

# LIGHT

## What is Light?

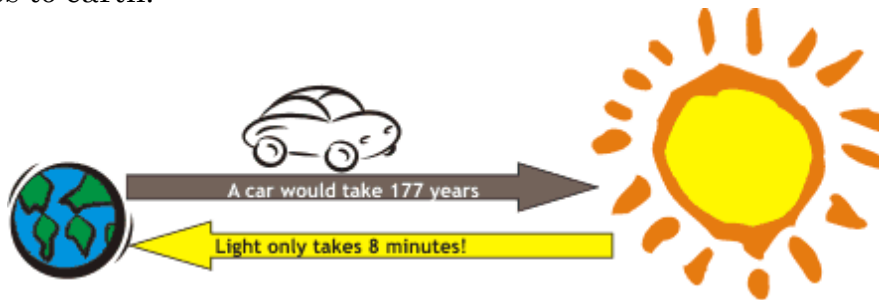
It's a kind of **energy**, we can see it and it makes the rainbow.

## How does light travel?

Light travels **FAST** and **STRAIGHT**.

## How FAST?

About 300,000 kilometres per second, so light from the sun takes **about 8 minutes** to go 149 million kilometres to earth.



## How STRAIGHT?

Perfectly straight, until something **bends** it. The straight paths of light are called **LIGHT RAYS**.

## Controlling Light

There are **THREE** basic ways to control light

- Block** it with something (this makes a **shadow**)
- Reflect** it (change its path with a mirror). This is called a **REFLECTION**.
- Bend** it. Change its direction by making it pass into another transparent material of different density, like glass or water. This is called **REFRACTION**, and it's how lenses work.

## **More from Light:**

Definition of **reflection**: it is a phenomenon that occurs when a light ray hits a surface and bounces off.

Definition of **refraction**: it is a phenomenon that occurs when a light ray hits a surface and bends

# LIGHT

1.- What is light? \_\_\_\_\_

\_\_\_\_\_

2.- How does it travel? \_\_\_\_\_

\_\_\_\_\_

3.- Draw the 3 ways of controlling light

1 When light bounces back off a surface, we say it has been ...

- reflected
- absorbed
- bent

**2.**

What types of surfaces reflect light well?

- Light coloured and smooth
- Dull and dark
- Dark coloured and smooth

**3.**

Which of these objects would reflect the most light?

- A rusty metal key
- A wooden spoon
- A polished metal knife

**4.**

How do mirrors work?

- By reflecting the light that hits them
- By absorbing the light that hits them
- By letting through the light that hits them

**5.**

Why do scissors look shiny?

- Because they are sharp
- Because they reflect light
  - Because they give out light
  -

6.  
To make a wall reflect as much light as possible, you should paint it ...
- black
  - white
  - yellow

7.  
How are shadows formed?
- By light passing through an object
  - By light reflecting from a shiny object
  - By an opaque object blocking the path of light

8.  
How do we see a tree?
- By light reflecting off the tree and entering our eyes
  - By light travelling from our eyes and reflecting off the tree
  - By light reflecting off our eyes and entering the tree

9.  
Which of these is FALSE?
- Light travels in straight lines
  - Light travels very fast
  - Light can pass through any material

10.  
A beam of light hitting a mirror at an angle is reflected off at ...
- a smaller angle
  - the same angle
  - a larger angle

## MAGNETISM

### Magnets and magnetic poles

Magnets have **north poles** and south poles. These **attract** each other. But two north poles will **repel** each other, as will two south poles.

When two magnets are close, they create **pushing or pulling forces**

### Magnetic materials

Magnets can attract other magnets but they can also attract magnetic materials.

Magnetic materials are always metals but only a few metals are magnetic.

Iron is **magnetic**, so any metal with iron in it will be attracted to a magnet. Most other metals, like **aluminium, copper or gold**, are not magnetic.

## EXERCISES:

1.- Definition of Magnetism: \_\_\_\_\_

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Magnetic force: \_\_\_\_\_

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Magnetic field: \_\_\_\_\_

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1. Which of these objects would be attracted to a magnet?

- A leather purse
- A steel key
- A wooden ruler

2. Magnet A can hold three steel paperclips; Magnet B can hold five. Which is the strongest?

- Magnet A
- Magnet B
- They are both equally strong

3. Two magnets are placed next to each other and push (repel) each other apart. What is one possible explanation for this?

