using the conventions of language. Students continue to apply earlier standards with greater complexity. Students are expected to share information and ideas by speaking audibly and clearly using the conventions of language.

K (23) Listening and speaking/teamwork. Students work productively with others in teams. Students continue to apply earlier standards with greater complexity. Students are expected to follow agreed-upon rules for discussion, including taking turns and speaking one at a time.

Energy

Figure 19.

Reading/comprehension skills. Students use a flexible range of metacognitive reading skills in both assigned and independent reading to understand an author's message. Students will continue to apply earlier standards with greater depth in increasingly more complex texts as they become self-directed, critical readers.

(B) The student is expected to ask and respond to questions about text.

(C) The student is expected to monitor and adjust comprehension (e.g., using background knowledge, creating sensory images, re-reading a portion aloud).

(F) The student is expected to make connections to own experiences, to ideas in other texts, and to the larger community and discuss textual evidence.

English Language Proficiency Standards

2 (I) Cross-curricular second language acquisition/listening. The student is expected to demonstrate listening comprehension of increasingly complex spoken English by following directions, retelling or summarizing spoken messages, responding to questions and requests, collaborating with peers, and taking notes commensurate with content and grade-level needs.

3 (D) Cross-curricular second language acquisition/speaking. The student is expected to speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency.

Language Objective

I can speak about the location of an object in relation to another using position words.

Energy

Response to Intervention/Tier 1 Differentiation

All science lessons support students in receiving quality Tier 1 instruction. Using the 5E model, knowledge is taught in a variety of contexts, integrating math, science, and ELA content, thus supporting the active engagement of students with the content. Lesson-specific differentiation strategies for addressing diverse student needs can be found throughout each lesson in sections titled “Differentiation Strategy.”

Differentiation should

- focus on skills students did not understand and extend the lesson for advanced students;
- be conducted in small groups or embedded in whole-group instruction; and
- provide students with a variety of strategies to process the information, such as
 - allowing for additional opportunities for verbal brainstorming of words associated with a topic (with teacher taking dictation);
 - making clear connections of new and more complex concepts to foundational aspects and prior knowledge;
 - participating in more tangible experiences, such as experiments, investigations, and active exploration;
 - sorting academic vocabulary words into categories by common attributes—process words or science content vocabulary;
 - organizing brainstorming into semantic maps or creating graphic organizers;
 - discussing the meaning of a graphic organizer with a partner; and
 - creating a visual representation to demonstrate understanding.

See the handout in the Content Resources section that addresses instructional strategies.

Energy

College and Career Readiness Standards

I.C1 Collaborative and safe working practices. Collaborate on joint projects.

I.E1 Effective communication of scientific information. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.

Vocabulary Focus

energy	above
heat	after
light	before
sound	behind
	below
	beside
	in front of
	over

5E Lesson Summary

Engage

Students identify energy around them.

Explore

Students use their senses to explore heat, light, and sound energy.

Explain

Students explain the different forms of energy.

Elaborate

Students use their senses to identify different forms of energy.

Evaluate

Students illustrate different forms of energy.



Energy

Engage

Content Builder

Kindergarten students may have varied experiences with and knowledge of energy. Many may have been told they have energy but will have no understanding of what energy means scientifically. This portion of the lesson will be a discussion to help students understand that energy is all around them and exists in many forms.

For purposes of this lesson, the following definitions for heat, light, and sound energy will be used.

- **Heat energy:** An object that gets warmer or colder has heat energy. Some examples of objects with heat energy include the Sun, people, and an oven that is baking cookies.
- **Light energy:** An object that lights up or shows light has light energy. Some examples of objects with light energy include the Sun, a flashlight, and a lamp.
- **Sound energy:** An object that makes a noise has sound energy because it is vibrating. Some examples of objects with sound energy include musical instruments, timing devices, and a basketball bouncing on a court.

To avoid teaching misconceptions, this lesson will not use microwave ovens as examples of heat energy. Microwave ovens use electromagnetic radiation rather than heat energy. Microwaves (of the electromagnetic spectrum) speed up the vibrations of water molecules. Each popcorn kernel has water inside. The heated water turns to steam, building up pressure. When there is enough pressure inside, the kernel explodes and you have popcorn.

