

Unit Summary

	Cluster 1: What Is Energy? (Lessons 1–2)	Cluster 2: Energy Transfers (Lessons 3–4)
Overview	Students discuss what they think energy is, where it is found, things it does, and how it is used. They create “Energy Is All Around Us” collages, play a card game to identify energy forms, and search for examples of each form on their school grounds. Finally, they create an “Energy Wheel” to display examples of each energy form.	Students work in small groups and rotate through several energy stations. They operate and discuss a variety of “energized” toys to identify the type of energy transfers that make each toy run. They learn how people use machines to harness energy transfers for useful tasks. The class builds three different boats, each utilizing a different type of energy transfer to propel it.
Science Content	<ul style="list-style-type: none"> Energy takes many forms, including heat, light, electrical, motion, elastic, gravitational, sound, and chemical. We can observe energy all around us. 	<ul style="list-style-type: none"> Energy can move, or transfer, from place to place. Sometimes energy changes form as it transfers. Energy can be harnessed for useful purposes. Machines help us use energy transfers to perform useful tasks.
Science Center	<ul style="list-style-type: none"> Display work, including energy collages, in an “Energy Gallery.” Independently read reference and supplemental-reading books about energy. Post “Energy Wheels” for class sharing. 	<ul style="list-style-type: none"> Operate toys and use energy maps to identify the energy transfers that make each toy run. Observe living things and use energy maps to identify the energy transfers occurring. Continue building machines. Peruse books about machines, inventions, and inventors.
Family Links	<ul style="list-style-type: none"> Students take home the “Welcome to the Energy Unit” letter to let their families know what they will be learning about energy and how they can become involved. Students record how they rely on energy in their after-school hours. 	<ul style="list-style-type: none"> Describe the energy transfers that occur when a toy from home is operated. Observe the transfer of motion energy to light energy when a wintergreen Lifesaver® is bitten. Build boats or other machines at home.
Further Science Explorations		<ul style="list-style-type: none"> Make handmade energy toys, such as whirligigs, button spinners, and tops. Observe the chemical-to-heat energy transfer when baking yeast and hydrogen peroxide are combined. Explore chemical-to-motion energy transfers through pop rockets. Discuss the transfer of chemical energy through the food chain. Feel how the friction between two objects produces heat energy. Set up and use a solar oven.
Cross-Curricular Extensions	<p>Language Arts: Discuss the derivation of the word <i>energy</i>. Begin an energy word bank. Report on scientists’ research or energy-related events through a class newspaper that can be sent home.</p> <p>Social Studies: Select a scientist or event and report on how the person or event advanced our understanding or use of one or more energy forms.</p> <p>Arts: Create a work of art that depicts something that epitomizes a sense of energy. Use the energy of motion to create art.</p>	<p>Language Arts: Interview an older family member or neighbor about the mechanical toys they played with as a child. Compare and contrast the Amish way of life with modern American life.</p> <p>Social Studies: Research toys of the 19th century. Research the history of early machines and the evolution of common household machines.</p> <p>Arts: Create flip-books depicting applications of energy transfers. Develop original kite designs that utilize wind energy. Observe paintings of early machines. Look at works of art featuring clotheslines and have students create “Clothesline Art.”</p>

Cluster 3: Heat Energy Transfers (Lessons 5–7)	Cluster 4: Applying Energy Smarts (Lessons 8–9)	
<p>Students collect and graph temperature data to see how heat energy transfers from warmer to cooler water. They investigate how heat energy is conducted at different rates through different materials by comparing how long it takes for pats of butter to fall off rods made of various materials set in warm water. They also attempt to limit heat energy transfer by designing and testing insulation for water bottles.</p>	<p>Students compare the light and heat output of incandescent and compact fluorescent light bulbs to understand the concept of energy efficiency. To culminate the unit, they develop ideas for inventions and depict them as a sketch, to show how a collection of ordinary objects interacting in a chain-like reaction could perform a task.</p>	<p>Overview</p>
<ul style="list-style-type: none"> • Warmer things lose heat, or transfer heat energy to cooler things until they both become the same temperature. • The transfer of heat energy can occur by direct contact or through space. • Some materials conduct heat energy more easily than others. • A conductor is a material that allows heat energy to travel through it. • An insulator is a material that slows the transfer of heat energy. 	<ul style="list-style-type: none"> • Not all energy transfers are desirable. Often energy is “wasted” or transferred to non-useful forms. • Some things transfer energy more efficiently than others. • Efficient machines waste less energy. 	<p>Science Content</p>
<ul style="list-style-type: none"> • Identify examples of heat energy transfers in an assortment of books. • Put rods made of different materials on a window sill or heating vent to test heat energy conductivity. • Design and test insulating “jackets” for juice boxes to keep them cool. 	<ul style="list-style-type: none"> • Further explore the relative energy efficiency of incandescent and compact fluorescent light bulbs. • Read books about energy-efficient machines, inventions, and inventors. • Observe illustrations of Rube Goldberg inventions. • Make a class book on the Energy Unit. 	<p>Science Center</p>
<ul style="list-style-type: none"> • List examples of heat energy transfers observed at home. • Examine utensils and other kitchen tools to see what they are made of and evaluate whether they are good or poor conductors of heat energy. • Inventory items from home that serve an insulation function. 	<ul style="list-style-type: none"> • Conduct a light bulb check at home for energy-efficient lighting. • Develop an idea for a “chain reaction” invention. 	<p>Family Links</p>
<ul style="list-style-type: none"> • Explore the role of heat energy transfers in global warming. • Research how mood rings work. • Feel for heat energy conduction through a variety of materials. • Explore the transfer of heat energy through space, known as radiation. • Design and test “jackets” for ice cubes. • Test how well different types of socks slow the transfer of heat energy. • Hear a home builder or insulation contractor speak about insulation. 	<ul style="list-style-type: none"> • Explore how friction reduces efficiency. • Listen to a guest speaker talk about how the “green building” industry uses energy-efficient technologies. • Construct, run trials, and modify one or two invention ideas. • View videos about inventions and the process of developing them. • Listen to a guest inventor speak about their work. 	<p>Further Science Explorations</p>
<p>Language Arts: Create a consumer report on socks as insulators.</p> <p>Mathematics: Use class data from the conduction exploration to create bar graphs.</p> <p>Social Studies: Explore the use of temperature scales and hold a class debate on whether the United States should switch to the Celsius scale.</p>	<p>Technology: Learn new vocabulary words associated with inventions. Create an “Invention Tips” handbook. Research and report on famous inventors.</p> <p>Mathematics: Calculate the energy and money saved by using a CFL bulb instead of an incandescent bulb.</p> <p>Social Studies: Research the invention of the light bulb. Explore what patents are and vote on the top ten patents of all time.</p> <p>Art: Create soap, dipped candles, and colored wax “stained glass.” Make small colored water puddles on white paper.</p>	<p>Cross-Curricular Extensions</p>