

# Electricity

**INPUT**



Electrical charges cause \_\_\_\_\_ .  
They can be \_\_\_\_\_ or \_\_\_\_\_ .  
Opposites attract and like charges \_\_\_\_\_ .

When electrical charges build up they are discharged as \_\_\_\_\_ electricity. An example of this is \_\_\_\_\_ during a thunderstorm.



In a \_\_\_\_\_ circuit, electricity travels through \_\_\_\_\_ path.  
In a \_\_\_\_\_ circuit, electricity flows through more than one path.

The flow of electric charge is called a \_\_\_\_\_ .  
This only flows through closed \_\_\_\_\_ .



**OUTPUT** Light  
Heat  
Motion



# Benjamin Franklin

Read the Literature feature in your textbook



## Write About It

**Response to Literature** This poem shows how Ben Franklin made an incredible discovery. Do some research to find out more about Ben Franklin and electricity. Then write a report. Include facts and details from more than one source.

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# Static Electricity

Use your textbook to help you fill in the blanks.

## What is an electrical charge?

1. Electrical charge is a \_\_\_\_\_.
2. Scientists call the two types of electrical charges \_\_\_\_\_ and \_\_\_\_\_.
3. When positive and negative charges \_\_\_\_\_, the matter is said to be neutral.
4. A positive charge and a negative charge \_\_\_\_\_ one another.
5. The word "electricity" comes from the ancient Greek word for \_\_\_\_\_.
6. When two objects touch, \_\_\_\_\_ between the objects.

## What is static electricity?

7. The buildup of electrical charges on an object is called \_\_\_\_\_.
8. When you hold a negatively charged balloon near a wall, it \_\_\_\_\_ the negative charges in the wall.

**What is an electrical discharge?**

9. Lightning is the discharge of \_\_\_\_\_ inside a storm cloud.
10. A \_\_\_\_\_ is the movement of static electricity from one object to another.
11. \_\_\_\_\_ in a cloud push down on the negative charges in the ground.
12. The safest place in a lightning storm is \_\_\_\_\_  
\_\_\_\_\_.

**What are conductors and insulators?**

13. Copper and silver are examples of \_\_\_\_\_ because charges flow through them easily.
14. Plastic on wires serves to \_\_\_\_\_ you from getting an electrical shock.
15. Wood is an example of an \_\_\_\_\_.
16. Plastic, glass, and \_\_\_\_\_ are also good insulators.

**Summarize the Main Idea**

17. What causes static electricity?

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## Static Electricity

Match the vocabulary word with the correct description.

1. \_\_\_\_\_ electrical charge
  2. \_\_\_\_\_ discharge
  3. \_\_\_\_\_ conductors
  4. \_\_\_\_\_ insulators
  5. \_\_\_\_\_ static electricity
- a. Rubber, plastic, and glass are good examples of these materials.
  - b. Positive and negative are the two types of this property of matter.
  - c. When clothes stick together after coming out of the dryer, they might have this buildup.
  - d. Walking across carpet and touching something metal can cause this movement of electricity.
  - e. Copper and other metals are good examples of these materials.

## Static Electricity

charged particles	electrical charges	negative
conductors	insulators	positive
discharge	movement	static electricity

Fill in the blanks.

Electricity powers traffic lights, appliances, and computers. There are different kinds of electricity, but all electricity is the result of \_\_\_\_\_.

There are two types of electrical charges. Scientists call these charges \_\_\_\_\_ and \_\_\_\_\_. When two objects touch, \_\_\_\_\_ can move from one object to the other. Negative charges move more easily than positive charges.

The buildup of electrical charges is called \_\_\_\_\_. It is what makes clothes stick together. A small shock can be received from a \_\_\_\_\_ of static electricity. A discharge is the \_\_\_\_\_ of static electricity from one object to another.

Metals like copper and silver are good \_\_\_\_\_ because they let charges flow through them easily. Rubber, plastic, and glass are examples of good \_\_\_\_\_. These materials do not let charges flow through them easily.

## Electric Circuits

Use your textbook to help you fill in the blanks.

### What is electric current?

1. \_\_\_\_\_ can be made to flow continuously through materials.
2. A flow of electrical charges is known as an \_\_\_\_\_.
3. The path along which electrical charges flow is called a \_\_\_\_\_.
4. A complete, unbroken path is called a \_\_\_\_\_.
5. Electric current cannot flow in an \_\_\_\_\_.
6. A \_\_\_\_\_ is a part of a circuit that opens and closes the circuit.
7. When a switch is closed, electric current can \_\_\_\_\_ through the circuit.

**What is a series circuit?**

8. In a series circuit, all of the electrical charges flow \_\_\_\_\_ and along \_\_\_\_\_.
9. If any part of a series circuit is removed or broken, the circuit is \_\_\_\_\_.