Advance Preparation

Use a flip chart to create a class science notebook.

Differentiation Strategy

ELL: It is important to recognize and tap into the experiential background of all students, including the cultural influences and interests of ELLs. Heat, light, and sound energy will be the focus. Organizing information

Materials

For teacher

- class science notebook or chart paper
- markers



Use these apps for creating the anchor chart.

Android™:
Mindjet®

iPad®: Mindjet®,
iThoughts HD

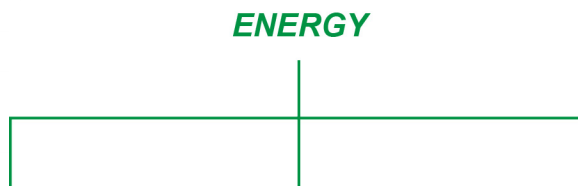
Refer to the Mobile Technology Integration document in Drop Boxes in your Science Academies for Grades K–4 Project Share group.

Energy

such as providing graphic organizers and providing illustrations are effective strategies for supporting student comprehension.

Teacher Instruction

- Ask the following: Do you have energy? *Student responses may vary but most should answer yes.*
- Ask the following: Is energy around you? *Student responses may vary but most should answer yes.*
- Ask the following: How do you know? *Student responses may vary and may include that other students have energy.*
- Ask students to complete the sentence: Energy helps me _____. *Answers may include that energy helps me move, play, and work.*
- Create an organizational chart in the class science notebook like the one shown below or create an anchor chart on a sheet of chart paper. See reference about anchor charts in the Content Resources section.

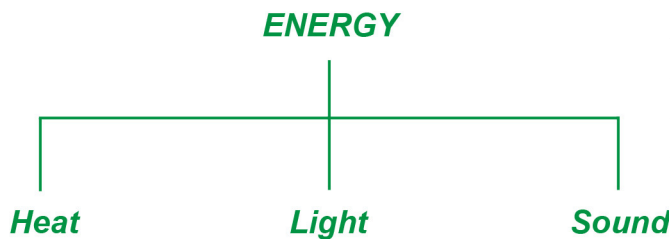


- Ask the following: What other things have energy? *Student responses will vary.*
- Write “Heat” under the first line.
- Say the following: Heat is a form of energy.
- Ask the following: What things have heat energy?
- Record student responses. *Responses may include that the Sun, ovens, and fires have heat energy.*
- Write “Light” under the middle line.
- Say the following: Light is a form of energy.
- Ask the following: What things have light energy?



Energy

- Record student responses. *Responses may include that the Sun, cars, houses, flashlights, and fires have light energy. Students may note that many objects that have heat energy may also have light energy.*
- Write “Sound” under the last line.
- Say the following: Sound is a form of energy.
- Ask the following: What are some things that have sound energy?
- Record student responses. *Responses may include that cars, phones, fires, radios, and people have sound energy. Students may note that many objects that have sound energy may also have light and/or heat energy.*



Facilitation Questions

- How do you know something has heat energy? *I can feel the heat energy, or warmth, from the Sun or from a fire. I can sometimes see when something is hot because it is red, like the burner on an electric stove.*
- How do you know something has light energy? *I can see light energy. Light energy from a flashlight or a candle helps me see in a dark room. Light energy from the Sun lights the day and creates shadows.*
- How do you know something has sound energy? *I can hear sound energy. Sound energy from the bell lets me know it is time for school, and sound energy from the radio makes me want to dance.*

Energy

Explore

Activity 1

Teacher Note

The items listed in the materials list are suggested items only. You can substitute items that are similar in size, shape, and material for those on the list. Be sure to have a variety of sounds for students to match. Any small opaque containers will work if you do not have access to plastic eggs.

Depending on your students, you might choose to lead or model some or all of these activities before asking your students to work through them in small groups or independently. Use the facilitation questions, as a whole class or individually, to debrief the activity and check for understanding. This can be done orally and written as a classroom science notebook entry to model how a scientist might record his or her observations.

At the completion of the three activities in the Explore section, it may be necessary to facilitate a discussion with a small group of students to revisit any misconceptions or to clarify understanding. Interactive scaffolding support at this point can help students re-examine the activities and participate in an active evaluation of their understanding.

