



# The Educator's Guide to:

## The Adventures of Sparky, the Energy Saving Squirrel

### the Adventures of Sparky, the Energy Saving Squirrel



#### Inside

- Essential questions for student inquiry
- Ready-to-use lessons to engage and explore
- Activities to extend learning
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- Glossary of useful terms

# Introduction

Everyone uses energy, so everyone can help save it, too! This guide, a supplement to the kids' book *The Adventures of Sparky, the Energy Saving Squirrel*, provides educators and parents with essential background information, practical lessons, and hands-on investigations for educating children about energy use and conservation. Large group activities ideal for the classroom and small group activities suitable for the home are designed enhance student learning. Essential questions and lesson plans are linked to curriculum requirements and explore themes within topics such as science as inquiry, physical science, science and technology, and science in personal and social perspectives. The guide's activities aim to help children acquire skills that are significant in their developmental process—to collect, organize, and communicate ideas.

## Essential Questions

### What is energy?

**Energy** can be thought of as the ability to do work. Energy is all around us and we rely on it for everything—from lighting our cities, to heating our homes, to making our food. We use energy to run, grow, and even to think! Energy exists in many different forms and can change from one form to another. Heat, light, sound, **electricity**, and motion are all forms of energy. Are you feeling “energetic” today?

### Where does our energy come from?

Our cities and homes use a lot of energy. The energy we use comes from a variety of sources: some comes from fuels like coal, oil, and natural gas, and some comes from the sun, the wind, the movement of water, and the heat of the earth. These **energy sources** are used to create the energy we use every day.

### What do we use energy for?

Energy enables us to light our cities, homes, and schools. We use energy to keep warm in the winter and to keep cool in the summer. We use it for cooking, for cleaning, for storing our food, and for entertainment—TVs, computers, and radios all use energy. Energy is very important to us and we shouldn't waste it!

### How does energy get to our homes, schools, and businesses?

Energy's journey begins at **power plants**, or power stations, where electricity is generated by utilizing an energy source such as coal or sunlight, or by capturing the power of moving water and wind. The electricity is then carried from power plants to homes, schools, and businesses through wires, called **power lines**, that are strung on utility poles or through underground pipes.

### How is energy measured in our homes?

When we use electricity or natural gas in our homes, it first passes through an electric meter or gas meter. The meter tells the utility company how much energy we use. Energy costs money, and the more we use the more we have to pay! The electric meter measures electricity usage in **kilowatt-hours (kWh)**, or the amount of energy used over a length of time. The gas meter measures natural gas usage in cubic feet (CF).

*Math Challenge!* One day in the month of January, a family used 30 kilowatt-hours of electricity to heat their home. The next day, the family wore sweaters instead of turning up the heat and only used 20 kilowatt-hours of electricity. How many kilowatt-hours did the family save?

### What can you do to save energy in your home?

There are many ways to become an energy-saver. Read *The Adventures of Sparky, the Energy Saving Squirrel* to learn how to save energy in your home. You can help to save energy and money by using **energy-efficient appliances**. And you can also reuse and recycle items instead of throwing them away. New things take energy and cost money to make, so the more you reuse the more you can save! Instead of throwing out old clothes, give them to someone in need. And always remember to separate out plastics, paper, glass, and metals from your trash. Recycling saves energy, too!

*Think About It: Why Save?* Saving energy at home, in school, and around your community can be very rewarding. Using less can help save money and reduce waste.

*The Reduce, Reuse, Recycle at Home Challenge!* Gather up some ordinary things that you would usually toss in the trash, such as plastic bottles, paper towel tubes, cardboard boxes, or newspapers. Can you think of ways to reuse them? Can you reuse them to build something new?

# Lessons to Engage and Explore!

## I. Waste Not—An Energy Experiment

### Introduction

One easy way to become an energy-saver is simply to use less.

### Objectives and Learning Goals

Students will realize that energy resources can be extended through decreased use.

### Time and Groups

30 minutes; this is a full class activity

### Materials

Two fast-burning stick candles (e.g., birthday candles), paper, colored pencils

### Activity Procedure

- Have the students sit in a circle in a wide open space in the classroom and explain the concept of conservation.
- Show the students the candles and explain that the energy needed to keep a flame burning comes in part from the candle wax. They can think of the candle

wax as the energy source and the flame as the use of that energy.

