NOVA SCOTIA SCIENCE 6
TEACHER'S RESOURCE

UNIT 1: ELECTRICITY

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McGraw-Hill Ryerson

UNIT 1: ELECTRICITY OVERVIEW

Unit 1 introduces students to:

- how electricity works, including the properties of electric charges,
- the ways that electrical energy is captured and used in circuits, and
- the broader social, environmental, and safety issues involved in generating and using electricity.

Over the course of the unit, students will create static electricity and observe what happens when an object is charged. They will also design and construct a variety of electrical pathways using direct current circuits. Through the investigations in this unit, students demonstrate that electricity can be transformed into light, heat, sound, motion, and magnetic effects. Students evaluate renewable and non-renewable methods of producing electricity; learn about energy efficiency, environmental concerns, and conservation; and work together to choose the energy source for a new community.

Chapter 1: Investigating and Controlling Electricity

Students first looked at the world of electricity in Science 3, when they studied invisible forces. Chapter 1 provides students with a first look into the world of electricity. It allows them to investigate friction and chemical methods of creating a controlled electrical system with predictable properties and behaviours.

Section 1.1 introduces students to the concepts of static electricity, including positive and negative charges, and attraction and repulsion. Students also learn about the creation of lightning through friction, attraction, and repulsion. The activities help students investigate the creation of static charge and observe how statically charged objects behave. Students will also look at the laws of attraction and repulsion, and examine lightning myths and realities.

Section 1.2 introduces students to the concept of electric current and its relationship to charged particles. Students learn the principle of grounding and how it can be used to make our daily lives safer. In the activities in this section, students create a simple electric circuit, discover the properties of conductors and insulators, and observe a chemically created electric current.

In section 1.3, students investigate the components and properties of electric circuits. Students learn about loads, conductors, sources, and switches. They then observe how these elements interact in series and parallel circuits. Students also learn about the behaviour of current in series, parallel, and short circuits. In the activities, students model current using diagrams and straws. They also create simple circuits, both in series and parallel.

Chapter 2: Power to You

Chapter 2 deals with energy conversion, generation, efficiency, and conservation. In section 2.1, students discover how electricity is converted into other kinds of useful energy, such as light, heat, and magnetism. Incandescent and compact fluorescent bulbs are compared in terms of energy efficiency and how they work. Students go on to investigate and observe the relationship between electricity and magnetism by creating an electromagnet in the classroom.

Section 2.2 introduces students to different sources of electricity (hydro-electric, fossil fuel, and nuclear), highlighting advantages and disadvantages of each. Students also research how electricity is produced in Nova Scotia and in Canada.

In section 2.3, students compare renewable and non-renewable energy sources. They learn about the various renewable methods of generating electricity, including solar, wind, tidal, biomass, and geothermal energy. In the activity in the section, students research and compare various sources of renewable and non-renewable energy.

Finally, in section 2.4, students learn to monitor their energy consumption through the use of electric meters and calculations of energy use in appliances and other electric devices. They discover the difference between energy efficiency and conservation, and create a plan to help reduce the amount of electricity used in their school.

The unit concludes with two interviews. The first is with Dr. Elsie Charles Basque, the first Mi'kmaq to earn a Nova Scotia Teacher's Certificate. The elder shares her experience of growing up in Nova Scotia in the early days of electricity. The second interview is with Andrew Gergely, an electrical engineer. The Unit 1 Project challenges students to apply their knowledge of electricity and their problem-solving skills to design a town and choose its source of energy.

