Grade 6

Cluster 3: Electricity

Overview

In this cluster, students explore current and static electricity and compare and contrast the characteristics of each. These explorations help students identify and appreciate the importance of electricity in everyday life and understand the need for safe practices when using electricity. Students have the opportunity to apply their knowledge of series and parallel circuits in the construction of a prototype that performs a specific function. They demonstrate how electricity can be transformed into motion, and motion into electricity. Students also identify other types of transformations that can take place. Students discuss advantages and disadvantages of various renewable and non-renewable sources of electrical energy, and recognize the importance of energy conservation. The creation of an action plan to help reduce electrical energy consumption helps students understand the impacts they can make.

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
Students will...	
6-3-01 Use appropriate vocabulary related to their investigations of electricity. Include: positive charge, negative charge, current electricity, static electricity, electrical circuit, insulator, conductor, switch, series circuit, parallel circuit, electromagnet, magnetic field, motor, generator, transformation, electrical energy, renewable, non-renewable, energy consumption. GLO: C6, D4, E4	Teacher Notes **Prior Knowledge**: Students have had previous experiences related to this cluster in Grade 3, Cluster 3: Forces That Attract or Repel. ➢ Introduce, explain, use, and reinforce vocabulary throughout this cluster. ➢ **Word Splash** Introduce students to their study of electricity and activate prior knowledge by using a Word Splash (Saphier and Haley, 1993). Print words randomly on a large wall chart and provide smaller copies to each student. Read the words to students and have them discuss their meaning. Have students write sentences to make predictions about the upcoming learning experiences. Collect and save all predictions and review them at the end of the study. (For a discussion of the Word Splash strategy, see *Success*, p. 6.28.)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Prescribed Learning Outcomes

Students will...

6-3-02 Explain the attraction and repulsion of electrostatically charged materials.

Include: negatively and positively charged materials attract one another; materials of like charge repel one another.

GLO: D4

6-0-7f Reflect on prior knowledge and experiences to construct new understanding, and apply this new knowledge in other contexts. GLO: A2, C4 (ELA Grade 6, 1.2.1)

6-0-7g ↻ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

6-0-7h Identify potential applications of investigation results. GLO: C4

Suggestions for Instruction

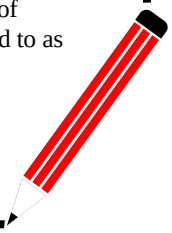
Teacher Notes

Background Information

All matter is composed of *atoms*. All atoms are composed of *subatomic particles*. *Protons* and *electrons* are part of these particles. Protons carry a positive charge and electrons carry a negative charge. Normally, objects carry an equal number of electrons and protons and are said to have a neutral charge.

When two different materials come into close contact (e.g., rubbing wool on a balloon) electrons may be transferred from one material to the other. When this occurs, one material ends up with an excess of electrons and becomes negatively charged. The other material ends up with a deficiency of electrons and becomes positively charged. This accumulation of imbalanced charges on objects results in the phenomenon referred to as static electricity.

Note: At this level, students are not expected to know or use the terms "electrons" or "protons." Instead, students are expected to use the terms *positive charges* and *negative charges*.



➢ Accessing Prior Knowledge

Ask students to rub a balloon in their hair or on another material such as felt or wool, then have students stick the balloon to a wall. Ask students to explain why the balloon stays on the wall. Record their ideas on a class chart.

➢ Static Electricity in the Environment

Use explicit instruction to introduce students to the concept of *positive charges* and *negative charges*. Add to the explanation of the balloon sticking to the wall using the terms *negatively charged*, *positively charged*, and *attract.* (Hair and wool are materials that readily give up negative charges so the balloon becomes negatively charged. When the negatively charged balloon is brought near the neutrally charged wall, the wall becomes positively charged and the two materials are attracted to one another.)

Have students brainstorm places in which they have experienced static electricity. (For example: lightning, getting shocked after walking across a carpet, clothes clinging after being in the dryer, combing hair in winter). Have them select one example and explain what causes the static electricity to happen. Their explanations should include the terms *repel, attract, static electricity, positive charge,* and *negative charge,* as well as a diagram.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Extended Response

Provide students with the following:

Electrostatics

Use words and diagrams to answer the following questions:

1. What happens when uncharged materials are placed together?
2. What happens when uncharged materials come in contact with a statically charged material?
3. What happens when two statically charged materials come together?

Science Everywhere 6 (p. 183)

PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-03 Explain current electricity, and compare the characteristics of current and static electricity by using a model.

GLO: A2, D4

6-0-4c ⊂ Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 6, 5.2.2)

6-0-4e ⊂ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

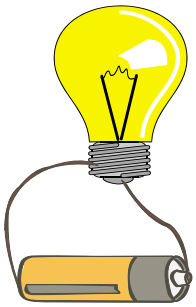
SUGGESTIONS FOR INSTRUCTION

➢ Current Electricity Demonstration

1. Have students hold hands while standing in a circle. Have each student squeeze the hand of the person next to him or her in turn until the circle is complete. Discuss what students observed.
2. Place 10 marbles side-by-side in a line. Roll a marble into the last marble in line and have students observe what happens. (The marble on the other end moves forward.)

Explain that the squeezing of hands and the moving of the force between the marbles is like the movement of negative charges along a circuit. This movement is continuous and orderly, not random.

➢ Making It Light Up



1. Provide small groups of students with a battery, two wires, and a light bulb (without the holder) and ask them to try to light the bulb. Have each small group pair with another group to share their solutions, looking at how they are similar. Have the groups share solutions with the class. Ask students what was required to light the bulb. (Wires need to come from both the positive and negative ends of the battery, with one wire touching the side of the bulb and the other wire touching the bottom of the bulb.)
2. Have students use their observations of the holding hands demonstration (from the Current Electricity Demonstration) to explain why the wires need to be touching both the side and the bottom of the bulb. (The current follows a path flowing from the negative pole to the positive pole on the battery.) Have students use their science notebooks to show/explain how they made the materials work.

➢ Static and Current Electricity Comparison

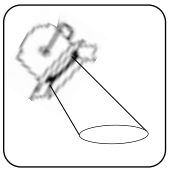
Introduce students to the term *current electricity*.