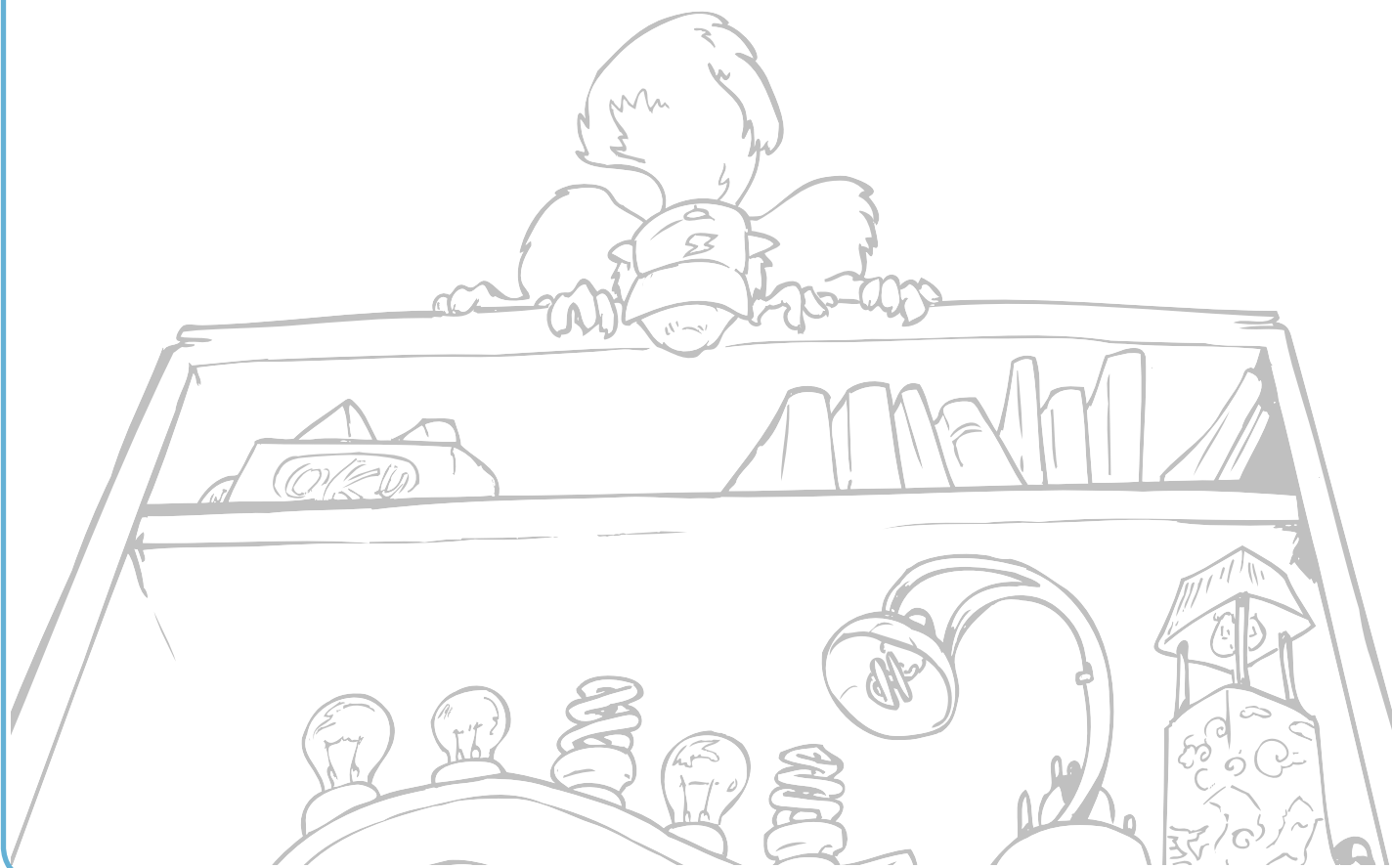
- Ask the students to draw, on pieces of paper or in their student notebooks, the two candles before they are lit. They should label these drawings “Start.”
- Experiment—candle 1: Let candle 1 burn until all of the wax has been used. Appoint a student time-keeper to keep track of how long it takes for the candle to expire.
- Experiment—candle 2: Blow out and relight candle 2 in five-minute increments. Appoint a second time-keeper, and have students take turns blowing out the candle.
- Ask the students to record their observations of the two candles throughout the experiment using drawings.

### Follow-Up Questions

Which candle lasted longer? Why?

