UNIT 4

The Characteristics of Electricity

BIG IDEAS

- The production and consumption of electrical energy has social, economic, and environmental implications.
- Static and current electricity have distinct properties that determine how they are used.
- Electricity is a form of energy produced from a variety of non-renewable and renewable sources.

Televisions, microwaves, computers, lights, toasters—these are just a few everyday items that rely on electricity. If you have ever experienced a blackout, you realize just how much you depend on a reliable source of electricity.

But generating electricity comes at a cost to the environment. For example, coal burning power plants produce greenhouse gases. Alternative sources of electricity, such as windmills, have far less impact, but they cannot yet supply enough energy to meet Ontario's needs.

Conservation is one way to reduce the environmental costs of generating electricity. Turning off lights and computers when they are not in use, switching to energy-efficient devices, and air-drying laundry are all simple ways to reduce the electricity we consume every day.

In this unit, you will learn what electricity is, how it is produced, and the effects of its consumption.

What are some sustainable ways to produce and use electricity?

Chapter 10
Static Charges and Energy

Chapter 11
Electrical Circuits

Chapter 12
Generating and Using Electricity

Get Ready for Unit 4

Concept Check

1. Using the words below, complete each sentence in your notebook.

current	parallel	static
energy	series	transformed

a. Electricity is a form of _____.

b. Electricity can be _____ into other forms of energy.

c. _____ electricity is the build-up of an electric charge on the surface of an object.

d. _____ electricity can be described as electric charge in motion.

e. In a _____ circuit, there are multiple paths along which the charge can flow.

f. In a _____ circuit, there is a single path along which the charge can flow.

2. Examine the illustration below. Identify materials that are either insulators or conductors of electricity. Record your answers in a two-column chart with the headings "Insulating Materials" and "Conducting Materials."

3. Electrical energy can be converted into other forms of energy. Match each device in column A below with the type of energy conversion in column B that occurs when the device is turned on.

Column A	Column B
a. MP3 player	**i.** mechanical energy and sound energy
b. toaster oven	**ii.** light energy and sound energy
c. television set	**iii.** heat and light energy
d. blender	**iv.** sound energy

4. In the illustration below, three students are using electrical devices.

Identify the following components of the circuit that powers each device. Write your answers in your notebook.

a. a load: _____

b. a power source: _____

c. a switch: _____

Inquiry Check

5. Plan You predict that a rubber balloon will allow a static charge to build up on it, if the balloon is rubbed with another object. Design a test you could perform to show the balloon's ability to hold a static charge.

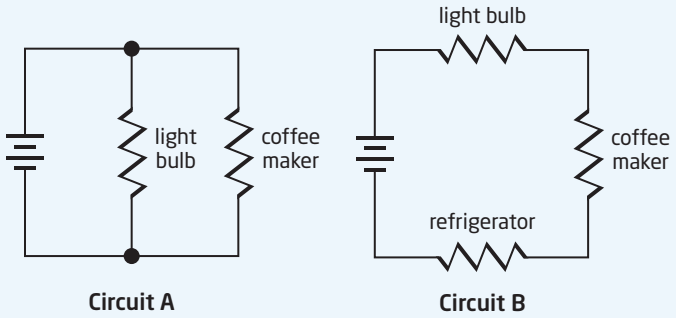
6. Analyze Use the circuit diagrams below to complete each sentence in your notebook.

a. Circuit ____ is a series circuit.

b. Circuit ____ has two loads.

c. Circuit ____ shows how electricity flows in our homes.

d. In circuit ____, all loads will stop working if one of the loads burns out.



Numeracy and Literacy Check

7. Analyze The Ontario Energy Board sets the price of electricity in Ontario based on the time of day.

Electricity Use Pricing in Ontario (2008)

Day	Time	Use	Price Rate (cents per kW•h)
Weekends and holidays	All day	Non-peak	4.0
Summer weekdays (May 1st–Oct 31st)	7 A.M.–11 A.M.	Non-peak	7.0
	11 A.M.–5 P.M.	Peak	8.0
	5 P.M.–7 A.M.	Non-peak	5.0
Winter weekdays (Nov 1st–Apr 30th)	7 A.M.–11 A.M.	Peak	8.0
	11 A.M.–5 P.M.	Non-peak	7.0
	5 P.M.–8 P.M.	Peak	8.0
	8 P.M.–7 A.M.	Non-peak	5.0

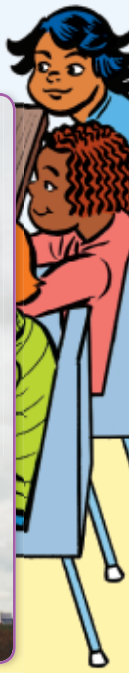
a. When are the most expensive times for electricity use?

b. When are the least expensive times for electricity use?

8. Writing Write a school PA announcement encouraging students and staff to reduce their daily electricity use.

Looking Ahead to the Unit 4 Project

At the end of this unit, you will have an opportunity to apply what you have learned in an inquiry or research project. Read the Unit 4 Projects on pages 522–523. Start a project folder now (either paper or electronic). Store ideas, notes, news clippings, websites, and lists of materials that might help you to complete your project.



Unit Project
Investigate how to reduce electricity use in your home.

An Issue to Analyze
Assess the environmental impacts of energy sources used by two power companies in Ontario