Have students use a Compare and Contrast Frame (Matchullis and Mueller, 1994) to develop a class chart comparing static and current electricity. This chart can be started at this time and then added to as students gain new information about current electricity.

(For a BLM of a Compare and Contrast Frame, see *SYSTH*, Attachment 10.4, or *Success*, p. 6.103.)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Lighting the Bulb

Provide students with the following:

Lighting the Bulb

You have been given a battery, some wire, and a light bulb. Draw a diagram to show how you would use these items to make the light bulb light up. Explain how you know it will work.

Science Everywhere 6 (p. 183)

Teacher Notes

Electricity is the flow of electrons through a conductor. Current electricity is produced when negative charges (electrons) move along a path (circuit).

Both static and current electricity involve the movement of negative charges.

- In *static electricity*, the movement of negative charges is random, caused by friction or rubbing, and is not confined to a path.
- In *current electricity*, the movement of negative charges is orderly and requires a path in which to travel.

PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-04 Identify dangers associated with static and current electricity, and demonstrate and describe appropriate safety precautions.

GLO: C1, D4

6-0-7g ⊂ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

6-0-7h Identify potential applications of investigation results. GLO: C4

6-0-9e ⊂ Be sensitive to and develop a sense of responsibility for the welfare of other humans, other living things, and the environment. GLO: B5

SUGGESTIONS FOR INSTRUCTION

➢ **Caution: Electricity!**

Have students brainstorm safety considerations regarding both current and static electricity. Have them give reasons for their suggestions. **Note:** There are important safety issues associated with static electricity that is manifested as lightning.

Examples:

Static Electricity (Lightning) Safety:

- Do not play outside during a thunderstorm. (Lightning often takes the easiest path from the clouds to the ground. It is easier for static electricity to go through a person than to take the long way around and go through the air. It is even easier for the electricity to travel through a large piece of metal [e.g., a golf club or baseball bat] and then channel through the person.)
- Do not take cover under a tall tree during a thunderstorm. (Lightning can hit the top of the tree, travel down the trunk, and then channel into a person standing under it.)
- Do not swim during a thunderstorm. (Lightning can hit the water and the electricity can channel into a person in the water.)

Current Electricity Safety:

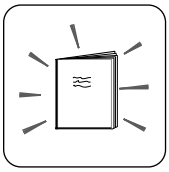
- Do not use appliances/devices that have cords with exposed wires. (A short circuit can happen when the outer covering of wires is worn or when wires touch one another.)
- Do not overload an electric socket. (Heat is produced as electricity passes through wires. If too many wires are plugged into one outlet, the heat produced can cause a fire.)
- Do not play near power lines.
- Never put anything but a plug into a socket. (Other objects can conduct electricity and cause a shock.)
- Do not unplug an appliance by pulling the cord. Always use the plug. (The cord can become damaged and can cause an electrical shock.)
- Do not use electrical appliances when you are in or near water. (Water is a conductor of electricity and if in contact with an electrical appliance can conduct electricity.)

Have students create safety posters demonstrating some of these safety issues. Posters can be shared by having students do a Gallery Walk (Brownlie and Close, 1992) and/or by displaying the posters in the school for other students to see.

(For a discussion of a Gallery Walk, see *Success*, p. 6.80.)

Suggestions for Assessment

Suggested Learning Resources



Safety Poster

Provide students with the following checklist for peer assessment of safety posters:

Peer Assessment of Safety Poster		
The poster	**Yes**	**No**
• clearly demonstrates safety issues		
• is presented in an appropriate format (pictures and text are easy to see from a distance)		
• is clear, colourful, and interesting		
Constructive comments:		

Teacher Notes

For related learning outcomes and teacher support, refer to General Learning Outcome 3—Safety, in *Kindergarten to Senior 4 Physical Education/Health Education: Manitoba Curriculum Framework of Outcomes for Active Healthy Lifestyles* (2000).

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
Students will...	
6-3-05 List electrical devices used at home, at school, and in the community, and identify the human needs that they fulfill. *Examples: heat, light, communication, movement...* GLO: B1, B2, D4	➢ **Electricity Survey** Have students conduct a survey both in their homes and in their communities to identify devices that use electricity. Have them identify the human needs that these electrical devices fulfill. Example: **Electricity Survey** **Note:** This chart is referred to again in an instructional strategy suggested for learning outcome 6-3-18.
6-0-2a ⊂ Access information using a variety of sources. *Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet…* GLO: C6 (ELA Grade 6, 3.2.2; Math: SP-II.1.6; TFS 2.2.1) **6-0-5a** ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2 **6-0-5f** ⊂ Record and organize observations in a variety of ways. *Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets…* GLO: C2, C6 (ELA Grade 6, 3.3.1; Math: SP-III.2.6) **6-0-8c** ⊂ Recognize that technology is a way of solving problems in response to human needs. GLO: A3, B2 **6-0-8d** ⊂ Provide examples of technologies from the past and describe how they have evolved over time. GLO: B1	➢ **What Happened before Electricity?** Have students add another column to their "Electrical Survey" chart called "Before Electricity." Ask students to indicate how humans met each need before there was electricity.

Location	Electrical Device	Human Need Met
kitchens of homes/ school/restaurants	• microwave • refrigerator • dishwasher • stove	• heat food • removal of heat (cooling) • heat for washing and drying dishes • heat for cooking
backyard/window/ school	• air conditioner	• removal of heat (cooling)
living room	• telephone	• communication

6-3-06 Develop a definition of an electrical circuit, based on classroom explorations. Include: an electrical circuit is a continuous path for charges and must contain a power source and a conductor. GLO: C2, D4	➢ **Defining an Electrical Circuit** Have students refer to the learning experiences related to current electricity suggested for learning outcome 6-3-03 (and those suggested for learning outcome 6-3-07, if appropriate). Have them work in small groups to use this information to develop a definition of an *electrical circuit*. The definition should include the concept that an electrical circuit • is a continuous path for charges • must contain a power source • must contain a conductor Have small groups share their definitions with the class. Use these definitions to develop a class definition.
6-0-4c ⊂ Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 6, 5.2.2)	

Teacher Notes

The instructional strategy suggested below could follow the learning experiences related to learning outcome 6-3-07 so that students can more fully understand what is meant by the term *conductor*.