**What is a parallel circuit?**

10. A parallel circuit is a circuit in which the electric current flows through \_\_\_\_\_.
11. The \_\_\_\_\_ of a parallel circuit divide the electric current between them.

**What affects electric current?**

12. The amount of electric current that can flow through a circuit depends on \_\_\_\_\_ and \_\_\_\_\_.
13. Voltage is measured in units called \_\_\_\_\_.
14. Increasing the \_\_\_\_\_ of a circuit decreases the flow of electrical charges through it.
15. A \_\_\_\_\_ can stop the rest of the circuit from operating properly and can be dangerous.



# Electric Circuits

Unscramble each of the clue words. Take the letters that appear in the boxes marked with circles and unscramble the letters for the final message.

## QUESTIONS

1. A property of matter
2. A flow of electrical charges
3. Can build up as static electricity and can be discharged
4. The unbroken path along which an electric current flows
5. Status of a circuit that is complete and unbroken with flowing electric current
6. Status of a circuit that has breaks or openings in which electric current cannot flow
7. Opens and closes the circuit
8. A circuit in which all electrical charges flow in the same direction and along the same path
9. The strength of a power source that is measured in volts
10. The ability of a substance to slow down electric current
11. Circuit in which the electric current follows two or more paths that are called branches

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**LLLAPREA**

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<b>B</b>			<b>B</b>
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## Electric Currents

series circuit

parallel circuit

electric current

voltage

current

open

charges

branches

### Fill in the blanks.

People depend on electricity to light up rooms and to power televisions and computers. The electricity that people use relies on a \_\_\_\_\_ of electrical charges. A flow of electrical charges is known as an \_\_\_\_\_. Electric currents keep \_\_\_\_\_ moving.

All electrical charges flow in the same direction and along the same path in a \_\_\_\_\_. If any part of a series circuit is removed or broken, the circuit is \_\_\_\_\_.

A \_\_\_\_\_ is a circuit in which the electric current follows more than one path. These different paths are often called \_\_\_\_\_.

The strength of a power source is its \_\_\_\_\_.

## Using Electrical Energy

Use your textbook to help you fill in the blanks.

### How is electrical energy used?

1. An incandescent bulb produces \_\_\_\_\_ and light.
2. Inside incandescent bulbs is a thin wire called a \_\_\_\_\_.
3. A fluorescent bulb uses a \_\_\_\_\_ to produce light.
4. Electrical energy can be converted into \_\_\_\_\_.
5. Electric motors change electrical energy into \_\_\_\_\_.

### How does electrical energy get to your home?

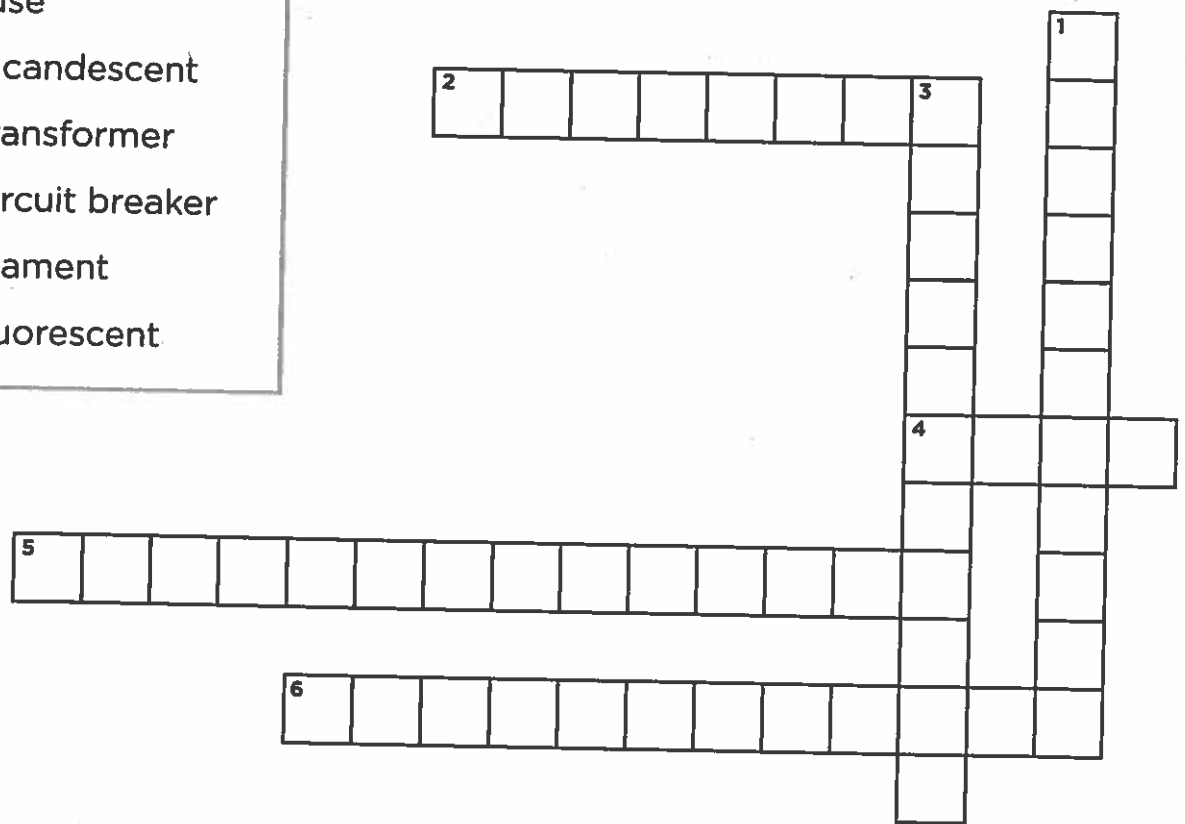
6. \_\_\_\_\_ are used to change the voltage of electric current.
7. Electric current from a power plant enters a transformer. Electric current leaves the transformer with a strength of about \_\_\_\_\_ volts.
8. Appliances in a home usually run on \_\_\_\_\_ volt circuits.

