



# Electricity

## READING LESSON

### Featured Book

**Discovering Electricity** by Rae Bains

ISBN: 0-89375-565-6

### Objective

The students will learn about electricity in easy to understand terms with useful pictures to enhance the explanations.

### Science Background

Electricity is one of the fundamental forces that hold all matter together. It is also the most versatile of all forms of energy. It can provide the heat to make light bulbs glow and electric heaters warm. It can generate the sound in a radio and the picture in a television set.

(How Science Works by Judith Hann)

### Reading Standards (see appendix A)

Standard 1 - Students read and understand a variety of materials.

Standard 6 - Students read and recognize literature as a record of human experience.

### Key Points

- Electricity is a kind of energy that gives us heat, light and power.
- Atoms make electricity work when electrons fly off an atom.
- Windmills, water wheels and power plants, all have generators, which convert energy into electricity.
- Electricity travels through circuits allowing it to provide power to appliances, lights and other items powered by electricity.



# Electricity

## READING LESSON - Question Review

Answer the questions below to help you review what was read in Discovering Electricity, by Rae Bains.

1. What is electricity?
  - a. Energy that you get from food
  - b. A kind of energy that gives us heat, light, and power
  - c. Energy created by movement
  
2. Which of the following statements are true about atoms?
  - They are very small
  - Millions of them fit on the head of a pin
  - You can see them
  - They make up the world
  
3. What part of an atom sometimes flies off by itself?
  - a. Electrons
  - b. Protons
  - c. Elements
  
4. When you rub a comb through your hair, what happens to the electrons?
  - a. They stay on your hair
  - b. They jump from your hair to the comb
  - c. They jump on your hand
  
5. How is electricity transferred to where we need it?
  - a. Through tubes
  - b. Through the air
  - c. Through wires
  
6. Some flashlights get their power from a small electrical generator. What is this generator called?
  - a. Electricity
  - b. A battery
  - c. A generator



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## READING LESSON - Question Review (continued)

7. What is a path that allows electricity to move through it called?
  - a. A circuit
  - b. A conductor
  - c. A generator
  
8. The wire inside a glass light bulb, the filament, is thinner than a hair. What happens when the filament gets really hot?
  - a. It gives us heat
  - b. It gives off a "glow" that we call light
  - c. It creates a spark
  
9. Wires are usually covered with rubber. What does the rubber act as?
  - a. A generator
  - b. An insulator
  - c. A circuit
  
10. Why are different types of gasses used in lights?
  - a. To make brighter light
  - b. To give off different temperatures of heat
  - c. To create different colors of light
  
11. What is the name of the device that measures all of the electricity you use in your home?
  - a. A generator
  - b. A meter
  - c. A battery
  
12. What acts like "traffic cops" to stop the flow of electricity if too much electricity gets in a wire?
  - a. Light sockets
  - b. Insulators
  - c. Circuit breakers and fuses



# Electricity

## READING LESSON - VOCABULARY

Below are several words that may be new to your vocabulary that you read in Discovering Electricity by Rae Bains. Fill in each blank with the correct word.

Atom  
Conductor  
Socket  
Current

Battery  
Electron  
Generator

Circuit  
Faucet  
Insulation

1. A \_\_\_\_\_ is a path that allows electricity to flow.
2. An opening or cavity into which something fits is called a \_\_\_\_\_.
3. A \_\_\_\_\_ is a fixture for drawing liquid, as from a pipe.
4. The smallest unit of an element that makes electricity work is called an \_\_\_\_\_.
5. \_\_\_\_\_ such as rubber, is used to cover wires to prevent the electricity that flows through them from hurting us or starting a fire.
6. The machine that changes mechanical energy into electricity is called a \_\_\_\_\_.
7. A \_\_\_\_\_ is a steady flow of electricity.
8. Electricity is created when a bit of an atom called an \_\_\_\_\_ flies from one atom to another.
9. Metal wire is used as a \_\_\_\_\_ to carry electrical current.
10. A \_\_\_\_\_ is a very small electrical generator used to power small appliances such as flashlights.