SUGGESTIONS FOR ASSESSMENT	SUGGESTED LEARNING RESOURCES
 **Journal Reflection** Have students use their science journals to reflect on how technology helps us meet our needs and how technology is constantly changing.	*Science Everywhere 6* (pp. 180, 183)

Prescribed Learning Outcomes

Students will...

6-3-07 Experiment to classify a variety of materials as insulators or conductors.

GLO: C2, D3, D4, E1

6-0-3a Formulate a prediction/hypothesis that identifies a cause and effect relationship. GLO: A2, C2 (Math: SP-I.1.6)

6-0-3b Identify variables that might have an impact on their experiments, and variables to hold constant to ensure a fair test. GLO: A2, C22

6-0-3c ⊂ Create a written plan to answer a specific question. Include: apparatus, materials, safety considerations, steps to follow. GLO: C1, C2 (ELA Grade 6, 3.1.4)

6-0-4a Carry out procedures that comprise a fair test. Include: controlling variables; repeating measurements to increase accuracy and reliability. GLO: C2

6-0-4e ⊂ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

6-0-5f ⊂ Record and organize observations in a variety of ways. *Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets…* GLO: C2, C6 (ELA Grade 6, 3.3.1; Math: SP-III.2.6)

6-0-6c ⊂ Identify and suggest explanations for patterns and discrepancies in data. GLO: A1, A2, C2, C5

6-0-7a Draw a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 6, 3.3.4)

6-0-7b ⊂ Base conclusions on evidence rather than preconceived ideas or hunches. GLO: C2, C4

6-0-7c Identify a new prediction/hypothesis based on investigation results. GLO: A1, C2 (ELA Grade 6, 3.3.4)

6-0-7g ⊂ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

6-0-7h Identify potential applications of investigation results. GLO: C4

6-0-9c ⊂ Demonstrate confidence in their ability to carry out investigations. GLO: C5

Suggestions for Instruction

Teacher Notes

Background Information

- A *conductor* is a material that allows the free flow of electrons, creating electric current. (Examples: metal, water.)
- An *insulator* is a material that will not allow an electric current to flow through it. (Examples: wood, rubber, paper, plastic.)

➢ Insulator or Conductor?

Provide students with batteries, bulbs, copper wires, bulb-holders, and alligator clips (or metal paper clips). Have students plan and conduct an experiment to answer the following question: Which materials conduct electricity? Have students

- identify materials to test (e.g., metal penny, rubber band, glass, aluminum foil, metal nail, plastic spoon)
- predict whether each substance will be an insulator or a conductor prior to the experiment
- conduct the experiment and share their findings with the class
- develop a definition for the terms *insulator* and *conductor* based on their findings
- identify potential applications of their experimental findings (e.g., Which material would be best to insulate a wire? Which material would be best to conduct electricity in a switch?)

For a description of the stages involved in scientific inquiry, refer to page 12 in this document.

Students may use the "Experiment Report" (BLM 6-H) to record their work.

Suggestions for Assessment

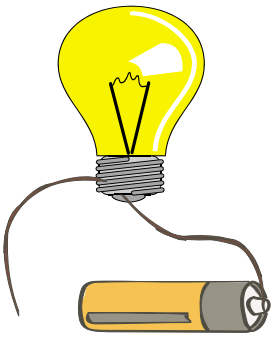
Suggested Learning Resources

Restricted Response

Provide students with the following:

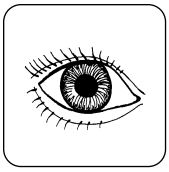
Completing the Circuit

Pat wants to complete this circuit in order to light up the bulb.



Which of the following materials could Pat use to complete the circuit? Explain your choices.

- ❑ metal knife
- ❑ plastic spoon
- ❑ rubber band
- ❑ metal nail
- ❑ wooden toothpick
- ❑ string of metal paper clips



Refer to “Conducting a Fair Test: Observation Checklist” (BLM 6-G) to assess the student-designed experiments.

Science Everywhere 6 (p. 188)

PRESCRIBED LEARNING OUTCOMES
Students will...
6-3-08 Demonstrate and describe the function of switches in electrical circuits. GLO: D4
6-0-4b ⊂ Construct a prototype. GLO: C3 **6-0-5c** Select and use tools and instruments to observe, measure, and construct. *Examples: hand lens, telescope, binoculars…* GLO: C2, C3, C5 **6-0-7g** ⊂ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

SUGGESTIONS FOR INSTRUCTION

➢ Accessing Prior Knowledge

Discuss with students the fact that we generally do not want electrical devices to run all the time. Ask them to suggest possible reasons for not running them constantly (e.g., batteries would wear out too quickly; electricity bills would increase; devices could overheat and cause fires; appliances would break down; the environment could be affected; we sometimes require darkness, especially to sleep or view movies).

Provide students with a list of electrical devices. Ask them to explain how we control the use of these devices.

Example:

Controlling Electrical Devices

Electrical Device	Method of Control
kitchen lights	on/off switch
stove element	on/off switch
vacuum cleaner	on/off switch
hand-held video game	on/off switch

In their science notebooks, have students explain the importance of switches on electrical devices.

Teacher Notes

Background Information

A switch allows us to control the flow of electricity without handling any wires. Switches allow us to close a circuit so that electricity can flow (on position) or open the circuit when we want to stop the flow of electricity (off position).

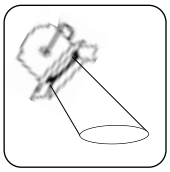
➢ Constructing Switches

Have students design and construct three different switches to control an electrical circuit. Students should select test materials used in other learning experiences or select new materials to test. Have students create a display of their switches, including a summary of the strengths and weaknesses of each.

Note: Students can also visit the Take-Apart Centre described in association with learning outcome 6-3-13 to examine switches used in different devices.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Explaining Switches

Provide students with batteries, wire, light bulbs, light bulb holders, and switches (commercial or class-made). Ask them to imagine the following scenario:

The beaded cord that turns the table light on and off fascinates your young cousin. She asks you to explain how it works. Use the materials provided to demonstrate and explain how the light gets turned on and off.