**How can homes use electrical energy safely?**

9. \_\_\_\_\_ can cause electrical fires.
10. A \_\_\_\_\_ stops the flow of charges by switching off the current if it gets too high.
11. A short circuit might happen when the \_\_\_\_\_ of a wire frays.
12. A \_\_\_\_\_ melts and breaks the circuit if the electric current in the circuit gets too high.
13. Plugging too many devices into one circuit can also cause too much current to go through a \_\_\_\_\_.
14. \_\_\_\_\_ stop the flow if there is too much electric current.

# Electrical Energy

- fuse
- incandescent
- transformer
- circuit breaker
- filament
- fluorescent



**Across**

- 2. A thin wire found in incandescent bulbs  
\_\_\_\_\_
- 4. Can melt to break the flow of electric current in a circuit  
\_\_\_\_\_
- 5. Can stop the flow of charges by switching off the current  
\_\_\_\_\_

- 6. A bulb that produces light and much heat \_\_\_\_\_

**Down**

- 1. A bulb that uses gas to produce light \_\_\_\_\_
- 3. Changes the voltage of electric current \_\_\_\_\_

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## Electrical Energy

fluorescent

heat

motion

transformers

electrical devices

incandescent

filament

Fill in the blanks.

\_\_\_\_\_ change the energy in the electric current into other kinds of energy such as light, heat, and motion.

A(n) \_\_\_\_\_ bulb uses high temperatures to produce light. Inside incandescent bulbs is a thin wire called a \_\_\_\_\_. A \_\_\_\_\_ bulb uses a gas to produce light. When an electric current passes through this gas, it glows.

Electrical energy can be converted into \_\_\_\_\_.  
Electric motors change electrical energy into \_\_\_\_\_.  
Electrical energy travels from a power station through wires and transformers to a home. \_\_\_\_\_ are used to change the voltage of an electric current. Safety devices such as fuses and circuit breakers are used to protect homes and stores from an electric overload.

**Write About It**

What do you use that works by electricity that you would have trouble doing without? Write an essay that explains how you use an electrical device. Use time-order words or spatial words to make your directions easy to follow.

**Getting Ideas**

Make a list of things you use that run on electricity. Choose one item to write about.

**Planning and Organizing**

Jenna uses a hair dryer after every swim practice. Here are some steps that she wrote. Put 1 by the step that comes first. Put 2 by the step that comes second and so on. Number the last step 5.

1. \_\_\_\_\_ This makes electric current flow through the dryer and heat up the heating element.
2. \_\_\_\_\_ Lift your hair with a hairbrush and blow the hot air on it.
3. \_\_\_\_\_ Plug the hair dryer into an electrical outlet.
4. \_\_\_\_\_ Then the current makes the electric motor spin, turning the fan.
5. \_\_\_\_\_ Find the “on” switch and move it to the “hot” or “warm” position.

**Drafting**

Write steps you could use in your explanation. Use the chart below to help you. Write the name of the device on the line.

Topic: _____
↓
First, _____
↓
Then, _____
↓
Next, _____
↓
Finally, _____

Now write the first draft of your explanation on a separate piece of paper. Write the steps in time order. Use transition words to connect the steps.