Advance Preparation

Prepare each Sound Explore Set by filling the eggs with one of each material listed. Place the other material in one of the ice cube tray sections. Cover the prepared ice cube trays with plastic wrap and secure with tape.

Teacher Instruction

- Display one Sound Explore Set.
- Invite a student volunteer to shake one of the eggs and to place the egg on the section of the ice cube tray that contains what they think is inside the egg.
- Invite another student volunteer to do the same thing.
- After you feel the activity has been sufficiently modeled, divide the class into groups of 4–6 students.

Materials

For teacher

- Materials for Sound Explore Sets:
 - 10 small, colored plastic eggs
 - ice cube tray
 - plastic wrap (to cover ice cube tray)
 - tape
 - 20 items (2 of each type) such as beans, centimeter cubes, cotton balls, craft pompons, marbles, paper clips, pieces of pasta, pencil-top erasers, pennies, rice, and small rocks

For student groups

- 1 Sound Explore Set

Energy

- Pass a set of materials to each group.
- Instruct student groups to work together to match the sounds of the eggs to the materials in the ice cube trays. Remind students not to open the eggs until they have been matched to items in the ice cube tray.
- After each group has finished matching, show students how to carefully open one egg at a time to check their work.

Facilitation Questions

- Which sense(s) did you use to match the materials in the eggs to the materials in the ice cube tray? *I used my sense of hearing to listen to each egg, my sense of touch to hold each egg, and my sense of sight to check that I properly matched the egg to the object I thought was in it.*
- How did you decide what was in each egg? *I shook each egg and listened to the sound. I felt how heavy each egg was and predicted how it might match the heaviness of an object in the ice cube tray.*
- What did you hear? *I heard soft sounds, hard sounds, sounds like a bouncing ball, and sounds like a rock would make.*
- What form of energy did you observe? *We observed sound energy.*
- How were the sounds different? *Some of the sounds were soft, some were sharp, some were loud, and some were quiet.*
- How many of the sounds did you guess correctly? *Answers may vary.*
- Which eggs did you match incorrectly? Why do you think that happened? *Answers will vary.*

Activity 2

Teacher Note

Because students will be using flashlights, you may want to review the appropriate ways to use a flashlight. Students should be advised to refrain from shining the light in each other's eyes.

It is recommended that students work in groups of 2–3 as you complete this activity as a whole class.

Materials

For teacher

- Materials for file folder tents:
 - 3 dark-colored, letter-size file folders
 - packaging tape
 - 1 sheet of white paper

For student groups

- 2–3 flashlights
- 1 file folder tent
- 1 set of color paddles
- 2–3 plastic animals or figures

Energy

Place a piece of white paper in the work area to make viewing the shadows from all directions easier.

Advance Preparation

- Gather three dark-colored file folders and packaging tape to create one file folder tent.
- Open two file folders and lay them side by side so that two sides overlap. The distance between the fold of each file folder should be slightly wider than the width of a file folder. Tape the folders together, as shown in Figure 1.

Figure 1.



Width of a file folder

- Open the third folder and lay it vertically across the two taped-together folders. Center the taped folders over the bottom half of the third folder, as shown in Figure 2.
- Tape the folders in place (front and back), making sure that when they stand the top flap allows no light to filter into the work space, as shown in Figure 3. Tape a sheet of white paper on the area where the two folders overlap, as shown in Figure 2.

Figure 2.

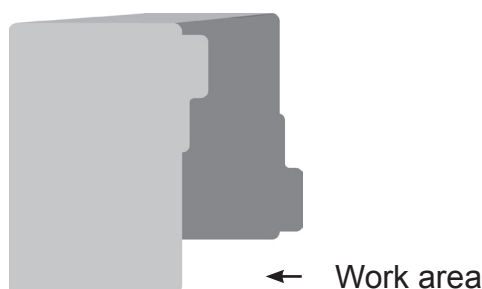


Tape white paper here

Energy

- To use the tent, stand the folder up so that it makes a U-shape, with the third folder providing a cover over the work space, as shown in Figure 3.

Figure 3.