# Electricity

## ACTIVITY LESSON

### Featured Science Activity

Constructing a Solar Powered Circuit Board

#### Objective

The students will learn how the sun's energy can be converted to electricity by building a solar powered quiz board. They will build simple circuits using aluminum foil and masking tape and use the light from the sun to transfer electrons from the photovoltaic cell to the quiz board making the buzzer buzz.

#### Science Background

The sun's energy can be made directly into electricity using photovoltaic cells or solar cells. Solar cells make electricity without moving, making noise, or polluting. They are used to power calculators, lights and even provide electricity to homes.

#### Science Standards (see appendix A for detailed overview)

Standard 2.2- Students know that energy appears in different forms, and can move (be transferred) and change (be transformed).

Standard 5-Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

#### Materials

- Photovoltaic Cell w/ wires
- Buzzer
- 3 in. Sheet of Aluminum foil
- Scissors
- Masking tape
- 2 Small Paper Clips
- Paper punch
- Ruler
- Quiz board (Last page of lesson)



# Electricity

## ACTIVITY LESSON (continued)

### Procedure

1. Take your ruler and the aluminum foil sheet and cut 5 strips of aluminum foil about 8 inches long and  $\frac{1}{2}$  inch wide and put them aside.
2. Turn to the last page of the lesson and fold the quiz board on the perforated line and remove it from your CLOUT workbook.
3. Read the first term on your quiz board and punch a hole to the left of the term.



### Discovering Electricity Quiz Board

TERM	DEFINITION
Battery	A device that measures how much electricity is used.
Electricity	A steady flow of electricity.
Meter	A very small electrical generator.
Circuit	A complete or unbroken path that allows electricity to flow.
Current	A type of energy that gives us heat, light, and power.

4. What definition to the right best describes the term "Battery"?
5. If you chose "A very small electrical generator", you're absolutely right! Punch a hole to the right of this definition.
6. Turn the quiz board over and place it face down so the back is facing you.
7. Take one of the aluminum strips and cover the term hole and the definition hole making sure to keep the aluminum strip flat and smooth. This is a circuit and will allow electricity to flow through.
8. **Completely** cover the aluminum strip with masking tape to secure it to the back of the board and to insulate the strip from the other four circuits you will be making.

### Back Side of Quiz Board

DEFINITION	TERM
<input type="radio"/> 1	<input type="radio"/> 1
<input type="radio"/> 2	<input type="radio"/> 2
<input type="radio"/> 3	<input type="radio"/> 3
<input type="radio"/> 4	<input type="radio"/> 4
<input type="radio"/> 5	<input type="radio"/> 5

All tin foil strips are completely covered in masking tape for insulation

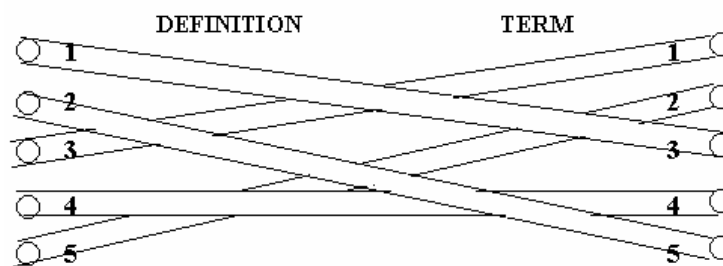


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## ACTIVITY LESSON (continued)

- Now repeat the same steps for the remaining terms and definitions. Make sure that the foil of each circuit is flat, smooth and completely covered by masking tape before going on to the next circuit.
- Once you have completed all five simple circuits the back of your board should look like the picture below.