Unit 1 Electricity: Correlation to Nova Scotia Grade 6 Science Curriculum

UNIT 1 CORRELATION TO NOVA SCOTIA GRADE 6 SCIENCE CURRICULUM

	NOVA SCOTIA SCIENCE 6	STUDENT TEXT PAGES
GENERAL CURRICULUM OUTCOMES		
STSE: Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology	• At Home Activity 1-C: How Shocking • Pause & Reflect (insulation) • Internet Connect (motors and electromagnets) • Ask an Electrical Engineer: Andrew Gergely (Exploring Further)	p. 13 p. 25 p. 43 pp. 56–7
Skills: Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.	• Starting Point Activity 1-A: Static, Static, Everywhere • all Conduct an Investigations • Problem-Solving Investigation 2-F: From Consuming to Conserving • Unit 1 Project: Building Communities	p. 5 pp. 8–9 (1-B); 16–7 (1-E); 26–7 (1-H); 30 (1-J); 38–9 (2-B) p. 51 pp. 58–9
Knowledge: Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.	• Find Out Activity 1-D: Put It Together • Conduct an Investigation 1-J: On Parallel Tracks • Unit 1 Project: Building Communities	p. 15 p. 29 pp. 58–9
SPECIFIC CURRICULUM OUTCOMES		
Uses for Electricity • demonstrate how electricity in circuits can produce light, heat, sound, motion, and magnetic effects (303-26)	• Starting Point Activity 2-A: Electric Lunch	p. 35
• describe how electricity has led to inventions and discuss electrical safety features at work and at play (107-9, 106-4, 108-2, 303-31)	• At Home activity 1-C: How Shocking! • Pause & Reflect (insulation) • Conduct an Investigation 1-H: In Series • Conversation with an Elder: Dr. Elsie Charles Basque	p. 13 p. 25 pp. 26–7 pp. 54–5
Investigating Static Electricity • make predictions and investigate static electricity; and draw conclusions based on evidence (104-5, 204-3, 204-7, 205-9, 206-5)	• Starting Point Activity 1-A: Static, Static, Everywhere • Conduct an Investigation 1-B: Get Ready, Get Set, Charge! • Internet Connect (atoms and matter) • At Home Activity 1-C: How Shocking!	p. 5 pp. 8–9 p. 11 p. 13
Circuit Pathways • compare a variety of electrical pathways by constructing simple circuits, series circuits, and parallel circuits and illustrate them with appropriate symbols (303-23, 303-25, 207-2)	• Find Out Activity 1-D: Put It Together • Conduct an Investigation 1-E: Lighten Up! • Conduct an Investigation 1-H: In Series • At Home Activity 1-I: Current in Parallel and Series Circuits • Conduct an Investigation 1-J: On Parallel Tracks	p. 15 pp.16–7 p. 26 p. 29 p. 30
• perform activities that compare the conductivity of different solids and liquids (205-3, 300-20)	• Find Out Activity 1-F: Electric Lemon • It's the Only Way to Go	p. 20 p. 25
• describe the role of switches in electrical circuits, and identify materials that can be used to make a switch (303-24, 204-8)	• Pause & Reflect (switches) • Find Out Activity 1-G: It's the Only Way to Go • Conduct an Investigation 1-H: In Series	p. 23 p. 25 p. 26
Electromagnets and Electric Generators • investigate and describe the relationship between electricity and magnetism using electromagnets and electric generators (204-1, 303-27, 303-22)	• Conduct an Investigation 2-B: What's the Big Attraction? • Internet Connect (motors and electromagnets)	p. 38 p. 43
Consumption and Conservation • explain various methods by which electricity is generated including renewable and non-renewable (105-3, 303-28, 303-29)	• Find Out Activity 2-C: What's Your Source? • Find Out Activity 2-D: Comparing Energy Sources	p. 41 p. 47
• describe how our actions could lead to reducing electrical energy consumption in your environment (108-5, 108-8, 303-30, 106-3)	• At Home Activity 2-E: Watts Up? • Internet Connect (electricity meters) • Problem-Solving Investigation 2-F: From Consuming to Conserving	p. 50 p. 50 p. 51

USING ACTIVITY-BASED LEARNING TO TEACH UNIT 1: ELECTRICITY

The hands-on, minds-on science in Unit 1 allows students to investigate and explore static electricity and electric currents. Students encounter electricity at home and at school, and this unit will connect their learning to everyday applications in a meaningful way. Engaging students in their own learning about electricity gives them opportunities to unify the concept of energy and emphasizes the nature of science.