Teacher Instruction

- Pass a set of materials, except the color paddles, to each group.
- Model how to set up the file folder tent and create a shadow using a flashlight and one of the plastic figures.
- Instruct students to place a figure within the darkened work space of the file folder tent.
- Instruct students to shine a flashlight toward the figure and observe its shadow.
- Ask the following: Is the flashlight located behind or in front of the figure?
- Instruct students to explore how the light energy affects the figure when held below, behind, in front of, or beside it. Remind students that they can move and pick up the figure to explore shadows.
- Allow students to continue to move the flashlight around the figure to alter the size and direction of the shadow and to ask questions that will allow students to practice vocabulary.
- Instruct students to remove the figure from the work space.
- Pass a set of color paddles to each group of students. Instruct students to shine the flashlight through each color paddle in the workspace and make observations.
- Allow time for students to mix and match the color paddles while shining the light through them to create more colors. Some students may find that using the ceiling lights also works when observing colors through the light paddles.

Energy

- Instruct students to replace the figure and repeat the last two steps with the color paddles.
- Allow adequate time for students to complete the activity.

Facilitation Questions

- What do you observe when the flashlight is held above the figure? Below? Behind? In front of? Beside? *Students should describe how the position of the shadow changes as the light is moved to different locations. Encourage students to use the following sentence stem to answer: "When I held the flashlight (position word) the figure, the shadow _____."*
- What do you observe when you shine the flashlight through a color paddle? *The light appears to be the same color as the paddle.*
- What colors did you create by overlapping the paddles? *Yellow and blue make green. Red and blue make purple. Yellow and red make orange.*
- What do you observe when a color paddle is placed between the flashlight and the figure? *Students should describe how the color changes and how the amount of light changes when something is blocking the light.*
- What sense did you use to make observations? *I used my sense of sight to make observations of light.*
- What form of energy did you observe? *We observed light energy.*

Materials

For teacher

- 9" x 13" aluminum baking dish
- hair dryer, 1600–1857 W
- hot glue gun and glue sticks
- old, broken crayons, unwrapped
- tape
- timing device
- 4 sheets of white cardstock

For each student

- safety goggles

Activity 3

Advance Preparation

Prepare two pages by hot-gluing 4–6 crayons or crayon pieces of different colors in a circle at the center of two sheets of cardstock. Prepare two additional pages by hot-gluing crayons or crayon pieces of different colors in a line near the top of two sheets of cardstock.

Teacher Note

Because students will be using a hair dryer to melt crayons, you may want to review the appropriate way to use a hair dryer. Students should refrain




Energy

from pointing the hair dryer in any direction other than at the crayons. Safety goggles should be worn to protect the eyes. Remind students not to touch melted crayons as they will be hot.

This activity must be carried out in small, teacher-led groups. The time it will take to melt the crayons will depend on the amount of heat given off from the hair dryer and on the brand of crayons used. Most crayons will show some change after 1 minute, with drastic change occurring by 5 minutes. Each student should hold the hair dryer for about 1 minute. It is not necessary, but you may wish to elevate one side of the tray as the crayons begin to melt.

Teacher Instruction

- Divide the class into groups of 4–6 students.
- Tape a prepared sheet of cardstock to the bottom of the baking dish.
- Call a group to your small-group area.
- Ask the following: What do you predict will happen to the crayons when the hair dryer is blown on them?
- Prompt students to share their predictions with the group using the following sentence starter: “I predict that the crayons will . . .”. Write the sentence starter on chart paper or white board and record student responses.
- Instruct students to put on their safety goggles.
- Model how to turn the hair dryer on high, point it at the crayons, and hold it 5–7 centimeters away from the crayons.
- Allow each student an opportunity to hold the hair dryer for 1 minute.
- Allow students to observe how the heat energy changes the crayons.
- Prompt students to describe their observations to the group using the following sentence starter: “I notice that the heat energy from the hair dryer . . .”. Write the sentence starter on chart paper or white board and record student responses.
- Repeat until every student has taken part in creating melted crayon art.



Download
Kinder_
Explore_
Energy from
Drop Boxes in
your Science
Academies for
Grades K–4
Project Share
group to use
on a SMART
or Mimio
interactive
whiteboard.