Checklist:

The student

- ❑ connects the materials using a switch to control the electricity flow
- ❑ understands that closing the switch (on) allows the electricity to flow
- ❑ understands that opening the switch (off) stops the flow of electricity
- ❑ provides a clear explanation
- ❑ uses the correct terminology

Science Everywhere 6 (p. 196)

Prescribed Learning Outcomes

Students will...

6-3-09 Construct and diagram simple series circuits and simple parallel circuits.

GLO: C2, C6, D4, E1

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

6-0-5c Select and use tools and instruments to observe, measure, and construct. *Examples: hand lens, telescope, binoculars…* GLO: C2, C3, C5

6-0-5f ⊂ Record and organize observations in a variety of ways. *Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets…* GLO: C2, C6 (ELA Grade 6, 3.3.1; Math: SP-III.2.6)

6-0-7a Draw a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 6, 3.3.4)

6-0-7f Reflect on prior knowledge and experiences to construct new understanding, and apply this new knowledge in other contexts. GLO: A2, C4 (ELA Grade 6, 1.2.1)

6-0-9d ⊂ Appreciate the importance of creativity, accuracy, honesty, and perseverance as scientific and technological habits of mind. GLO: C5

(continued)

Suggestions for Instruction

Teacher Notes

Background Information

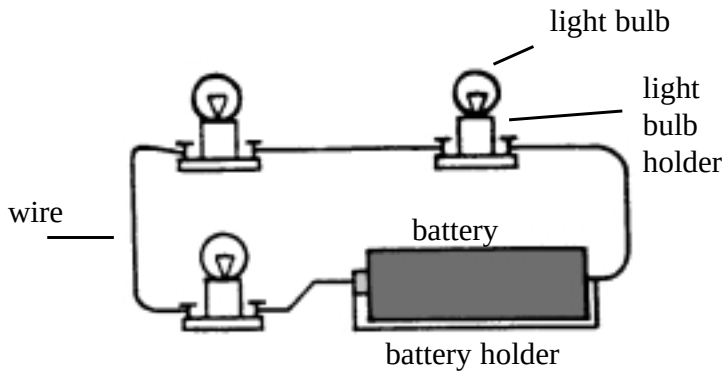
- A *series circuit* uses a single path to connect the electric source(s) to the output device(s).
- A *parallel circuit* provides more than one path for a current. It also provides the same voltage for every source and output device.

➢ Series and Parallel Circuits

Part A: Series Circuit

Have students draw and label a diagram of a simple circuit (similar to the ones they have constructed in previous learning activities) containing one battery and three light bulbs. Have students predict what will happen if one of the light bulbs is removed. Ask them to explain their thinking and then construct the circuit to test their prediction.

Example:

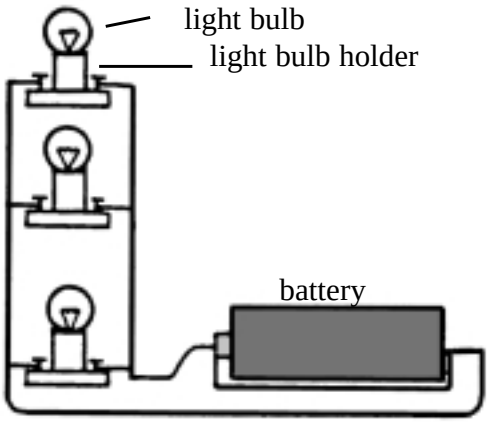


Part B: Parallel Circuits

Challenge students to create a circuit that will allow the two light bulbs to remain lit even when one light bulb is removed. Have them explain in their science notebooks how they designed their circuit and how it works. Their explanation should include a labelled diagram.

(continued)

SUGGESTIONS FOR ASSESSMENT	SUGGESTED LEARNING RESOURCES
Refer to the assessment strategy suggested for learning outcome 6-3-10.	*Science Everywhere 6* (p. 192)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
Students will...	
6-3-09 *(continued)*	*(continued)* Example:  Provide students with two titles for their diagrams—Series Circuit and Parallel Circuit—and ask them to decide which title goes with which diagram and explain why. Have students identify examples in daily life where parallel circuits are used, and explain what would happen if parallel circuits were replaced with series circuits (e.g., if Christmas tree lights were on a series circuit, the string would not light up if one bulb burnt out). ➢ **Tree Climbing Analogy** Have students compare series and parallel circuits using the analogy of climbing a tree with a rope or with a ladder. Example: • Climbing a tree with a rope is like using a series circuit. If the rope breaks, the climber will not be able to get to the top of the tree. In a series circuit, if one bulb/electrical device burns out the others will not work. • Climbing a tree with a ladder is like using a parallel circuit. If one rung breaks, the climber can still use the others to reach the top. In a parallel circuit, if one bulb/electrical device burns out the rest will continue to work. Ask students to think of other analogies. (Example: In a maze analogy, one end of the battery is the starting point with the wires serving as paths. A bulb acts as a bridge along a path. If the bulb is removed, a dead end is created along that path.)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Journal Reflection

In their science journals, have students reflect on how analogies are useful in understanding series and parallel circuits. Ask students to identify other areas where analogies are helpful.

PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-10 Explore to determine factors that affect bulb brightness in simple series and parallel circuits.

Include: number of bulbs, number of batteries, placement of bulbs and batteries.

GLO: C2, D4

6-0-1a Formulate specific questions that lead to investigations. Include: rephrase questions to a testable form; focus research questions. GLO: A1, C2 (ELA Grade 6, 3.1.2; Math: SP-I.1.6)

6-0-3a Formulate a prediction/hypothesis that identifies a cause and effect relationship. GLO: A2, C2 (Math: SP-I.1.6)

6-0-3b Identify variables that might have an impact on their experiments, and variables to hold constant to ensure a fair test. GLO: A2, C22

6-0-3c ⊂ Create a written plan to answer a specific question. Include: apparatus, materials, safety considerations, steps to follow. GLO: C1, C2 (ELA Grade 6, 3.1.4)

6-0-4a Carry out procedures that comprise a fair test. Include: controlling variables; repeating measurements to increase accuracy and reliability. GLO: C2

6-0-4e ⊂ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

6-0-5c Select and use tools and instruments to observe, measure, and construct. *Examples: hand lens, telescope, binoculars…* GLO: C2, C3, C5

6-0-6c ⊂ Identify and suggest explanations for patterns and discrepancies in data. GLO: A1, A2, C2, C5

6-0-7a Draw a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 6, 3.3.4)

6-0-7b ⊂ Base conclusions on evidence rather than preconceived ideas or hunches. GLO: C2, C4

6-0-7c Identify a new prediction/hypothesis based on investigation results. GLO: A1, C2 (ELA Grade 6, 3.3.4)

SUGGESTIONS FOR INSTRUCTION

➢ Exploring Bulb Brightness

For this experiment, have students use the series and parallel circuits made in conjunction with learning outcome 6-3-09. Provide students with additional batteries, light bulbs and holders, and wire.