Activities may be varied, but all should address the outcomes and empower student learning. For example, Conduct an Investigation 1- B: Get Ready, Get Set, Charge! provides students with a variety of materials and challenges them to determine which combination of materials makes a static charge. Activities later in the unit challenge students to determine combinations of materials that make a specific electric circuit.

Assessing Prior Knowledge and Introducing the Unit

In Science 3, the unit Invisible Forces used experimentation to introduce students to a variety of materials that might make static charges. A discussion of prior knowledge of electricity should include students' experiences in their daily lives. There are several ways to introduce this unit through investigations. Consider introducing the need for safe practices around electricity, control over the amount of electricity used, or the inventions and applications of new devices to begin the study. Giving students the materials to explore and record their findings will lead to questions and a fair test to solve practical problems that they design or try.

Exploring Key Concepts

The key concepts are

- static electricity
- electrical circuits
- energy use

Throughout the unit, students should test their predictions and hypotheses, record observations, and use the tools and apparatus in a manner that ensures personal safety and the safety of others. Encourage students to explain concepts and definitions in their own words. Key term BLMs have been provided for each chapter to assist in this.

Ask probing questions to redirect students' investigations when necessary. Avoid rhetorical questions that require students to confess to the class that they do not understand a particular topic. (Such questions usually include: Does everyone understand that?, Isn't that right?, and Who does not get it?) Instead, ask operational questions, and rephrase the question when a student cannot provide an answer. Follow up a student's response by asking what evidence they have to support their answer(s).

This unit gives students considerable hands-on, minds-on work. Some students may be able to put together a circuit but not explain it, some may be able to explain a circuit but are not able to use the equipment to put it together, and some may be able to put the circuit together and explain how it works. There are many different ways that students and a teacher may address the concepts. The important point is the actual doing and thinking in science. Practice of literacy skills while reading material and writing their results will help students clarify their knowledge. There will also be opportunities for students to do mathematics in the course of their science work.

Assessing Student Learning

The key point in student assessment is that assessment should reflect the methods used in learning. A minimum of sixty percent of class time is for hands-on, minds-on science (actually doing experiments and activities) and thus the assessment should mimic that teaching and learning model. In science the application of STSE and Skills is more important than knowledge. Therefore paper and pencil tests are not the most effective way to assess what students know and are able to do in relation to electricity.

For example, students need opportunities to plan and perform experiments in order to develop the ability to analyze and solve problems. To assess their proficiency with this skill, individual steps in a procedure can be reproduced on single strips of paper. Each student would receive a set and be asked to read the steps and put them in a logical sequence. This technique can be used to introduce the skill and again to test initial student comprehension. After a few experiments, the assessment task can be modified by leaving out steps, adding unnecessary steps, or giving partial steps. This will help gauge the students' ability to construct their own experiment, which is a skill they will be using in science courses right up to grade 12.

See the following section on assessment in this Teacher's Resource for more guidelines for assessing hands-on, minds-on learning.

IMPLEMENTATION PLANNER FOR UNIT 1 ELECTRICITY

The implementation planning chart below is intended to help you use *Nova Scotia Science 6* to cover the curriculum by highlighting the activities, investigations, and some suggested assessment options. (See the Assessment section of this teacher's resource for more information.) Page numbers in the student book are indicated in [ ].