**Revising and Proofreading**

Here are some sentences that Jenna wrote. Combine each pair of sentences. Turn the second sentence into a prepositional phrase.

1. Make sure nothing blocks the airflow. It comes from the nozzle.

\_\_\_\_\_

2. Remove the plug. Take it from the electrical outlet.

\_\_\_\_\_

Now revise and proofread your explanation.



## Hybrid Power

In cities like Los Angeles and Sacramento, millions of people drive cars. Most of the cars run on gasoline. There is a limited supply of gasoline in the world, and our cars make us very dependent on it. Also, the more gasoline the cars burn, the more they pollute the air. Pollution from cars contributes to a cloud of smog that sometimes covers a city like a blanket.

### How can we become less dependent on gasoline and cut down on air pollution?

One way is to build better cars. Car companies have been working to develop hybrid cars. “Hybrid” is a word that describes something that is a mix of two different things. Hybrid cars use two different power sources—gasoline fuel and electrical energy.

In a traditional car, the gasoline engine runs all the time. But when the car is stopped at a light, sitting in traffic, or slowing down, power from the gasoline engine is not needed at all. At these times, the fuel that is used to keep the engine running is just being wasted.

A hybrid car is designed so that it uses much less fuel than a traditional car. It combines a gas-powered engine with an electrical motor powered by batteries. When the car is stopped or slowing down, the gas-powered engine shuts off. The battery-powered motor takes over to keep the lights, air conditioning, and radio working. The batteries get recharged when the car slows to a stop. The car changes its energy of motion into electrical energy.

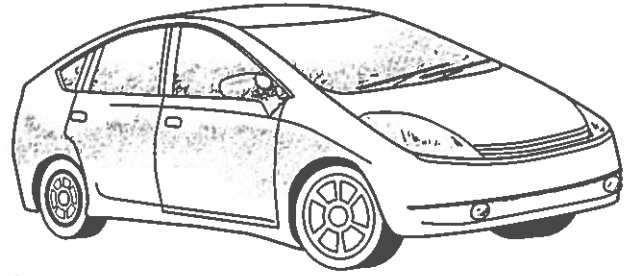
The gasoline engines in hybrid cars can be smaller and more energy efficient and still provide enough power to keep the car cruising on the freeway. This makes us less dependent on gasoline — and makes for a cleaner environment!

# Reading

Name \_\_\_\_\_ Date \_\_\_\_\_

## Main Idea

- The main idea is the focus of the entire article.
- Details support and explain the main idea.



## Write About It

How do hybrid cars help people and the environment?

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How does a hybrid car produce electrical energy?

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# Electricity

Choose the letter of the best answer.

- The strength of a power source is its
  - charge.
  - discharge.
  - resistance.
  - voltage.
- A safety device that switches off dangerous currents is a
  - circuit breaker.
  - insulator.
  - resistor.
  - transformer.
- Charges do not flow easily through
  - conductors.
  - copper wire.
  - insulators.
  - silver.
- The continuous flow of electrical charges is
  - discharge.
  - electric current.
  - static electricity.
  - voltage.
- Rubbing wool on a balloon causes a buildup of electrical charges called
  - discharge.
  - resistance.
  - static electricity.
  - voltage.
- Electric current flows through one path in a
  - transformer.
  - open circuit.
  - parallel circuit.
  - series circuit.
- A device that protects against dangerous amounts of current is a
  - filament.
  - fuse.
  - volt.
  - transformer.

Choose the letter of the best answer.

8. The voltage of an electric current can be increased by a(n)
- |               |                 |
|---------------|-----------------|
| a. fuse.      | c. resistor.    |
| b. insulator. | d. transformer. |
9. Charges flow easily through
- |                |             |
|----------------|-------------|
| a. conductors. | c. plastic. |
| b. insulators. | d. rubber.  |
10. Resistance is the ability of a substance to
- |                                    |
|------------------------------------|
| a. change the charge of an object. |
| b. provide power to a circuit.     |
| c. slow down electric current.     |
| d. speed up electric current.      |
11. Electric current flows through different paths in a
- |                  |                      |
|------------------|----------------------|
| a. fuse.         | c. parallel circuit. |
| b. open circuit. | d. series circuit.   |
12. The path of electric current is called a
- |             |                 |
|-------------|-----------------|
| a. circuit. | c. switch.      |
| b. fuse.    | d. transformer. |
13. A property of matter that can be positive or negative is
- |                       |                |
|-----------------------|----------------|
| a. electrical charge. | c. resistance. |
| b. electric current.  | d. voltage.    |
14. Static electricity that moves from one object to another is a(n)
- |               |                      |
|---------------|----------------------|
| a. circuit.   | c. electric current. |
| b. discharge. | d. transformer.      |