- The north poles of both magnets are facing one another
- One magnet is made of gold
- The north pole of one magnet is facing the south pole of the other magnet

4. The pushing or pulling force of a magnet is

- strongest in the middle of the magnet
- strongest at the ends of the magnet
- the same all the way through the magnet

5. Which two metals will be attracted by a magnet?

- Iron and steel
- Gold and silver
- Aluminium and lead

6. When two magnets repel each other, they ...

- push away from each other
- pull towards each other
- neither push nor pull

7. When two magnets attract each other, they ...

- push away from each other
- pull towards each other
- neither push nor pull

8. Magnetism is a type of ...

- electricity
- gravity
- force

9. When you squash a spring down with your hand, you feel ...

- an upward push on your hand
- a downward push on your hand
- no push or pull at all

10. The more you squash or compress a spring down with your hand ...

- the bigger the downward force on your hand
- the smaller the upward force on your hand
- the bigger the upward force on your hand

**Worksheet 17.** Date .....

*Apply your knowledge*  
**MAGNETS AND MAGNETISM**

**1. Write true or false.**

- a. A magnet is an object that can attract all types of objects. \_\_\_\_\_
- b. Magnets have two poles. \_\_\_\_\_
- c. Opposite magnetic poles repel each other. \_\_\_\_\_
- d. To make an electromagnet, you only need a conducting wire. \_\_\_\_\_
- e. Magnetic strips store information on credit cards. \_\_\_\_\_

**2. What type of magnets are used in the following objects?**

electromagnet	magnetic strip	magnetic recording media
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\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

**3. Investigate.**

a. What is a compass? \_\_\_\_\_

\_\_\_\_\_

b. What does it tell us about the Earth? \_\_\_\_\_

\_\_\_\_\_



# What is electricity (1<sup>st</sup> part)

## 0.- Electrical object

Making Heat	Making sound	Making light	Making movement

Sentences:

The cd player uses electricity to make sound

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## 1.- Definition of Electricity:

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## 2.-Draw an atom: electrons, neutrons and protons

# Electrical Charges

If an object has more positive charges (⊕) than negative charges (⊖), its electrical charge is positive (⊕).

If an object has more negative charges (⊖) than positive charges (⊕), its electrical charge is negative (⊖).

If an object has the same number of positive (⊕) and negative (⊖) charges, it has no electrical charge or is neutral.

Example:



Electrical charge: **positive charge**

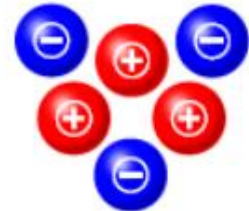
Count the positive and negative charges in each picture. Write positive charge, negative charge, or no charge on each line.

1.



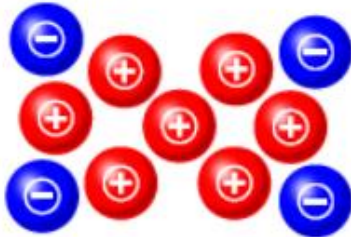
electrical charge: \_\_\_\_\_

2.



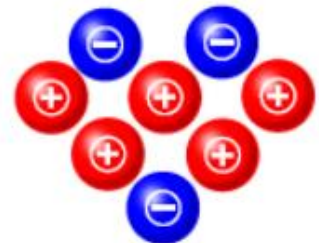
electrical charge: \_\_\_\_\_

3.



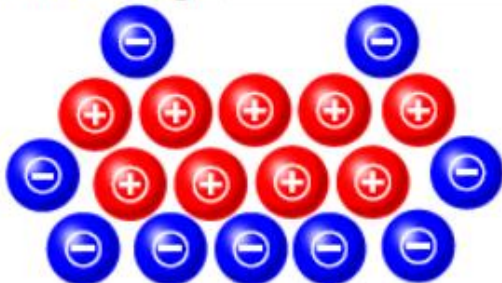
electrical charge: \_\_\_\_\_

4.



electrical charge: \_\_\_\_\_

5.



electrical charge: \_\_\_\_\_

6.