WEEK #	ACTIVITIES [STUDENT TEXT PAGE]	ASSESSMENT OPTIONS
	Unit 1 Opener [2-3]	• Getting Ready answers
	Chapter 1: Investigating and Controlling Electricity [4-33]	• Rubric 2, Science Logbook • Checklist 7, Concept Map • Vocabulary BLMs, Science Portfolio (if using), one-on-one interviews
	Starting Point Activity 1-A: Static, Static, Everywhere [5]	• What Did You Find Out? answers
	Section 1.1: Static Electricity [6-14]	• Check Your Understanding answers [14]
	Conduct an Investigation 1-B: Get Ready, Get Set, Charge! [8]	• Checklist 14, Scientific Drawing
	At Home Activity 1-C: How Shocking! [13]	• Checklist 1, Investigating an Issue • Checklist 5 Poster
	Section 1.2: Making Connections [15-21]	• Check Your Understanding answers [21]
	Find Out Activity 1-D: Put It Together [15]	• What Did You Find Out? answers
	Conduct an Investigation 1-E: Lighten Up! [16]	• Rubric 14, Predicting
	Find Out Activity 1-F: Electric Lemon [20]	• Checklist 15, Making Observations and Inferences
	Section 1.3: Electrical Circuits [22-33]	• Check Your Understanding answers [32]
	Find Out Activity 1-G: It's the Only Way to Go [25]	• Checklist 14, Scientific Drawing
	Conduct an Investigation 1-H: In Series [26]	• Rubric 19, Conduct an Investigation
	At Home Activity 1-I: Current in Parallel and Series Circuits [29]	• Checklist 2, Developing Models
	Conduct an Investigation 1-J: On Parallel Tracks [30]	• Rubric 19, Conduct an Investigation
	Chapter 2: Power to You [34-53]	• Rubric 2, Science Logbook • Checklist 7, Concept Map • Vocabulary BLMs, Science Portfolio (if using), one-on-one interviews
	Starting Point Activity 2-A: Electric Lunch [35]	• What Did You Find Out? answers
	Section 2.1 Using Electricity [36-39]	• Check Your Understanding answers [39]
	Conduct an Investigation 2-B: What's the Big Attraction? [38]	• Rubric 19, Conduct an Investigation
	Section 2.2: Using the Electromagnetic Connection to Generate Electricity [40-43]	• Check Your Understanding answers [43]
	Find Out Activity 2-C: What's Your Source? [41]	• Rubric 5, Research Project
	Section 2.3: Renewable Sources of Electricity [44-48]	• Check Your Understanding answers [48]
	Find Out Activity 2-D: Comparing Energy Sources [47]	• Checklist 3, Oral Presentation • Rubric 18, Template to develop a rubric for a debate
	Section 2.4: Consuming and Conserving Electrical Energy [49-53]	• Check Your Understanding answers [52]
	At Home Activity 2-E: Watts Up? [50]	• Rubric 5, Research Project
	Problem-Solving Investigation 2-F: From Consuming to Conserving [51]	• Rubric 11, Problem Solving
	Conversation with an Elder: Dr. Elsie Charles Basque [54-55]	• Checklist 3, Oral Presentation
	Ask an Electrical Engineer: Andrew Gergely [56-57]	• Checklist 5, Research Project
	Unit 1 Project: Building Communities [58-59]	• Checklist 11, Project Self-Assessment • Checklist 12, Project Group Assessment

MULTIPLE INTELLIGENCES CORRELATIONS FOR UNIT 1 ACTIVITIES AND INVESTIGATIONS

The table below shows the multiple intelligences engaged in the activities and investigations for this unit in order to help you plan for differentiated instruction in your science lessons. For more information concerning differentiated instruction and multiple intelligences, see the Introduction and Implementation section of this Teacher's Resource.

The multiple intelligence codes are as follows: VL = Verbal-Linguistic; LM = Logical-Mathematical; N = Naturalist; VS = Visual-Spatial; BK = Body-Kinesthetic; IE = Interpersonal; IA = Intra-personal; MR = Musical-Rhythmic; E = Existential.