Ask groups of students to experiment to determine what affects bulb brightness in both parallel and series circuits. Have students identify three factors that affect bulb brightness.

Note: Remind students to change **one** factor at a time to ensure a fair test.

Examples:

- increasing or decreasing the number of bulbs
- increasing or decreasing the number of batteries
- changing the placement of the bulbs
- changing the placement of the batteries

Ask students to record their observations, then write their conclusions indicating which factor(s) affected light bulb brightness. Students may use the "Experiment Report" BLM 6-H) to record their work. Have groups share their conclusions with the class.

Example:

Factors That Affect Bulb Brightness

Change	Circuit Type	Effect
increasing the number of bulbs	series	dims the bulbs
	parallel	bulb brightness is not changed
increasing the number of batteries	series	increases the brightness
	parallel	bulb brightness is not changed

SUGGESTIONS FOR ASSESSMENT

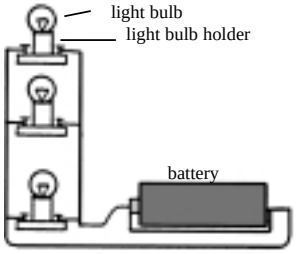
SUGGESTED LEARNING RESOURCES

Restricted Response

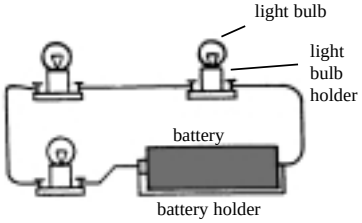
Provide students with the following:

Identify the Circuit

Circuit 1



Circuit 2

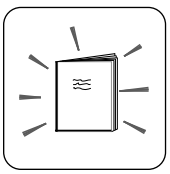


For each of the following statements, identify the circuit (circuit 1 or circuit 2) to which the statement refers.

a. If one light bulb burns out, the other will continue to work. _____
b. The light bulbs in this circuit will be brighter than the light bulbs in the other circuit. _____
c. This circuit is a parallel circuit. _____
d. Electricity has only one path to follow. _____

Look for:

a. 1
b. 1
c. 1
d. 2



When assessing the Exploring Bulb Brightness learning activity, refer to "Experiment Report: Assessment" (BLM 6-I).

Prescribed Learning Outcomes

Students will...

6-3-11 Use the design process to construct an electrical circuit that performs a useful function.

Examples: doorbell, alarm, motorized toy, game...

GLO: C3, D4

6-0-1c Identify practical problems to solve. *Examples: How can I make a hot-air balloon? Which type of light bulb should I buy?…* GLO: C3

6-0-1d ⊂ Identify various methods to solve a practical problem, and select and justify one to implement. *Examples: constructing and testing a prototype; evaluating consumer products; accessing information from a variety of sources...* GLO: C3 (Math: SP-I.2.6, SP-II.1.6)

6-0-3d ⊂ Develop criteria to evaluate a prototype or consumer product. Include: function, aesthetics, use of recycled materials, cost, reliability. GLO: C3

6-0-3e ⊂ Create a written plan to solve a problem. Include: materials, safety considerations, labelled diagrams of top and side views, steps to follow. GLO: C1, C3, C6

6-0-4b ⊂ Construct a prototype. GLO: C3

6-0-4c ⊂ Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 6, 5.2.2)

6-0-4d Assume various roles to achieve group goals. GLO: C7 (ELA Grade 6, 5.2.2)

6-0-4e ⊂ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5b ⊂ Test a prototype or consumer product, using predetermined criteria. GLO: C3, C5

6-0-6d ⊂ Identify and make improvements to a prototype, and explain the rationale for the changes. GLO: C3, C4

6-0-6f ⊂ Evaluate the methods used to answer a question or solve a problem. GLO: C2, C3 (ELA Grade 6, 3.3.4)

6-0-7d ⊂ Propose and justify a solution to the initial problem. GLO: C3

6-0-7e ⊂ Identify new practical problems to solve. GLO: C3

6-0-8c ⊂ Recognize that technology is a way of solving problems in response to human needs. GLO: A3, B2

6-0-9c ⊂ Demonstrate confidence in their ability to carry out investigations. GLO: C5

Suggestions for Instruction

➢ Designing a Security System

Ask students to construct a prototype to solve the following design challenge:

A construction company has hired you to develop a security system for new houses. They want a system that uses an electrical circuit either to set off an alarm, or to turn on lights if a house is entered illegally. Before you install the system, you are required to build a prototype to demonstrate how the system works.

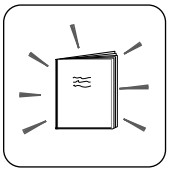
As a class, develop criteria that address the scientific components of the task (e.g., complete circuit, switch) and a variety of other criteria (e.g., appearance, durability). This learning experience allows students to apply their knowledge and skills related to electrical circuits from previous learning activities to a practical problem. It also provides an opportunity for teachers to identify and correct individual conceptual problems or misunderstandings related to circuits. Ensure that all students have an opportunity to take part in the planning and construction processes. Have each group present their prototype to the class, identifying problems they had in designing and building it, and explaining how these problems were overcome.

For a description of the stages of the design process, refer to page 16 of this document.

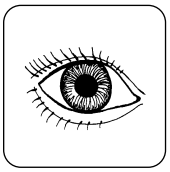
Students may use the "Design Project Report" (BLM 6-E) to record their work.