How could we have made candle 2 last even longer?

What other things that use energy in the classroom can be turned off and saved for later?





## 2. Spreading Energy-Saving Awareness

### Introduction

Now that you know how to be an energy-saver at home and in school, spread the word!

### Objectives and Learning Goals

Students will learn to communicate energy-saving ideas to their school community.

### Time and Groups

45 minutes; small groups of 2-3 students

### Materials

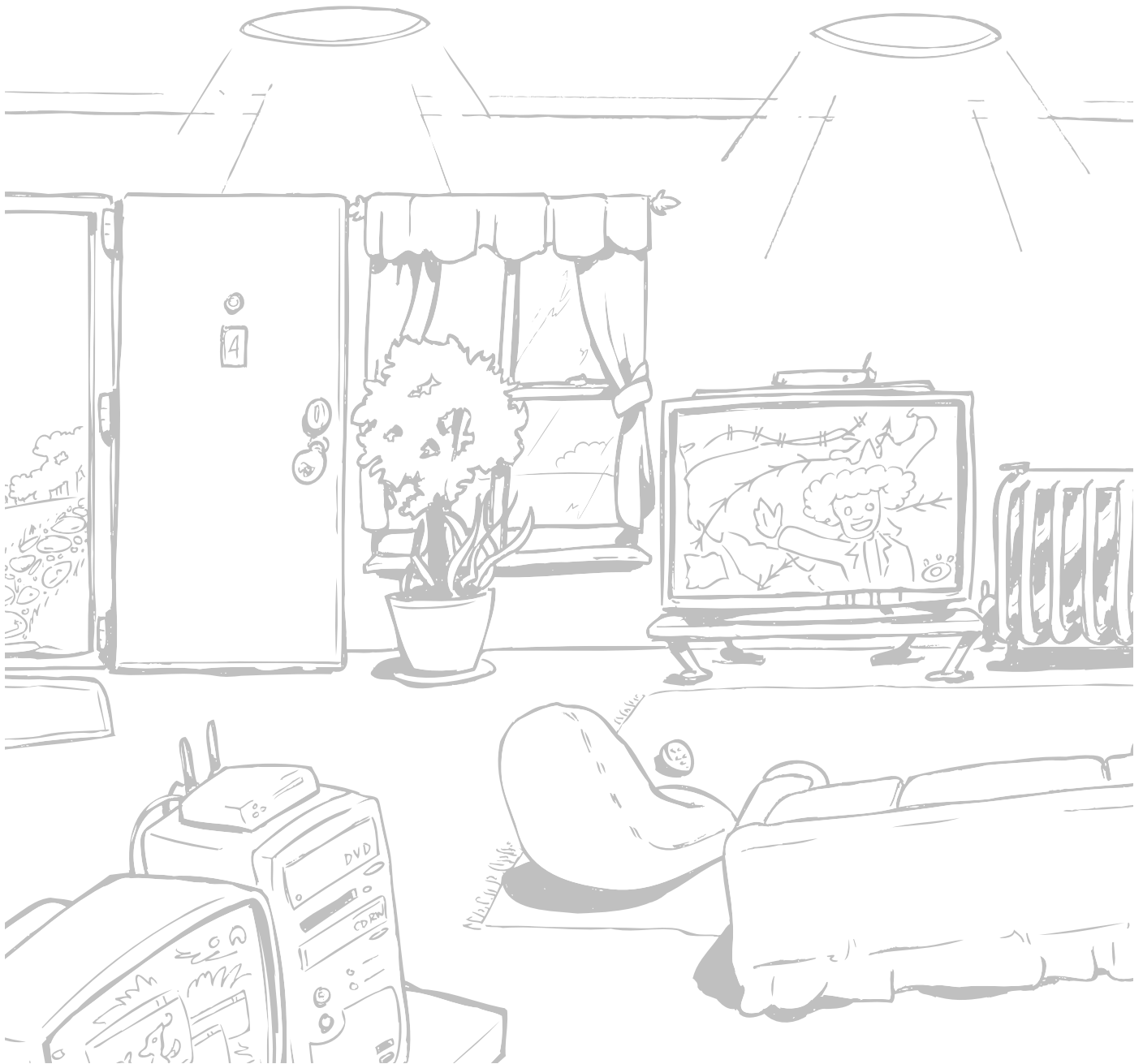
Poster paper, colored pencils or markers

### Activity Procedure

- Divide students into small groups.
- Ask students to create posters to hang up around the school to spread their energy-saving ideas.