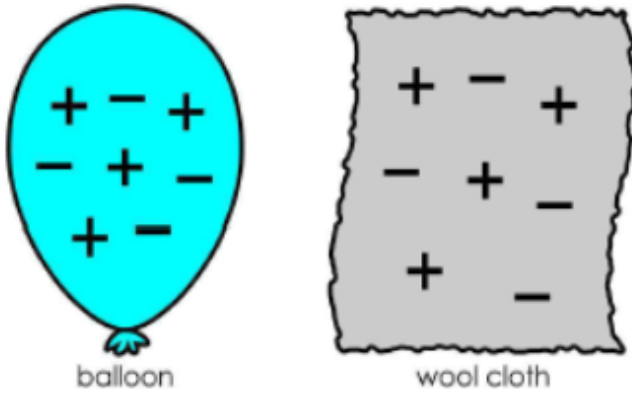


electrical charge: \_\_\_\_\_

# Static Electricity

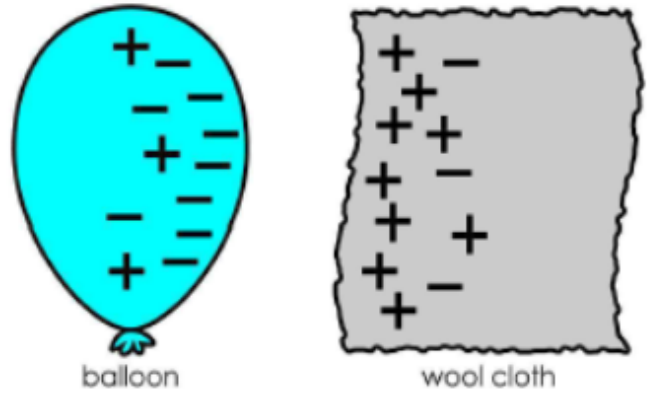
Rubbing a balloon with wool cloth will create static electricity charges.

This balloon has **not** been rubbed with the wool cloth.



Picture 1

This balloon **has** been rubbed with the wool cloth.



Picture 2

In Picture 1, does the balloon have a positive charge, negative charge, or no charge? \_\_\_\_\_

In Picture 1, does the cloth have a positive charge, negative charge, or no charge? \_\_\_\_\_

In Picture 2, does the balloon have a positive charge, negative charge, or no charge? \_\_\_\_\_

In Picture 2, does the cloth have a positive charge, negative charge, or no charge? \_\_\_\_\_

If you place small pieces of tissue paper near the balloon in Picture 2, they would probably stick to the balloon. Explain why.

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3-Choose the correct sentence for each definition:

- |  |                      |
|--|----------------------|
| - When electrons jump from atom to atom                | - electrons          |
| - A pathway, in which current flows                    | - static electricity |
| - Some insulating materials become charged when rubbed | - electric current   |
| - They whizz round and round the nucleus of the atom   | - electric circuit   |

4 .-. Look at the picture. Make 5 sentences that explain the behaviour of the particles of the atom.

Electrons	move	around the	nucleus
Protons	don't move		
Neutrons	are	together in the	
	aren't		

5.- Complete these sentences with the most suitable word. Work in pairs.

- \_\_\_\_\_ (electrons/protons) have negative charge and protons have \_\_\_\_\_ (positive/negative) charge.
- A \_\_\_\_\_ (stable/charged) atom has the same number of electrons and protons.
- If an atom has a higher number of electrons than of protons it is \_\_\_\_\_ (positively/negatively) charged.
- If an atom has a lower number of electrons than of protons it is \_\_\_\_\_ (positively/negatively) charged.
- If an atom is stable it \_\_\_\_\_ (has/does not have) charge.

### Electricity at home ( 2<sup>nd</sup> part)

1.- Where does Electricity come from?

It comes from \_\_\_\_\_  
\_\_\_\_\_

2.- How does electricity come to my house?

\_\_\_\_\_  
\_\_\_\_\_

#### 4.- When is electricity dangerous?

Sentences to give recommendations:

You should..... you shouldn't .... You must ..... you mustn't ..... you can add ALWAYS / NEVER

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9-Thomas Alva Edison was born in Ohio (United States) in 1847. He worked in business but he was also an inventor. He enjoyed doing experiments with electricity. In 1879 he invented the bulb. He used a carbonized bamboo filament. That bulb worked for 48 hours. He died in 1931.

