## Checking Concepts

1. What is the name of the property of a material that slows down current and converts electrical energy into other forms of energy?
2. Using Ohm's law, state the relationship of current, resistance, and voltage.
3. What two values do you need in order to calculate resistance?
4. (a) What is the unit of resistance?
   (b) What is its symbol?
5. What is used to control current and potential difference in a circuit?
6. Explain how manufacturers indicate the value of resistance on each resistor.
7. Draw the symbol used to represent a resistor in a circuit diagram.

Understanding Key Ideas

8. A 1.2 A current flows through a 250 Ω resistor. Calculate the voltage across this resistor.
9. A 120 Ω resistor is connected to a 12 V battery. Calculate the current through the resistor.
10. An unknown resistor transforms 2.0 mA of current when connected to a 9.0 V battery. Calculate the value of this resistor.
11. A classmate hands you a resistor that has the following colour bands: yellow, orange, red, and silver. What is the resistance of this resistor?

12. A light bulb is connected to a battery and the brightness of the light is observed. A resistor is then connected between the battery and the light bulb and the brightness of the light decreases. Explain this observation using what you know about energy and circuit components.
13. Draw a circuit diagram for the following circuit.
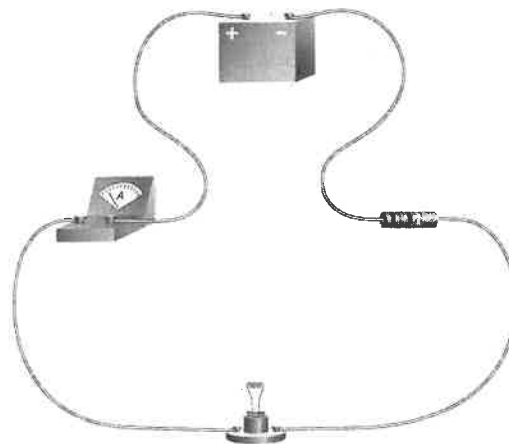
Pause and Reflect

Suppose you are given several batteries, an ammeter, voltmeter, connecting wires, and a resistor that has no coloured bands indicating its value. How could you determine an accurate value for this resistor?

Prepare Your Own Summary

In this chapter, you investigated the relationship between current, voltage, and resistance. Create your own summary of the key ideas from this chapter. You may include graphic organizers or illustrations with your notes. (See Science Skill 12 for help with using graphic organizers.) Use the following headings to organize your notes:

1. Electrical Energy
2. Current
3. Voltage
4. Resistance and Ohm's Law
5. Circuits

Checking Concepts

1. What is the purpose of a battery?
2. In a battery, what form of energy is converted into electric potential energy?
3. What is the relationship of electric potential energy, charge, and potential difference (voltage)?
4. What materials are needed to produce an electrochemical cell?
5. List five methods of producing electric energy.
6. What unit is used for measuring voltage?
7. What is the purpose of a voltmeter?
8. What is the purpose of an ammeter?
9. Copy and complete the following table in your notebook.

|	Symbol	Unit	Unit Symbol
Voltage	V		
Current		amperes	
Resistance			Ω

10. Draw the following circuit symbols.
    (a) battery
    (b) bulb
    (c) resistor
    (d) voltmeter
    (e) ammeter
    (f) switch
11. What is the relationship between amperes (A) and milliamperes (mA)?
12. What is the difference between conventional current and electron flow?
13. What are the four basic components of an electric circuit?
14. Explain the relationship between resistance and resistor.
15. State the relationship of voltage (V), current (I), and resistance (R).
16. When an electron passes through a resistor, what happens to its electric energy?
17. What is the purpose of an ohmmeter?
18. Resistors have a maximum of four coloured bands stamped on their surface. What does each band represent?

Understanding Key Ideas

19. In order for skiers to have potential energy, they must travel to the top of the hill. Explain how this is similar to electrons in an electrochemical cell.

20. A voltmeter is connected to the (+) and (−) terminals of a battery and measures 6.0 V. If the lead on the (−) terminal is removed and now touches the (+) terminal, what would now be the reading on the meter? Explain your answer.

21. Explain how two 9.0 V batteries could have different amounts of electric potential energy.

22. Explain the difference between static electricity and current electricity.

23. By looking at an electrical set-up, explain how you would determine if it is a complete circuit.

24. You enter a dark room and press the light switch on the wall. The ceiling light turns on immediately. Explain why you do not have to wait for the electrons at the switch to travel to the ceiling light before the light goes on.

25. Draw a circuit diagram for the circuit below.
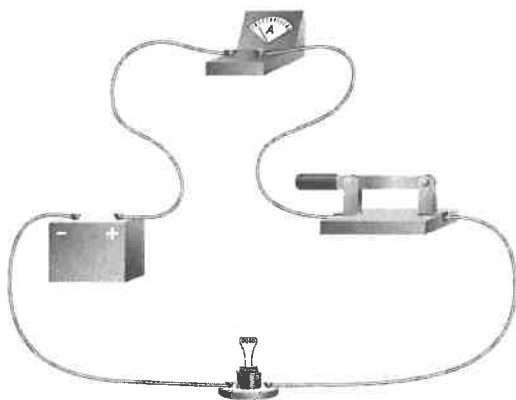
26. Convert each of the following:
    (a) 400 mA = _____ A
    (b) 18 kΩ   = _____ Ω
    (c) 12 MV   = _____ V

27. The current through a 120 Ω resistor is 2.0 A. Calculate the voltage across this resistor.

28. The current through a load is 75 mA. If the potential difference across the load is 12 V, what is the resistance of the load?

29. Calculate the resistance of the bulb in the following circuit:
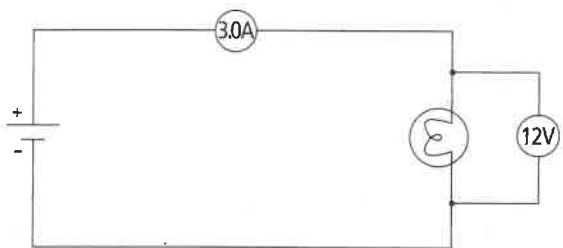
30. A fellow student hands you a resistor and the bands of colour are brown, black, and orange. What is the resistance of this resistor?

31. Draw a circuit diagram for the circuit shown below.
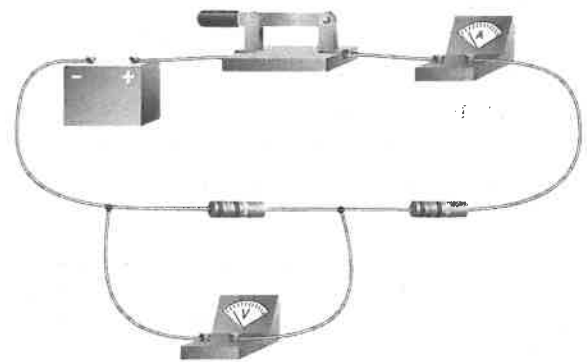
Pause and Reflect

A common flashlight contains a battery, a light bulb, and a switch. Draw a possible circuit diagram for the flashlight. In your circuit diagram, does it matter where the switch is located? Explain your answer.