### Follow-Up Activity

Organize an energy-saving event at school, and ask students to brainstorm ways to involve their community. For example, the school community could plan reading groups in the park instead of using lights (which use energy!) in the classroom.



### 3. Energy-Savers and Wasters Sorting Game

#### Introduction

Thanks to Sparky the Squirrel, you have learned many ways to save energy at home and save money for your family, too!

#### Objective and Learning Goals

Students will review energy-saving tips learned from Sparky the Squirrel.

Students will be able to apply these tips to other areas in their life, such as at school or friends' houses.

Students will learn to work together in large group activities.

#### Time and Groups

45 minutes; a full class activity that can easily be adapted to an individual or small group activity for home

#### Materials

Paper or cardstock, scissors, colored pencils

#### Activity Procedure

Make the playing cards by having each student write down one energy-saver tip or one energy waster on a precut paper card. Students may also include an illustration on their card, but they shouldn't write "saver" or "waster" on the card. Collect and shuffle the cards.

- ▶ Divide the classroom in half—one side for energy-savers and the other for wasters.
- ▶ One by one, give each student a saver or waster card.
- ▶ After the student reads the card aloud to the class, he or she must move to the appropriate side of the room.
- ▶ After the students sort through all of the playing cards, they can be challenged to find their energy-saving partner. For example, the one holding the waster card "Leave the water running while you brush your teeth" can find his or her counterpart holding the saver card "Turn on the faucet only when you need to while brushing your teeth."
- ▶ The activity may be played a few times by shuffling and swapping the cards or making new ones.



# At Home Activities to Extend Learning!

## 1. Energy at Home

### Overview

Families use energy in many ways at home. How does your family use electricity?

### Exploration

With an adult helper, list or draw the items in each room that use electricity. Describe what electricity makes each item do—for example, “makes light,” “makes sound,” “heats up,” “cools down,” or “moves”.

### Extension

Be an energy auditor! Do you see any ways you can save energy in your home?

## 2. Meter Reader

### Overview

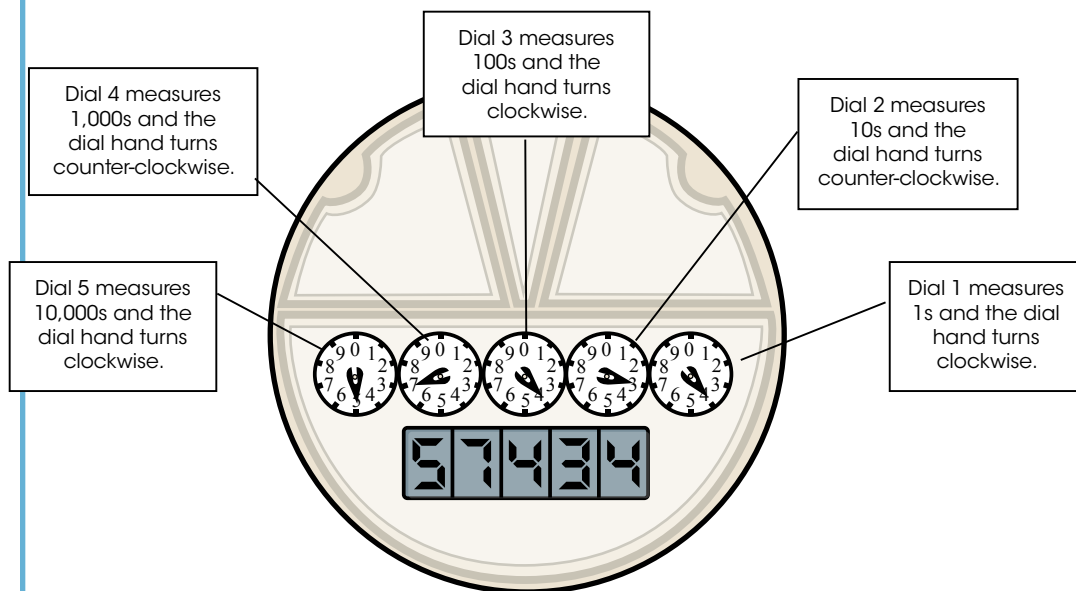
When you use electricity at home, it first passes through an electric meter. The meter tells your electricity company how much energy you use. Remember, electricity costs money and the more you use the bigger the bill! The meter measures electricity usage in kilowatt-hours (kWh), or the amount of energy used over a length of time.