Where and when was he born? \_\_\_\_\_  
What was his job? \_\_\_\_\_  
What did he invent? \_\_\_\_\_  
Which materials did he use? \_\_\_\_\_

# Electrical circuits and electrical current

Electrical current is the flow of electrical charges. It transmits energy called electricity.  
Electrical circuits

## Electrical current and electric circuits

### LOOK AND READ

#### 1. Electrical current

**Electrical current** is the **flow** of electrical charges. It transmits energy called **electricity**.

Electrical current flows differently, depending on the type of material through which it flows.

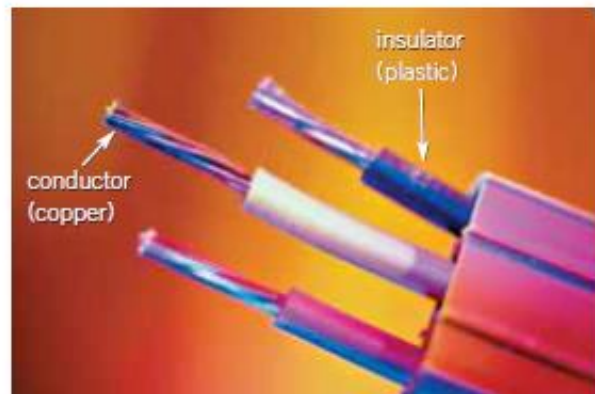
- **Conductors:** electrical current flows easily through conductors. Most metals are conductors.
- **Insulators:** electrical current does not flow easily through insulators, such as air, glass, plastic, wood and rubber.

#### 2. Electric circuits

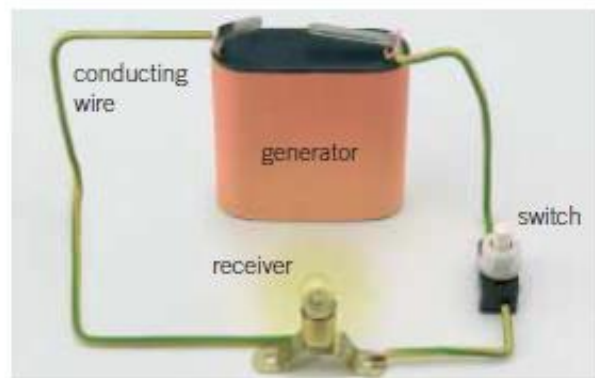
An **electric circuit** consists of different components connected to each other to allow the flow of an electrical current.

The four basic components of an electric circuit are:

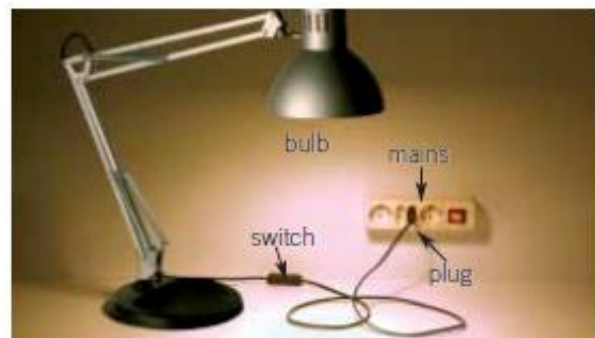
- A **generator**, which is the source of electricity, such as an electrical plant or a battery
- An **electrical component**, such as a light bulb or a motor
- **Conducting wires**
- A **switch** to control the flow of electrical current. A switch in the *on* position closes the circuit and allows the flow of electrical current. A switch in the *off* position opens the circuit and breaks the flow of electrical current.





Wires are made up of conductors (copper) and insulators (plastic).





An electric circuit



An electric circuit: the plug connects the lamp to the mains, which provides the electricity. The switch opens or closes the circuit.

  **Electrical current flows easily through conductors.**  
Write more sentences about electrical current.

 **When is an electric circuit open?** 

1.- An electrical circuit to work must be \_\_\_\_\_

2.- what are the elements in an electrical circuit? Draw every symbol and the name by it

1.In a simple series circuit, why does the bulb light when you close the switch?

- Because the switch produces electricity
- Because closing the switch completes the circuit
- Because closing the switch breaks the circuit

2.In a simple series circuit, why does the bulb go out when you open the switch?

- Because the battery goes flat
- Because opening the switch breaks the circuit
- Because too much electricity flows through the bulb

3.Imagine a simple series circuit with one 1.5V battery and one bulb. When the 1.5V battery is replaced with a 3V battery ...