Suggestions for Assessment

Refer to the following BLMs for assessment suggestions:



"Design Project Report: Assessment" (BLM 6-F)



"Constructing a Prototype: Observation Checklist" (BLM 6-D)

Suggested Learning Resources

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By Design: Technology Exploration & Integration

Design and Technology System (Design Process Reference and Tools)

Mathematics, Science, & Technology Connections (Design Process Reference and Tools)

PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-12 Demonstrate, using a simple electromagnet constructed in class, that an electric current can create a magnetic field.

GLO: C2, D4

6-0-4e ↻ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5a ↻ Make observations that are relevant to a specific question. GLO: A1, A2, C2

6-0-7f Reflect on prior knowledge and experiences to construct new understanding, and apply this new knowledge in other contexts. GLO: A2, C4 (ELA Grade 6, 1.2.1)

SUGGESTIONS FOR INSTRUCTION

➢ **Making an Electromagnet**

Provide pairs of students with a large iron nail, a "D" cell battery, tape, and 90 cm of wire. Before constructing the electromagnet, have students try to use the nail to pick up objects such as paper clips, pins, keys, and/or coins. Ask them to record what they observed.

Have students construct a simple electromagnet by following these directions:

1. Hold the nail. Wrap the middle section of the wire tightly around the nail, starting from just below the head down to just above the point of the nail.
2. Tape one end of the wire to the negative end of the battery and the other to the positive end.
3. Try to pick up the objects with the nail. Record your observations.
4. Disconnect the wire from the battery and try to pick up objects. Record your observations.
5. In your science notebook, explain your results. Why do you think this happened? (Passing an electric current through certain types of metal objects creates a magnetic field. The magnetic field lasts only as long as the electric current is present.)

SUGGESTIONS FOR ASSESSMENT	SUGGESTED LEARNING RESOURCES
Refer to the assessment strategy suggested for learning outcome 6-3-13.	*Science Everywhere 6* (p. 202)

PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-13 Explore motors and generators to determine that electromagnets transform electricity into motion, and motion into electricity.

GLO: A5, D4, E2, E4

6-0-4e ⊂ Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

6-0-7a Draw a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 6, 3.3.4)

6-0-7h Identify potential applications of investigation results. GLO: C4

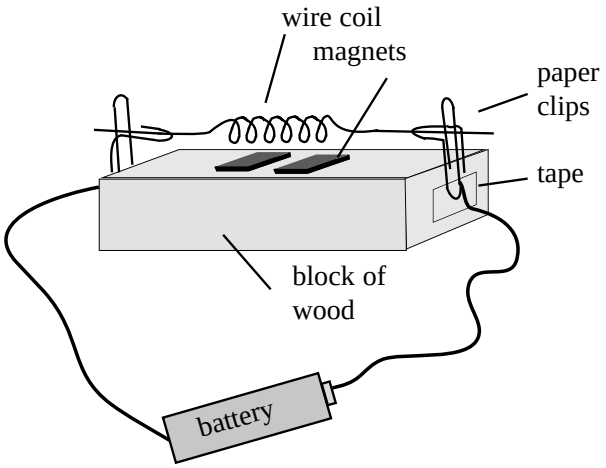
(continued)

SUGGESTIONS FOR INSTRUCTION

➢ Constructing a Simple Motor

Provide small groups of students with the following materials: two square magnets, wire, a 6-volt battery, masking tape, a pencil, paper clips, and a small block of wood (approximately 5 cm x 15 cm). Have students follow these directions to make a simple motor:

1. Wind the wire around a pencil to form a coil. Leave about 10 cm of wire at each end. Slide the coil off the pencil. To prevent the coil from unwinding, wrap a small piece of tape at two places on the coil.
2. Tape the magnets to the block of wood so that they are together in the middle of the board.



3. Attach a paper clip to opposite sides of the block so that half the clip is sticking up above the block. The top part of the paper clip should be bent downward in the middle so that it will support the wire from the coil.
4. Connect the paper clips to the battery with wires.
5. Put the ends of the coil into the paper clips.
6. Start the motor by spinning the coil.
7. Record your observations. What is causing the coil to turn? (The electric current running through the coil creates a magnetic field around it. The magnet alternately repels and attracts the coil, causing it to rotate. Motors change electricity into motion.)

(continued)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Teacher Notes

Background Information

- An *electric motor* contains two bar magnets and a rotating coil of wire called an armature. The coil becomes an electromagnet when it is charged with electricity. One end becomes the north pole; the other end becomes the south pole. The magnetized electromagnet rotates in the magnetic field of the bar magnets. Because like poles of magnets repel each other, and unlike poles attract each other, the coil spins on its axis. To prevent the armature from stopping its rotation, a commutator and brushes are used to change the direction of current flow. This reverses the magnetic polarity of the armature, keeping it turning.
- A *generator* is a device that produces electricity from mechanical energy. In a generator, a large coil of wires called an armature turns between the poles of many powerful magnets. This causes an electric current to flow in the coils of the armature.

Science Everywhere 6 (p. 205)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
Students will...	
6-3-13 *(continued)*	*(continued)*

➢ **Making a Simple Generator**

Provide groups of students with a piece of copper wire about two metres long, a bar magnet, and a compass. Have students follow these directions to make a simple generator:

1. Wrap one end of the wire around your hand about 10 times to make a coil. Slide the coil off your hand.
2. Wrap the other end of the wire around the compass about five times.
3. Twist the two ends of the wire together.
4. Slide the magnet quickly back and forth inside the coil.
5. Look at the compass. What is happening? (The moving needle in the compass shows that electricity is flowing through the wires.)
6. Record your findings in your science notebook.

➢ **Take-Apart Centre**

Have students bring to class old items that contain motors (e.g., record players, radio-controlled cars, fans). Make sure that these items are no longer needed. Have students take apart the items to observe the motors.

Safety Precaution:

Be sure to cut off the cords before letting students take the motors apart.

Advise students to wear safety goggles as they work.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Extended Response

Provide students with the following:

Electromagnets

In your science notebook, explain the purpose of electromagnets in generators and motors.

Look for:

- electromagnets transform electricity into motion (in motors)
- electromagnets transform motion into electricity (in generators)

Prescribed Learning Outcomes

Students will...

6-3-14 Identify forms of energy that may result from the transformation of electrical energy, and recognize that energy can only be changed from one form into another, not created or destroyed.