Back Side of Quiz Board



All tin foil strips are completely covered in masking tape for insulation

- Flip your quiz board right side up and place the Photovoltaic (PV) cell on the designated area of your board. **IMPORTANT:** The wires on the cell are very fragile so DO NOT handle the PV cell by the wires.
- Now unravel the two paperclips and insert each one through the holes on the plastic frame on each side of your photovoltaic cell through the back of your circuit board.
- Fold the paper clips so that they aren't sticking out and cover them with masking tape. This will help keep your PV cell in place.

**Congratulations! You have created your very own  
SOLAR POWERED QUIZ BOARD!**

### Quiz Board Operation

- Find a nice sunny spot to test your quiz board.  
**Note:** The PV cell needs sunlight to operate. Do not block the surface of the PV cell with your body or with the quiz board. (An overhead projector can also be used as a light source if the sun isn't cooperating).
- Start with the first term - Battery. Touch the end of the black wire on the left to the foil in the hole next to term.





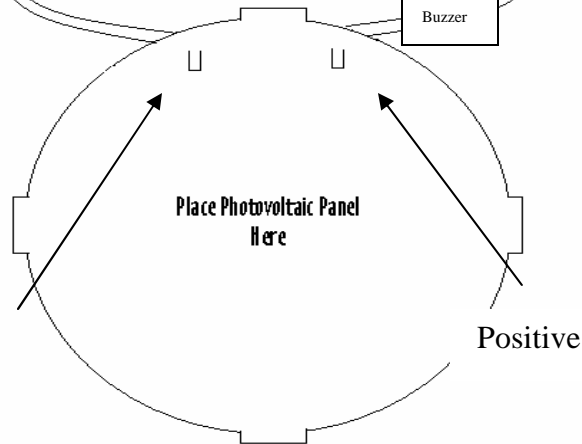
# Electricity

## ACTIVITY LESSON (continued)

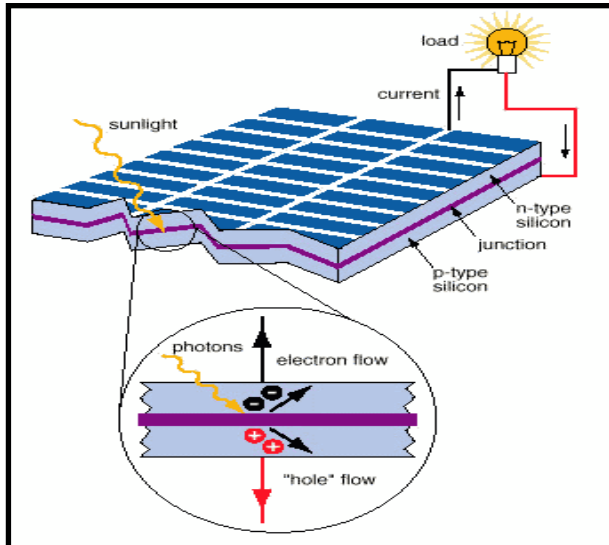
16. Touch the buzzer's black wire on the right to the foil in the hole next to the correct definition. Both wires should be touching the foil at the same time. If your circuit was done correctly, you should hear the buzzer!

### Discovering Electricity Quiz Board

TERM	DEFINITION
Battery	A device that measures how much electricity is used.
Electricity	A steady flow of electricity.
Meter	A very small electrical generator.
Circuit	A complete or unbroken path that allows electricity to flow.
Current	A type of energy that gives us heat, light, and power.



### How Does This Work?



The light from the sun enters the solar cell and is converted into electricity. The energy runs through the wires and travels through a closed circuit providing power to something such as the buzzer, which is referred to as a "load".

### Trouble-shooting

If you do not hear the buzzer, check each of the following:

- Make sure the foil is connected properly on the back
- Make sure the questions are answered correctly
- Make sure the foil is smooth with no wrinkles, twists or tears.



# Discovering Electricity

## *Quiz Board*

TERM	DEFINITION
Battery	A device that measures how much electricity is used.
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