- the bulb gets brighter
- the bulb gets dimmer
- the bulb stays at the same level of brightness

4.Imagine a circuit with a 1.5V battery and one bulb. Imagine a similar circuit with a 3V battery and two bulbs. Which has the brightest bulbs?

- The circuit with a 1.5V battery and one bulb
- The circuit with a 3V battery and two bulbs
- The bulbs in both circuits are of similar brightness levels

5. Why might a bulb flash and go out when a 1.5V battery and a 3V battery are both connected across it in a simple series circuit?

- There is not enough electricity flowing around the circuit
- Too much electricity flows through the bulb's filament and the bulb blows
- The batteries are flat

6. What is the effect of changing the wire in a circuit from a straight thick wire to a straight thin wire?

- The bulbs become dimmer
- The bulbs become brighter
- The bulbs stay at the same level of brightness

7. What is the effect of changing the wire in a circuit from a straight thick wire to a longer (coiled) thick wire?

- The bulbs become dimmer
- The bulbs become brighter
- The bulbs stay at the same level of brightness

8. In a circuit diagram, what does a circle with a cross inside it represent?

- A light bulb
- A motor
- A battery

9. What do the long straight lines represent in a circuit diagram?

- Motors
- Light bulbs

Wires

10. How is a battery represented in a circuit diagram?

A circle with a cross inside it

A circle with an M inside it

A long line and a short line

## Learning Electricity and Circuits Worksheet

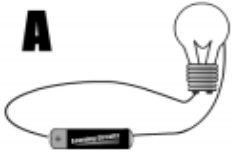



Name: .....

Date: .....

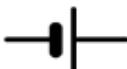






Class: .....



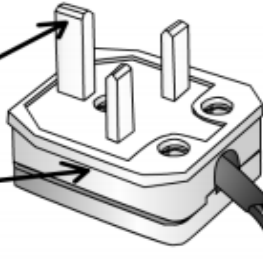
For each of the circuits below tick if you think it will work or not

<b>A</b> 	<b>B</b> 	<b>C</b> 	<b>D</b> 
<input type="checkbox"/> Work <input type="checkbox"/> Not Work	<input type="checkbox"/> Work <input type="checkbox"/> Not Work	<input type="checkbox"/> Work <input type="checkbox"/> Not Work	<input type="checkbox"/> Work <input type="checkbox"/> Not Work

Label the symbols with the correct component

 <input type="text"/>	 <input type="text"/>	 <input type="text"/>	 <input type="text"/>
 <input type="text"/>	 <input type="text"/>	 <input type="text"/>	

Look at the diagram of a plug, can you label the conductors and insulators?



→ (top pin)

→ (middle pin)

→ (bottom pin)

→ (left wire)

→ (right wire)

Once you have completed this worksheet hand it in to your teacher or parent. You can also keep it for revision

## Electrical Conductors and insulator

1.- What is an electrical conductor? Examples \_\_\_\_\_

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2.- What is an electrical insulator? Examples \_\_\_\_\_

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1.A material that lets electricity pass through it is called ...

- an electrical conductor
- an electrical insulator
- an electrical appliance

2.A material that does NOT let electricity pass through it is called ...

- an electrical conductor
- an electrical insulator
- an electrical appliance

3.Which of the following materials is an electrical conductor?

- Silver
- Silver-coloured plastic
- Cork

4.Which of the following materials is an electrical insulator?

- Aluminium
- Gold
- Rubber

5.In which circuit will the bulb or bulbs glow brightest?

- A simple circuit with one bulb and one battery
- A simple circuit with one bulb and two batteries

A simple circuit with two bulbs and one battery

**6.** Why is a bulb brighter when it is powered by two batteries rather than one?

Because the flow of electricity in the circuit is less

Because the flow of electricity in the circuit is the same

Because the flow of electricity in the circuit is greater

**7.** Ruby has connected two bulbs across two batteries in a simple circuit. How can she make the bulbs dimmer?

Replace one of the batteries with a section of wire

Replace one of the batteries with a cork

Replace one of the bulbs with a section of wire

**8.** Ruby makes a complete simple circuit with one bulb and three batteries. The bulb lights for an instant and then goes out. Why?