Energy



Before



During



After

Energy

Facilitation Questions

- What caused the crayons to change? *Heat energy from the hair dryer melted the crayons.*
- Did the colors mix as the crayons melted? If so, what new colors could you make? *Yes, the colors mixed. New colors will vary based on the two original colors.*
- What sense(s) did you use to make observations? *I used my sense of touch to feel the heat and my sense of sight to see the effects of heat.*
- What form of energy did you observe? *We observed heat energy. Some students may also recognize the observation of sound and light energy.*
- What other ways could we melt the crayons? *Student responses will vary and may include leaving them in a hot car or in sunlight.*

Energy

Explain

Teacher Note

This story includes a reference to using an air popper to make popcorn. If your students are not familiar with an air popper, you might choose to provide them with this experience. Be aware that some popcorn poppers may be too hot to touch while popping.

Teacher Instruction

- Read and discuss *Energy Mysteries*.

Facilitation Questions

- Where is energy? *Energy is all around us.*
- What melted the ice cream? *Heat energy from the Sun melted the ice cream.*
- What melted the candles? *Heat energy from the flames melted the candles.*
- Which sense is used to observe heat energy? *The sense of touch is used to feel heat energy.*
- What lit the dark room? *Light energy from the candle flames lit the dark room.*
- What other forms of light energy could light a dark room? *A flashlight, a lamp, or a night-light could light a dark room.*
- Which sense is used to observe light energy? *The sense of sight is used to see light energy.*
- What changed the popcorn kernels into popcorn? *Heat energy from the hot air popper changed the popcorn kernels into popcorn.*
- What helped me hear the popcorn popping? *Sound energy helped me hear the corn popping and the kernels bouncing around inside the air popper.*
- Which sense is used to observe sound energy? *The sense of hearing is used to hear sound energy.*

Materials

For teacher

- anchor chart from Engage
- class science notebook or chart paper
- *Energy Mysteries* book

Energy

- What are three forms of energy? *Heat, light, and sound are forms of energy.*
- Where else have you found or felt heat energy? *Accept all reasonable answers.*
- Where else have you found or seen light energy? *Accept all reasonable answers.*
- Where else have you found or heard sound energy? *Accept all reasonable answers.*
- What examples of different forms of energy could we add to the anchor chart from Engage? *Accept all reasonable answers.*
- Which form of energy do you think is most important? *Accept all reasonable answers.*
- Is there a form of energy you could live without? *Student responses will vary and may include that people who are blind and/or deaf can and do live without light and/or sound energy.*

Energy

Elaborate

Materials

For each student

- RM 1

Teacher Note

The abbreviation RM stands for reproducible master. RMs include activity cards detailing instructions for students to follow or pages on which they can record observations and data.

You may choose to complete *RM 1: What Form of Energy Is It?* as a class or in small groups.

Differentiation Strategies

G/T: Provide students with page 3 of *RM 1* and magazines so that they can select their own sources of energy to identify and record clues for, marking each sense they used to make the observations and identifying the form of energy.

ELL: Display the sentence stems provided below to support student comprehension.

Teacher Instruction

- Pass *RM 1* to each student.
- Instruct students to identify the pictures on *RM 1*.
- Ask the following: If you observed this object in real life, what form of energy would you observe?
- Instruct students to circle the form of energy each picture represents: heat, light, or sound.
- Ask the following: Which senses would you use to observe the energy in this picture?
- Instruct students to circle each sense they use to observe the energy source.
- Write the following sentence stems on chart paper or a white board and record student responses.
 - I use my sense(s) of _____ to explore the light energy of _____.

Download
Kinder_
Elaborate_
Energy from
Drop Boxes in
your Science
Academies for
Grades K–4
Project Share
group to use
on a SMART™
or Mimio®
interactive
whiteboard.

Energy



















- I use my sense(s) of _____ to explore the sound energy of _____.
- I use my sense(s) of _____ to explore the heat energy of _____.
- Ask the following: What clues would help you identify the form of energy it has?
- Instruct students to record observations and clues in the last column.
- Facilitate a class discussion, allowing all students to share their clues.



