	VL	LM	N	VS	BK	IE	IA	MR	E
UNIT 1: ELECTRICITY [page #]									
Chapter 1: Investigating and Controlling Electricity [4-33]									
Starting Point Activity 1-A: Static, Static, Everywhere [5]	●	■		■	■				
Conduct an Investigation 1-B: Get Ready, Get Set, Charge! [8]	●	■		■	■				
At Home Activity 1-C: How Shocking! [13]	■			●					
Find Out Activity 1-D: Put It Together [15]	■	●			■				
Conduct an Investigation 1-E: Lighten Up! [16]	■			■	■				
Find Out Activity 1-F: Electric Lemon [20]	●				■				
Find Out Activity 1-G: It's the Only Way to Go [25]	●			■	■				
Conduct an Investigation 1-H: In Series [26]	●			■	■				
At Home Activity 1-I: Current in Parallel and Series Circuits [29]	●				■				
Conduct an Investigation 1-J: On Parallel Tracks [30]	●			■	■				
Chapter 2: Power to You [34-53]									
Starting Point Activity 2-A: Electric Lunch [35]	●	■				●			
Conduct an Investigation 2-B: What's the Big Attraction? [38]	●			■	■				
Find Out Activity 2-C: What's Your Source? [41]	●			■		■			
Find Out Activity 2-D: Comparing Energy Sources [47]	■					■	■		●
At Home Activity 2-E: Watts Up? [50]	●	■					●		●
Problem-Solving Investigation 2-F: From Consuming to Conserving [51]	●	■	■	●	●	■	●	●	■
Unit 1 Project: Building Communities [58-59]	●	■		■		●			

■ indicates the primary intelligences involved in the activity or investigation

● indicates the secondary intelligences. For instance, for a hands-on experiment, students use mostly body-kinesthetic (the tactile skills) and visual-spatial (for observation) intelligence. However, if the activity includes a follow-up discussion or a written recording, there is a verbal-linguistic component. If the activity is done in groups, there is an interpersonal component.

Advance Planning Chart for Activities and Investigations for Unit 1: Electricity

ACTIVITY/ INVESTIGATION	ADVANCE PREPARATION	APPARATUS/ MATERIALS	TIME REQUIRED	OTHER CONSIDERATIONS
CHAPTER 1: INVESTIGATING AND CONTROLLING ELECTRICITY				
Starting Point Activity 1-A Static, Static, Everywhere, p. 5	• 3 days before: Obtain a class set of materials. Ask students to bring in materials as they are able to.	Per group: • string • markers • tape • 2 balloons • 1 wool cloth • other lightweight objects that can be hung, such as plastic containers or Styrofoam™ cups	• 20 min	• Try to avoid humid or rainy days. • Avoid doing the activity on a carpet.
Conduct an Investigation 1-B Get Ready, Get Set, Charge!, pp. 8–9	• 3 days before: Obtain materials for each group. • 1 day before: Photocopy BLM 1.[X] Get Ready, Get Set, Charge! or have students prepare the tables required to complete the investigation.	Per group: • 2 plastic spoons • 2 glass rods • 1 wool cloth • 1 silk cloth • paper punches or confetti	• Part 1: 20 min • Part 2: 10 min • Wrap up: 10 min	• Advise students of safety concerns when using glass rods. • Try to do the activity on a dry day.
At Home Activity 1-C How Shocking!, p. 13	• 1 week before: Identify some age appropriate books and web sites the students may use to research beliefs about lightning. Have students list and begin to collect lightning beliefs.	none	• 2 hours including research at home	• Review the appropriate use of Internet and library facilities and the effective use of search engines with students. (Check your board's or school's internet use policy.)
Find Out Activity 1-D Put It Together, p. 15	• 3 days before: Collect a complete set of materials for each group in the class. Ask students to bring in materials as they are able to. Test all components to ensure that each group has a full set of operational equipment. • 1 day before: Photocopy BLM 1.[X] Drawing Electrical Circuits and hand out. Discuss the symbols used to sketch electrical circuits.	Per group: • 1 D-Cell battery (1.5 V) in a holder • 2 aluminum foil strips (10 cm long by 1 cm wide) • 1 small flashlight bulb • additional items (these could include copper wires with alligator clips, additional D-cell batteries, buzzers, and switches)	• 30 min	• Discuss safety concerns related the heat released as electricity moves through conductors.
Conduct an Investigation 1-E Lighten Up!, pp. 16–17	• 3 days before: Prepare a complete set of materials for each group. Ask students to bring in materials as they are able to. Test all components to ensure that each group has a full set of operational equipment. • 1 day before: Photocopy the BLM 1.[X] Lighten Up! or have each group prepare the table required to complete the investigation.	Per group: • 1 D-Cell battery (1.5 V) • 1 battery holder • 3 copper wires with an alligator clip on each end • 1 small flashlight bulb • 1 light holder • 4 small plastic containers • 1 spoon • glass rod • piece of silk • piece of wood • a penny coin • a nickel coin • tap water • lemon juice • salt-water solution • baking soda solution	• 60 min	• Review safety rules for working with electricity and glass with students. • Warn students not to touch the metal parts of the alligator clips or pinch one another with them.
Find Out Activity 1-F Electric Lemon, p. 20	• 3 days before: Gather a class set of headphones and other materials. Ask students to bring in materials as they are able to. Test all headphones to ensure they work.	Per group: • 1 pair of headphones • 1 galvanized nail • 1 piece of copper wire (heavy gauge) • 1 lemon	• 20 min	• Advise students of the proper handling of sharp objects and acidic lemon juice.