Not enough electricity flows around the circuit

Too much electricity flows through the bulb's filament

The batteries are flat

**9.** Why is electrical wiring usually made from copper?

Because copper is shiny

Because copper conducts electricity

Because copper is not magnetic

**10.** Why is electrical wiring usually covered with a layer of plastic?

To make it look pretty

To help electricity flow along the wire

To make it safe

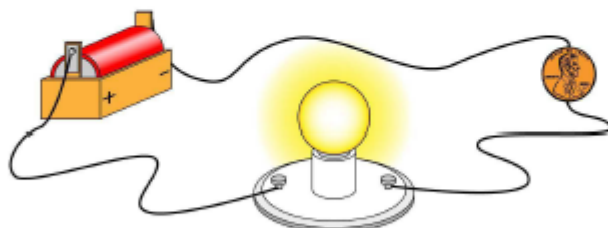


## Conductors and Insulators

A **conductor** is a material that allows electricity to flow through it.

An **insulator** is a material that electricity cannot flow through.

To determine whether an object is a conductor or insulator, you can build a simple circuit with a battery, light bulb, and three pieces of wire.



Touch the free ends of the wire to the object you are testing. If the light bulb lights up, the object is made from a conductor. If it does not, the object is made from an insulator.

Complete the table. Predict whether each item is made from a material that is a conductor or insulator. Then test each item to determine if it is made from a conductor or insulator.

Object	Prediction: Conductor or Insulator?	Result: Conductor or Insulator?
rubber band		
penny		
nickel		
toothpick		
key		
paper clip		
brass paper fastener		
glass microscope slide		
(your choice)		
(your choice)		

# REVISION

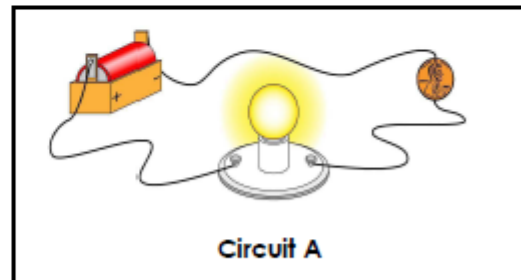
Name: \_\_\_\_\_

## Electricity

Choose the best answer for each question. Write the letter on the line.

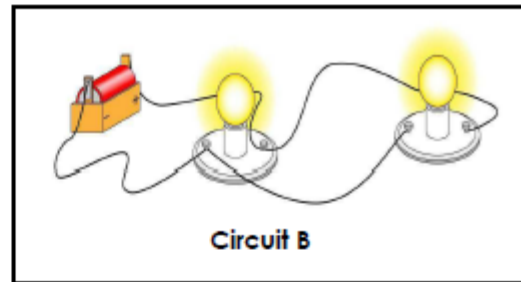
- \_\_\_\_\_ 1. What supplies energy in an electric circuit?
- a. a conductor
  - b. light bulb
  - c. a wire
  - d. a battery

- \_\_\_\_\_ 2. Which material is a conductor?
- a. plastic
  - b. silver
  - c. glass
  - d. wood



- \_\_\_\_\_ 3. Which type of circuit is Circuit A?
- a. series
  - b. parallel
  - c. perpendicular
  - d. current

- \_\_\_\_\_ 4. Which item is a resistor in Circuit B?
- a. light bulb
  - b. wire
  - c. battery
  - d. screws



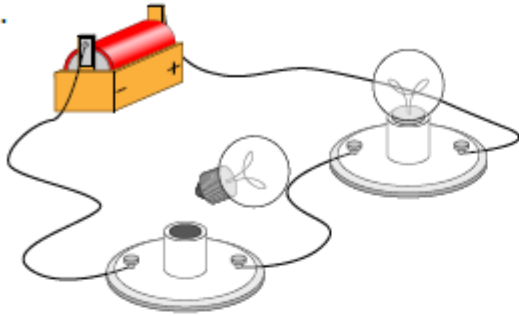
- \_\_\_\_\_ 5. Why did the person who made Circuit A probably connect the wires to a penny?
- a. They needed to use a penny to make the bulb light.
  - b. They were testing to see if the penny conducts electricity.
  - c. They used the penny to supply extra power.
  - d. The penny will prevent sparks.