Facilitation Questions

- Which senses do you use to make observations of the _____? *Answers will vary.*
- What form of energy do you observe? *Answers will vary.*
- What clues and observations help you identify the energy in the picture of the _____? *Answers will vary but should include observations that would be made in real life and would lead to the identification of the form of energy in each picture.*
- What other heat energy examples can you identify? *Answers may include that a heater and a hair dryer are examples of heat energy.*
- What other light energy examples can you identify? *Answers may include that the lights in the classroom and the lamp in the office are examples of light energy.*
- What other sound energy examples can you identify? *Answers may include that a bell ringing, people talking, and cars driving by outside are examples of sound energy.*

Energy

RM 1 Answer Key

Picture from the Scene	Form of Energy	Senses Used to Make Energy Observations	Clues
 Lamp	Heat Light Sound	    	
 Bird	Heat Light Sound	    	
 Sun	Heat Light Sound	    	

Picture from the Scene	Form of Energy	Senses Used to Make Energy Observations	Clues
 Bee	Heat Light Sound	    	
 Television	Heat Light Sound	    	
 Grill	Heat Light Sound	    	

Energy

Evaluate

Teacher Note

Students will be asked to draw a picture of heat, light, and sound energy. Some students may draw three separate pictures such as the Sun (heat), a lamp (light), and a drum (sound). Other students may draw one picture, such as an oven, that includes all three energy sources.


Teacher Instruction

- Instruct each student to draw a picture or pictures of heat, light, and sound energy.
- Ask each student to help you identify and label their pictures.
- Ask each student the following: Which senses would you use to make the observations of the energy source(s)? *Accept all reasonable answers.*

Materials

For each student

- crayons
- pencil
- science notebook or white paper



Use these apps for creating student drawings.

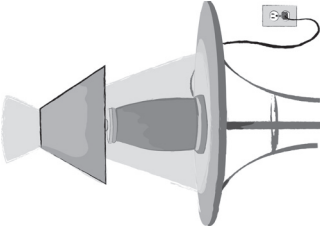











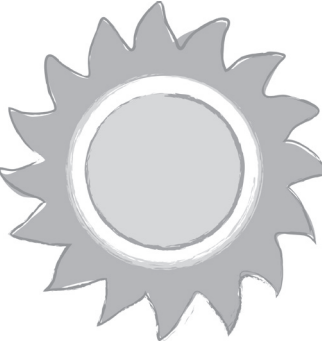





Android™: Screencast

iPad®: Screenchomp, Screencasts HD

Refer to the Mobile Technology Integration document in Drop Boxes in your Science Academies for Grades K–4 Project Share group.






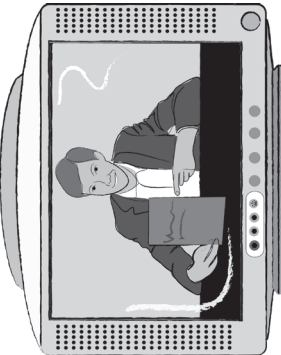




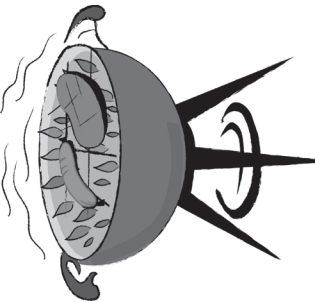




Kindergarten

RM 1: What Form of Energy Is It?

Picture from the Scene	Form of Energy	Senses Used to Make Energy Observations	Clues
 <p>Lamp</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	    	
 <p>Bird</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	    	
 <p>Sun</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	    	
















Kindergarten

RM 1: What Form of Energy Is It? continued

Picture from the Scene	Form of Energy	Senses Used to Make Energy Observations	Clues
 <p>Bee</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	   	
 <p>Television</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	   	
 <p>Grill</p>	<p>Heat</p> <p>Light</p> <p>Sound</p>	   	

Kindergarten

RM 1: What Form of Energy Is It? continued

Picture from the Scene	Form of Energy	Senses Used to Make Energy Observations	Clues
	Heat Light Sound	    	
	Heat Light Sound	    	
	Heat Light Sound	    	

NOTES

[illegible]