### Exploration

With an adult helper, record your home’s meter location and the company your family buys electricity from. Draw a picture of the meter. With your helper, can you figure out how much your next energy bill will be?

### Extension

Bring your sketches and notes to school to share!



An Electric meter can look complicated, but its easy once you learn how!

Here’s an example:  
This meter reads 57,434 kWh.

$$\text{(monthly kilowatt-hours)} \times \text{(average cost)} = \text{monthly bill}$$

### 3. Energy from Morning to Night

#### Overview

You use energy in many ways, and you use it from the moment you wake up until you go to bed!

#### Exploration

Keep a list of all the ways you use energy throughout the day.

#### Extension

Bring your list to school to share!

#### Further Questions for Kids to Think About and Review

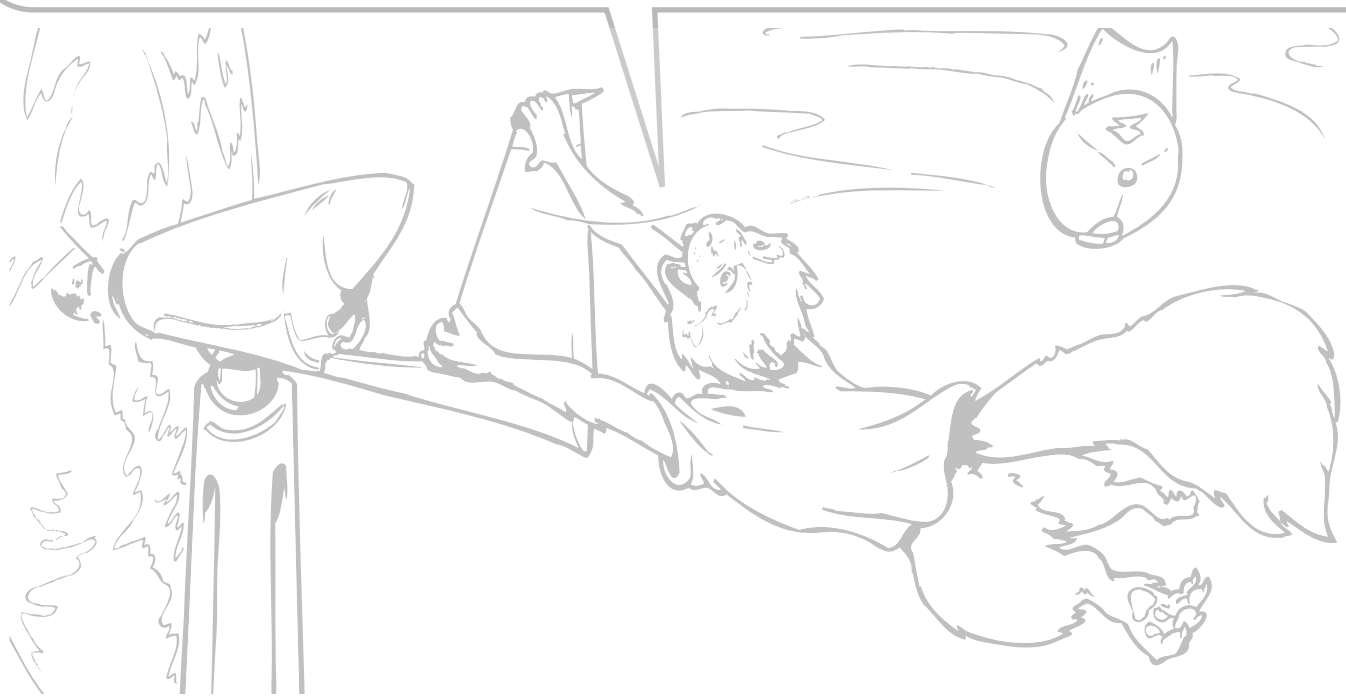
How would life be different without electricity?

What else can energy do besides make light?

Why should we save energy? What are other ways we can save?

How does electricity get to your house? What does it cost? How is it measured?

How does your family's utility generate electricity?