Include: light, heat, sound, motion.

GLO: D4, E4

6-0-5f ⊂ Record and organize observations in a variety of ways. *Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets…* GLO: C2, C6 (ELA Grade 6, 3.3.1; Math: SP-III.2.6)

Suggestions for Instruction

Teacher Notes

The concept that energy cannot be created or destroyed will not be readily apparent to students. Introduce students to this concept.

➢ **Accessing Prior Knowledge**

Have students use the Think-Pair-Share strategy (McTighe and Lyman, 1992) to identify forms of energy.

➢ **Transformation of Energy**

Present students with a list of electrical devices. Have them identify the form of energy that each device creates by transforming electrical energy.

Example:

Changing One Form of Energy to Another

Electrical Device	Changes Electrical Energy Into:
light bulb	light/heat
radio	sound
radio-controlled car	motion

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Restricted Response

Provide students with the following:

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Energy Transformation

Complete the following sentences:

1. Electrical energy can be transformed into _____ energy.
   A _____ is an example.
2. Electrical energy can be transformed into _____ energy.
   A _____ is an example.
3. Electrical energy can be transformed into _____ energy.
   A _____ is an example.
4. Electrical energy can be transformed into _____ energy.
   A _____ is an example.

Prescribed Learning Outcomes

Students will...

6-3-15 Identify the two major sources of electrical energy, and provide examples of each.

Include: chemical sources such as batteries; electromagnetic sources such as turbine motion caused by wind, falling water, and steam.

GLO: B1, D4, E4

6-0-2a ⊂ Access information using a variety of sources. *Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet…* GLO: C6 (ELA Grade 6, 3.2.2; Math: SP-II.1.6; TFS 2.2.1)

6-0-2c Make notes on a topic, combining information from more than one source and referencing sources appropriately. GLO: C6 (ELA Grade 6, 3.3.2)

6-0-5a ⊂ Make observations that are relevant to a specific question. GLO: A1, A2, C2

Suggestions for Instruction

Teacher Notes

Background Information

A battery changes chemical energy into electrical energy.

- A dry cell battery is made up of a zinc case with a carbon rod in the centre. The space between is filled with a chemical paste. Turning on the switch connects the zinc and the carbon. A chemical reaction takes place, creating a circuit through which electrical charges can move.
- A car battery is a wet cell battery made up of layers of lead. The case contains water and acid instead of chemical paste. The lead and the acid cause a chemical reaction that produces an electrical current.

Generators require a source of energy to create turbine motion, an electromagnetic source of electricity. Some generators use water (hydroelectric power) and others use steam or wind (windmills).

➢ Making a Simple Battery

Gather the following materials: two wires, two alligator clips, a glass beaker, a zinc electrode, a copper electrode, lemon juice, and an ammeter (used to measure the strength of an electrical current).

To demonstrate how a battery produces energy, construct a battery by following these directions:

- Fill the beaker with lemon juice.
- Put the alligator clips on the ends of the wires and attach them to the ammeter.
- Put both electrodes in the beaker, moving them as close together as possible without touching.
- Connect one wire to each electrode.
- Observe what happens.

(Electrical energy is produced due to a chemical reaction between the zinc and the lemon juice.)

➢ Sources of Electrical Energy

Have students use videos, CD-ROMs, Internet resources, and/or print resources to research sources of electrical energy. If possible, have students visit a hydro plant. Ask students to share their findings with the class.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Extended Response

Provide students with the following:

Sources of Electrical Energy

What are the two major sources of electrical energy? Give an example of each source.

Look for:

- chemical sources (e.g., batteries)
- electromagnetic sources (e.g., turbine motion caused by falling water, steam or wind)
- an example is given for each

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PRESCRIBED LEARNING OUTCOMES

Students will...

6-3-16 Identify renewable and non-renewable sources of electrical energy, and discuss advantages and disadvantages of each.

Examples: renewable sources such as hydroelectric, wind, geothermal, solar; non-renewable sources such as fossil fuels, nuclear fission...

GLO: B5, E4

6-0-2a ⊂ Access information using a variety of sources. *Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet…* GLO: C6 (ELA Grade 6, 3.2.2; Math: SP-II.1.6; TFS 2.2.1)

6-0-2b ⊂ Review information to determine its usefulness, using predetermined criteria. GLO: C6, C8 (ELA Grade 6, 3.2.3)

6-0-2c Make notes on a topic, combining information from more than one source and referencing sources appropriately. GLO: C6 (ELA Grade 6, 3.3.2)

6-0-7g ⊂ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

6-0-7h Identify potential applications of investigation results. GLO: C4

6-0-8g ⊂ Describe positive and negative effects of scientific and technological endeavours. Include: effects on themselves, society, the environment, and the economy. GLO: A1, B1, B3, B5

6-0-9e ⊂ Be sensitive to and develop a sense of responsibility for the welfare of other humans, other living things, and the environment. GLO: B5

SUGGESTIONS FOR INSTRUCTION

➢ Identifying Energy Resources

Have students brainstorm sources of electrical energy. Have them sort their ideas into "renewable" and "non-renewable" categories. Ask students to share their ideas with the class and create a class chart.

➢ Positive or Negative?

Using the list of energy sources identified in the previous learning activity, have students identify the advantages and disadvantages of each energy source. Students may be divided into groups with each group researching one source of electrical energy and then presenting their findings to the class.

After all groups have shared their results, ask students to review the positive and negative points and indicate whom or what each source of electrical energy affects (e.g., the environment, people, the economy). Have students use their science notebooks to reflect on the challenges of making decisions related to electricity production that balance the three perspectives.

Example:

Energy Source	Positive Points	Negative Points
Hydroelectric energy	• Water is a renewable resource. • Water is readily available (at least in Canada). • It is cheap to produce. • It is relatively pollution free.	• Land has been flooded to create reservoirs for hydroelectric plants. As a result, habitats have been destroyed. • Long systems of transmission lines are needed to carry electricity to where it is needed, and these are expensive.
Coal	• Coal is cheap. • A large quantity is still available. • Other products can be created from coal.	• Coal causes air and water pollution. • Mining has an impact on the environment and is dangerous for miners. • Coal will eventually run out (is a non-renewable resource).