ACTIVITY/ INVESTIGATION	ADVANCE PREPARATION	APPARATUS/ MATERIALS	TIME REQUIRED	OTHER CONSIDERATIONS
Find Out Activity 1-G It's the Only Way to Go, p. 25	• 1 week before: Ask students to bring in simple flashlights that can be opened up and taken apart. Ask them to bring in both working and non-working flashlights, and to put their names on them. • 1 day before: Sort flashlights into "working well" and "not working well" groups.	Per group: • 1 flashlight with batteries • coloured pencils	• 45 min	• Remind students to handle flashlight parts carefully.
Conduct an Investigation 1-H In Series, pp. 26–27	• 3 days before: Gather a class set of materials. Ask students to bring in materials as they are able to. Test all components to ensure that each group has a full set of operational equipment. • 1 day before: Photocopy BLM 1.[X] In Series or explain to students how to create observation charts to use during the investigation.	Per group: • 2 D-cell batteries in holders (1.5 V) • 2 small flashlight bulbs in holders (3 V) • 4 copper wires with an alligator clip on each end • 1 switch	• Part 1: 15 min • Part 2: 15 min • Part 3: 20 min	• Review Working Safely with Electric Circuits on page 26. • Remind students to connect the load first and disconnect the battery first when constructing circuits.
At Home Activity 1-I Current in Parallel and Series, p. 29	none	none	• 30 min	• Remind students not to share straws or water as it may pass on germs. • Advise students to be careful when handling glassware. Plastic 'glassware' is advisable.
Conduct an Investigation 1-J On Parallel Tracks, p. 30	• 3 days before: Collect enough equipment for each group. Test all components to ensure that each group has a full set of operational equipment. • 1 day before: Photocopy BLM 1.[X] On Parallel Tracks or have students prepare an observation table for the investigation.	Per group: • 1 D-cell battery (1.5 V) in a holder • 6 copper wires with an alligator clip on each end • 2 small flashlight bulbs (1.5 V) in holders • 1 buzzer (1.5 V)	• 40 min	• Review Working Safely with Electric Circuits on page 26.
CHAPTER 2: POWER TO YOU				
Starting Point Activity 2-A Electric Lunch, p. 35	none	none	• 30 min	
Conduct an Investigation 2-B What's the Big Attraction?, p. 38	• 3 days before: Collect enough equipment for each group in the class. Ask students to bring in materials as they are able to. • 1 day before: Complete the activity yourself to ensure its success.	Per group: • 1 D-cell battery (1.5 V) • 2 copper wires with alligator clips • 1 iron rod (5 cm) • 1 piece of copper wire (15–20 cm) • iron filings • white paper • rubber gloves	• 40 min	• Students should wear rubber gloves when handling iron filings. Remind students to avoid breathing in the filings and to dispose of them carefully. • Review the safety precautions for dealing with electrical circuits.
Find Out Activity 2-C What's Your Source, p. 41	• 1 month before: Collect books, articles, and web sites to assist with the investigation. Ask students to bring in materials as they are able to. • 1 week before: Secure access to the necessary computers, library resources, and other materials to complete the activity on the planned day. Have students prepare a data table for their data collection or photocopy BLM 2.[X] What's Your Source? Visit useful web sites at school before beginning the activity to ensure they are not blocked by web-filtering software.	none	• 60 min for data collection • 30 min for discussion, table preparation, and completion of questions	• You may wish to collect relevant information with regards to power generation in your area to assist students.