## Glossary of Useful Terms

**Electric meter** An instrument used in homes and businesses to measure the amount of electricity used

**Electricity** The flow of electrons.

**Energy** The ability to do work.

**Energy efficient** Technologies that use less energy to do the same job.

**Energy source** A fuel or natural occurrence used to produce electricity.

**Kilowatt-hour (kWh)** The amount of electrical energy used over a length of time.

**Power lines** Wires that carry electricity to homes, schools, and businesses.

**Power plant** The place where electricity is made.

**Recycle** To process used materials such as plastics, paper, metals, and glass into new products.

**Reuse** To give something a new use.

# Correlation to Standards

This educator's guide can be correlated to the standards listed below for students in grades K–5. The activities provided in this guide allow children to use appropriate techniques to collect, organize, communicate, and visualize data. Selected lessons also enable the use of mathematics to ask questions and form conclusions.

## National Science Education Standards K–4

*Content Standard A:* Science as Inquiry, A1. Abilities necessary to do scientific inquiry, A2. Understanding about scientific inquiry

*Content Standard B:* Physical Science, B3. Light, heat, electricity, and magnetism

*Content Standard E:* Science and Technology, E2. Understanding about science and technology

*Content Standard F:* Science in Personal and Social Perspectives, F3. Types of resources, F5. Science and technology in local challenges

3.4, 4.4, 5.4

Integration of Knowledge and Ideas: CCSS.ELA-LITERACY.RI.K.8, 1.8, 2.8, 3.8, 4.8, 5.8

Range of Reading and Level of Text Complexity: CCSS.ELA-LITERACY.RI.K.10, 1.10, 2.10, 3.10, 4.10, 5.10

### Writing

Text Types and Purposes: CCSS.ELA-LITERACY.W.K.1, 1.1, 2.1, 3.1, 3.1.A, 3.1.B, 4.1, 4.1.A, 4.1.B, 5.1, 5.1.A, 5.1.B

Production and Distribution of Writing: CCSS.ELA-LITERACY.W.K.5, 1.5, 2.5, 3.5, 4.5, 5.5

Research to Build and Present Knowledge: CCSS.ELA-LITERACY.W.K.8, 1.8, 2.8, 3.8, 4.8, 5.8

## Next Generation Science Standards K–5

*Scientific and Engineering Practices:* Asking questions and defining problems; Planning and carrying out investigations; Analyzing and interpreting data; Obtaining, evaluating, and communicating information

*Disciplinary Core Ideas:* ESS3.C Human impacts on Earth systems; PS3.A: Definitions of Energy; PS3.D Energy in chemical processes and everyday life

*Crosscutting Concepts:* Patterns; Cause and effect; Energy and Matter; Stability and change

### Speaking & Listening

Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.K.1, K.1.A, K.1.B, 1.1, 1.1.A, 1.1.B, 1.1.C, 2.1, 2.1.A, 2.1.B, 2.1.C, 3.1, 3.1.A, 3.1.B, 3.1.C, 3.1.D, 4.1, 4.1.A, 4.1.B, 4.1.C, 4.1.D, 5.1, 5.1.A, 5.1.B, 5.1.C, 5.1.D

Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.K.5, 1.5, 2.5, 3.5, 4.5, 5.5

### Language

Vocabulary Acquisition and Use: CCSS.ELA-LITERACY.L.K.4, 1.4, 2.4, 3.4, 4.4, 5.4

## Common Core Standards

### English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects K–5

#### Reading: Informational Text

Key Ideas and Details: CCSS.ELA-LITERACY.RI.K.1, 1.1, 1.2, 1.3, 1.4, 1.5; CCSS.ELA-LITERACY.RI.K.2, 1.2, 2.2, 3.2, 4.2, 5.2

Craft and Structure: CCSS.ELA-LITERACY.RI.K.4, 1.4, 2.4,

### Mathematics Standards K–5

Counting & Cardinality: CCSS.MATH.CONTENT.K.CC.B.4, B.4.A, B.4.B, B.4.C; CCSS.MATH.CONTENT.K.CC.C.6

Operations & Algebraic Thinking: CCSS.MATH.CONTENT.K.OA.A.1, 1.OA.A1, 2.OA.A1, 3.OA.A1, 4.OA.A1, 5.OA.A1

Measurement & Data: CCSS.MATH.CONTENT.K.MD.B.3; CCSS.MATH.CONTENT.1.MD.C.4

## References

- Energy Star: [www.energystar.gov](http://www.energystar.gov)
- Energy Quest: [www.energyquest.ca.gov](http://www.energyquest.ca.gov)
- National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). Common Core State Standards. Washington, DC: Authors.

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