Suggestions for Assessment

Suggested Learning Resources

Teacher Notes

Background Information

- *Renewable energy* resources can be used over and over again. They are not consumable and do not get used up. Hydroelectric, wind, geothermal, and solar energy are examples of renewable sources of electrical energy.
- *Non-renewable energy* resources are consumable and can only be used once. Fossils fuels such as coal and oil are non-renewable sources of electrical energy. Nuclear fission is also a non-renewable source of electrical energy.

For related teacher support, refer to *Education for a Sustainable Future: A Resource for Curriculum Developers, Teachers, and Administrators* (2000).

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Education for a Sustainable Future: A Resource for Curriculum Developers, Teachers, and Administrators

Prescribed Learning Outcomes

Students will...

6-3-17 Evaluate an electrical device using the design process.

Examples: light bulbs, kitchen appliances...

GLO: B5, C4

6-0-1c Identify practical problems to solve. *Examples: How can I make a hot-air balloon? Which type of light bulb should I buy?…* GLO: C3

6-0-1d ⊂ Identify various methods to solve a practical problem, and select and justify one to implement. *Examples: constructing and testing a prototype; evaluating consumer products; accessing information from a variety of sources...* GLO: C3 (Math: SP-I.2.6, SP-II.1.6)

6-0-3d ⊂ Develop criteria to evaluate a prototype or consumer product. Include: function, aesthetics, use of recycled materials, cost, reliability. GLO: C3

6-0-3e ⊂ Create a written plan to solve a problem. Include: materials, safety considerations, labelled diagrams of top and side views, steps to follow. GLO: C1, C3, C6

6-0-5b ⊂ Test a prototype or consumer product, using predetermined criteria. GLO: C3, C5

6-0-6e ⊂ Evaluate the strengths and weaknesses of a consumer product, based on predetermined criteria. GLO: C3, C4

6-0-7d ⊂ Propose and justify a solution to the initial problem. GLO: C3

Suggestions for Instruction

Teacher Notes

The following learning activity is an example of the design process. Students can choose to evaluate any electrical device to complete this learning activity.

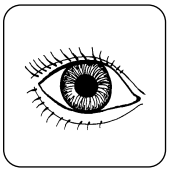
➢ Looking at Light Bulbs

Have students follow the design process to evaluate electric light bulbs:

- Identify the problem to solve (e.g., What light bulb should I buy?).
- Identify ways to solve the problem and then select one to implement (e.g., testing light bulbs to see which one is best).
- Develop criteria to evaluate the light bulbs (e.g., reasonable cost, how long they last, environmental concerns).
- Create a written plan listing materials needed, the procedure to follow, and safety considerations.
- Test the product using the criteria established.
- Evaluate the strengths and weaknesses of the light bulbs based on the criteria.
- Propose possible modifications to the design of the light bulb.
- Propose and justify a solution to the initial problem.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Looking at Light Bulbs

Look for indications of the following in student work:

Checklist:

The student

- ❑ identifies the problem
- ❑ identifies the criteria
- ❑ determines the method/procedure to conduct the test
- ❑ tests the product using predetermined criteria
- ❑ analyzes the data
- ❑ presents findings and arrives at a conclusion

By Design: Technology Exploration & Integration (Design Process Reference and Tools)

Design and Technology System (Design Process Reference and Tools)

Mathematics, Science, & Technology Connections (Design Process Reference and Tools)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
Students will...	
6-3-18 Describe factors that affect the consumption of electrical energy, and outline an action plan to reduce electrical energy consumption at home, at school, or in the community. GLO: B5, C4, E4	➢ **Reducing Energy Consumption** Have students brainstorm reasons why it is important to reduce energy consumption, making links to their discussions related to learning outcome 6-3-16, regarding renewable and non-renewable sources of energy. ➢ **Consumption of Energy (Action Plan)** Have students refer to the Electricity Survey they conducted in relation to learning outcome 6-3-05. Have them add a fourth column titled "Frequency of Use" or "When Used" and fill it in. Example: **Electricity Survey** Have students select four electricity sources and develop a plan for reducing their electrical energy consumption. (For example: Use the dishwasher only when it is completely full. Turn off the heat for drying and let the dishes air-dry.) Have students share their plans with the class. Action plans may be published in a class newspaper and sent home to parents/guardians.
6-3-19 Describe the ways in which electricity has had an impact on daily life. GLO: B1, B2, B5	➢ **Electricity Use Journal** Have students track the times that they use electricity over the course of an entire day. Ask students to reflect on their results in their science journals and comment on the potential consequences of individual overuse of electricity to society, the environment, and the economy.

Location	Electrical Device	Human Need Met	Frequency of Use
kitchen	dishwasher	provides heated water and air to wash and dry dishes	twice a day

6-0-7g ⊂ Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 6, 4.4.1; TFS: 3.2.2, 3.2.3)

6-0-8g ⊂ Describe positive and negative effects of scientific and technological endeavours. Include: effects on themselves, society, the environment, and the economy. GLO: A1, B1, B3, B5

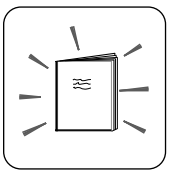
6-0-9e ⊂ Be sensitive to and develop a sense of responsibility for the welfare of other humans, other living things, and the environment. GLO: B5

6-0-9f ⊂ Frequently and thoughtfully evaluate the potential consequences of their actions. GLO: B5, C4

6-0-8c ⊂ Recognize that technology is a way of solving problems in response to human needs. GLO: A3, B2

6-0-8g ⊂ Describe positive and negative effects of scientific and technological endeavours. Include: effects on themselves, society, the environment, and the economy. GLO: A1, B1, B3, B5

6-0-9f ⊂ Frequently and thoughtfully evaluate the potential consequences of their actions. GLO: B5, C4

SUGGESTIONS FOR ASSESSMENT	SUGGESTED LEARNING RESOURCES
	Science Everywhere 6 (p. 171)
 **Short Story** Provide students with the following: **A Day without Electricity** Imagine what your day would be like if there were no electricity. What impact would this have on communication, transportation, heat, and light? Write a short story called "A Day without Electricity" that discusses these impacts. Look for: • references to communication, transportation, heat, and light	*Science Everywhere 6* (p. 168)

Notes