ACTIVITY/ INVESTIGATION	ADVANCE PREPARATION	APPARATUS/ MATERIALS	TIME REQUIRED	OTHER CONSIDERATIONS
Find Out Activity 2-D Comparing Energy Sources, p. 47	• 1 month before: Collect books, articles, and web sites to assist with the investigation. Ask students to bring in materials as they are able to. • 1 week before: Secure access to the necessary computers, library resources and other materials to complete the activity. Have students prepare a data table for their data collection or photocopy BLM 2.[X] Comparing Energy Sources. Visit useful web sites at school before beginning the activity to ensure they are not blocked by web-filtering software.	none	• 60 min for data collection • 30 min for discussion/debate with classmates	• You may wish to collect relevant information with regards to power generation in your area to facilitate student research. • Plan a visit if a power generation unit is nearby. • Ask students, "What do you think your great grandparents used as energy sources? How has it changed from their great-grandparents' time? How do you think it will change in your own time?"
At Home Activity 2-E Watt's Up?, p. 50	• 1 week before: Ask students to examine a number of electric devices at home and bring in a list of the wattage value of at least three of them. • 1 day before: Photocopy BLM 2.[X] Watts Up? or have students copy the data table from the student book into their notebooks.	none	• 30 min of class time to discuss how to complete and read labels • 30 min of home time to read labels and do calculations	• Advise students to ask a parent or guardian for both permission and assistance, especially if searching for labels on dryers, refrigerators, and stoves. Parents may also assist in estimating the number of hours each device is used. • Advise students that they should unplug devices before they start examining them.
Problem-Solving Investigation 2-F From Consuming to Conserving, p. 51	• 1 week before: Reserve the library and/or computer lab and collect the necessary resources for students to compete the activity.	Per group: • textbook, library books, and the Internet • pens and pencils, paper, other props	• 2 h for research and data collection • 2 h for presentation organization • 10 min each for group presentations	• Encourage students to assign individual and group roles before beginning research. • Advise students of the proper use of citations and images collected from the Internet.
Conversation With an Elder: Exploring Further, p. 55	• 1 week before: Review the purpose of the activity and have students identify people they might interview and questions they could ask them.	none	• Students will complete most of the work outside of the classroom. The time spent doing research and preparation will vary from student to student. • 10 min per student for presentations.	• You may wish to identify some items such as mp3 players, DVD players, digital cameras, or other devices for students to ask about.
Ask an Electrical Engineer: Exploring Further, p. 57	• 1 week before: Identify and print off information regarding the job of an electrical engineer.	none	• 30 min	None
Unit 1 Project Building Communities, pp. 58–59	• 2-3 weeks before: Finalize student groups and have each group to formalize their project plan. (Ensure that all three energy sources are represented.)	Per group: • drawing paper • pens and pencils • Bristol board	• Several hours for research and preparation • 1.5 hours for discussion and presentation	• You may wish to investigate communities in which either solar, wind, or hydro-electric power is the primary source of energy and share your findings in a pre-project class discussion.