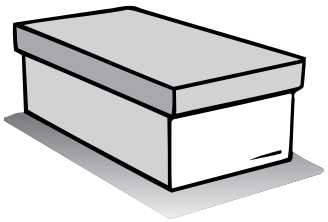
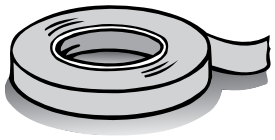
Chapter Science Investigation Name _____

Circuits in Games

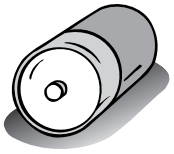
What You Need

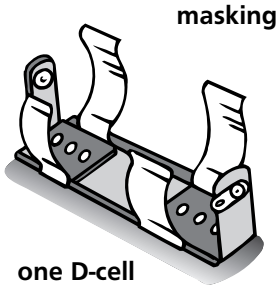

scissors

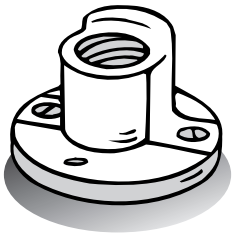

one shoe box with the lid

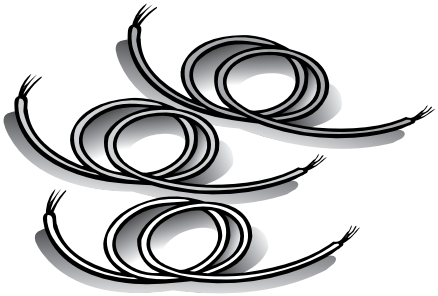

masking tape

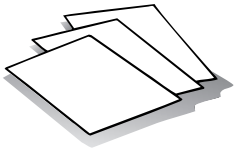

one flashlight bulb

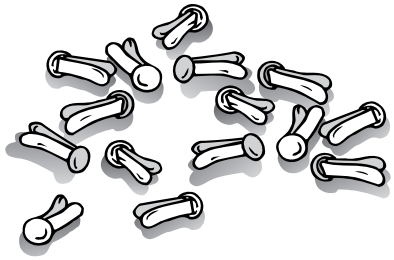

one D-cell battery

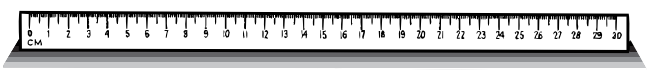

one D-cell battery holder

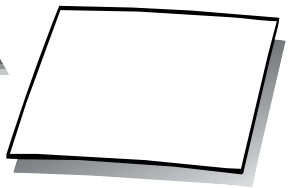

one lightbulb holder


3 insulated wires with stripped ends, each 30 cm long


small sheets of paper


10 brass fasteners


metric ruler


one piece of foil (30 cm × 30 cm)

Find Out

Do this activity to see how a game can be made using electrical circuits.

Process Skills

Constructing Models
Measuring
Observing
Communicating

Time

- One hour the first day
- 15 minutes a day for two weeks

What to Do

1. **Make** a game board. Place the lid of a shoe box on your desk so the top of the box is facing you lengthwise (up and down). **Measure** 3 cm from the left and right side of the box and draw a light pencil line to make two margins. Make five dots on both lines. The dots should be 5 cm apart.

2. Have your teacher poke a hole through each dot with scissors. Place a brass fastener in each hole.

3. Turn the shoe box lid over, and you will see the points of the brass fasteners. Cut a strip of aluminum foil so it will reach from one fastener on the left to one on the right. Attach the aluminum strip to each fastener, fold the brass fastener over the foil and cover it with masking tape. Connect each fastener on the right with a fastener on the left. Foil strips may cross over one another, because the tape acts as an insulator.

4. Set up the battery in its holder and the lightbulb in its holder. Attach an insulated wire between them. Extend each of the other wires from the other terminal on the holders.

5. Touch the ends of these wires to **observe** the circuit (circle of energy). The light should go on if there is a complete circuit.

6. Place the shoe box lid on the box. Touch one of the wires to one of the brass heads on the right side and the other wire to a head on the left side. When the bulb lights up, you have a circuit.

7. Think of five questions about electricity. Print them neatly, each on a separate piece of paper. Place the questions next to the brass heads on the left side of the box. Print the answers to the questions. Place these next to the brass heads on the right, so that when both heads are touched by the wires, the circuit will be complete and the bulb will light, showing the correct answer.

8. Invite other students to play the game.

9. Change the game by changing the questions and answers.

Conclusions

1. What are the important things in an electric circuit?
Answers will vary but should include a conductor and a circle of energy.