- \_\_\_\_\_ 6. Which of these could be used as a resistor in a circuit?
- a. a pencil
  - b. a gas engine
  - c. a rubber eraser
  - d. an electric motor

# Electrical Circuits

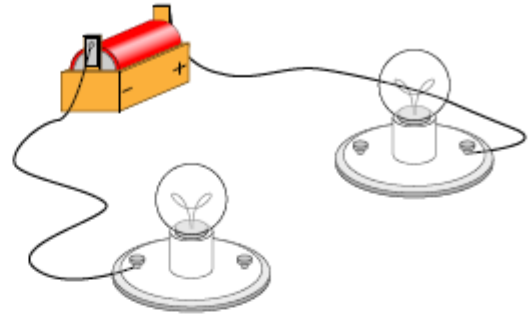
Tell whether the light bulb or bulbs will light or will not light based on the circuit.

1.



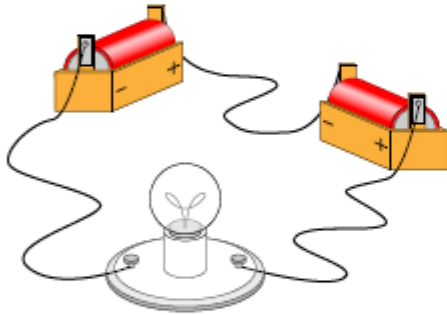
\_\_\_\_\_

2.



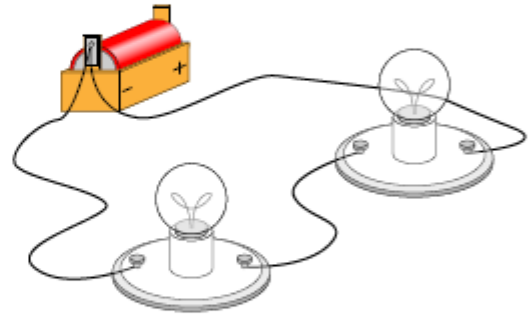
\_\_\_\_\_

3.



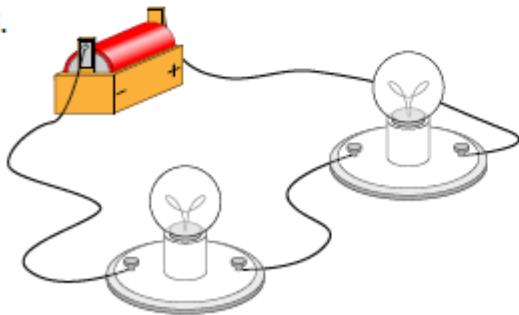
\_\_\_\_\_

4.



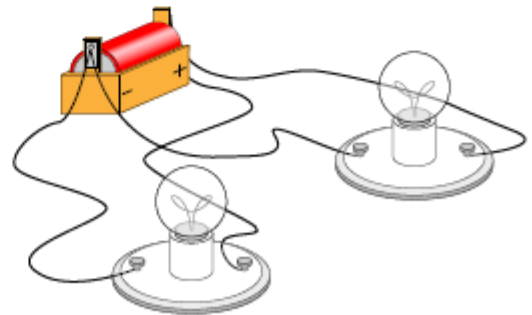
\_\_\_\_\_

5.



\_\_\_\_\_

6.



\_\_\_\_\_

Name: \_\_\_\_\_

## Electricity

circuit	glass	insulators	conductors
electric current	rubber	series	parallel
resistor	copper	battery	silver



Chose the best word(s) from the word box to complete each sentence.

1. The flow of electricity is an \_\_\_\_\_.
2. A path that an electric current follows is a \_\_\_\_\_.
3. A \_\_\_\_\_ supplies energy to move electricity through a circuit.
4. \_\_\_\_\_ are materials that electrical current cannot pass through.
5. \_\_\_\_\_ are materials that electrical current can easily pass through.
6. \_\_\_\_\_ and \_\_\_\_\_ are examples of materials that are conductors.
7. \_\_\_\_\_ and \_\_\_\_\_ are examples of materials that are insulators.
8. A \_\_\_\_\_ is a material that cuts down the flow of current, but does not stop it.
9. A \_\_\_\_\_ circuit is a circuit in which electrical current can follow only one path.
10. A \_\_\_\_\_ circuit is a circuit in which electrical current has more than one path to follow.