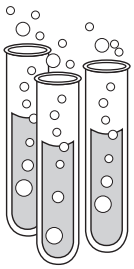
2. What is the difference between a conductor and a nonconductor of electricity?
A conductor allows energy or electric current to pass through or move; a nonconductor does not allow energy to flow through very well.

New Questions

1. Where does the circuitry in your home begin?
Answers will vary.

2. Why do plugs have two prongs?
One prong carries the current or energy in. The other prong carries the current or energy out or back to the outlet.

3. How does the circuit continue through the bulb?
The current continues to flow through a wire in the bulb.



Name _____

ACTIVITY

Making a Squeeze Circuit

Draw a picture of the electric current you made with your partners.

Use these labels for your drawing:

D-cell battery **Bulb** **Wires**

Draw arrows to show how the electric current moved through the model.

Name _____

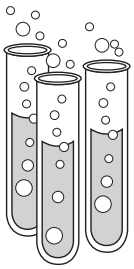
Conclusions

1. How did the students in your group have to arrange themselves to act out the flow of electric current from a battery to a lightbulb?
so current would flow in a circle from cell to wires to bulb

2. Why was this arrangement so important to show the flow of electric current?
This is the way electric current flows in a circuit.

Asking New Questions

1. What would have happened to the flow of electric current in your model if one of the "wires" had let go of the hand of another "wire"?
The energy would not have a way to continue along a path. The circuit would be broken and the bulb would not light up.

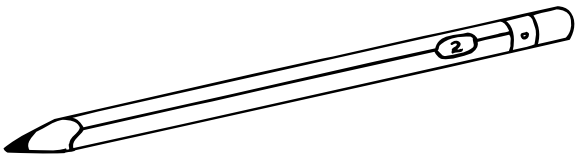
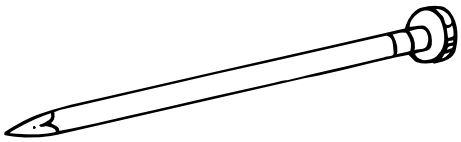
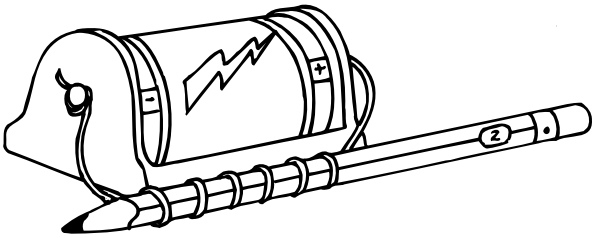
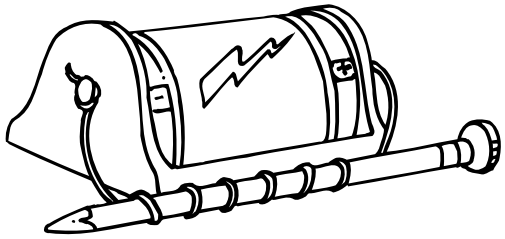


Name _____

ACTIVITY

Making an Electromagnet

Record your observations in the chart.

	How Many Paper Clips
	
	
	
	

Name _____

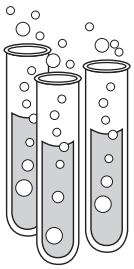
Conclusions

1. What happened when you touched the pencil to the paper clips when both ends of the wire were attached to the battery?
nothing, because the pencil is not made of iron or steel.

2. What happened when you repeated the activity with a nail instead of a pencil?
The magnetism of the wire wrapped around the steel nail, created an electromagnet and attracted some of the paper clips.

Asking New Questions

1. What could you change to make the nail pick up more paper clips?
If you made more wire loops around the nail, the magnetism would become stronger and it would pick up more paper clips.



Name _____

ACTIVITY

Observing Static Cling

Bring the two strips of tape close to each other. What happens?
Students will observe that the strips are attracted to one another.

Stroke the strips several times with your fingers. Bring the strips together again. What happens?
The strips are no longer attracted to one another.

Stick one strip to your desk. Stick the other strip on top of the first strip. Peel both strips off your desk. Peel the strips apart. Bring them together. What happens?
The strips will attract one another again.

Name _____

Conclusions

1. What happened when you brought the strips of tape near each other in Step 4? In Step 7?
The two strips repelled each other in Step 4 and attracted each other in Step 7.

2. What happened after the other student stroked the strips?
After they were stroked, the strips had no effect on each other.

Asking New Questions

1. Why do you think you got different results depending on what you did to the tape?
The different results came from changing the electrical charge on the tape. When the pieces of tape both had the same charge, they repelled each other. When they had different charges, they attracted each other.

2. Why did stroking the strips have the effect it did?
The extra electrical charge in the strips was grounded. When you rub something with your hands, the extra charge moves to your body, spreads out, and travels to the ground.