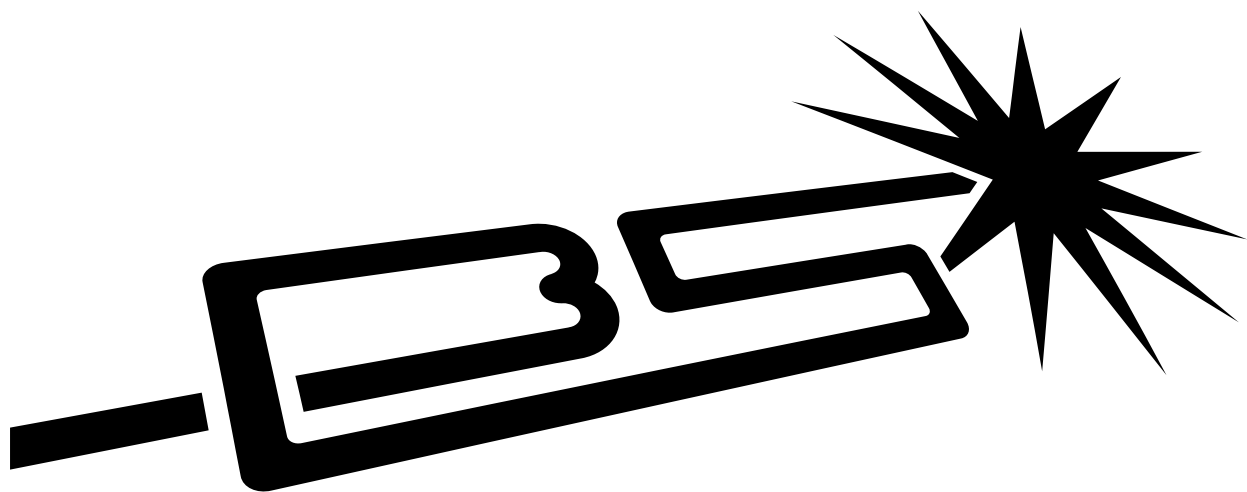


# BRIGHT SPARKS ACTIVITY BOOK

NAME:

---



# Battery or mains electricity?



- All the things below need electricity to work.
  - Some use mains electricity from the plug socket (230 Volts).
  - Some use batteries which are made up of cells which store electricity.
- A single cell is 1.5 Volts.
- Voltage is the measure of strength to push the electricity around the circuit.
- Batteries are a SAFE way of handling electricity.

Write in the boxes below the numbers of the items you think use batteries, and the numbers of the items you think use mains electricity.



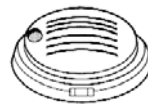
1 Toaster



5 Mobile Phone



2 Kettle



6 Smoke Alarm



3 TV



7 Remote Control



4 Torch



8 Wall Clock

Things which use <b>BATTERIES</b>	Things which use <b>MAINS ELECTRICITY</b>
<p>Write the number of the item</p>	

## Safety Point

The voltage coming through the plug from the mains electricity is 230 Volts. **THIS CAN KILL**

# Symbols for use in electrical circuits



These are the symbols you will need to know when you are drawing circuits.

1 cell battery = 1.5V



3V battery



Two 1.5V cells connected together = 3V battery



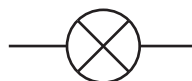
Switch (open)



Switch (closed)



Bulb



Motor



Buzzer



Bell



Connecting wire

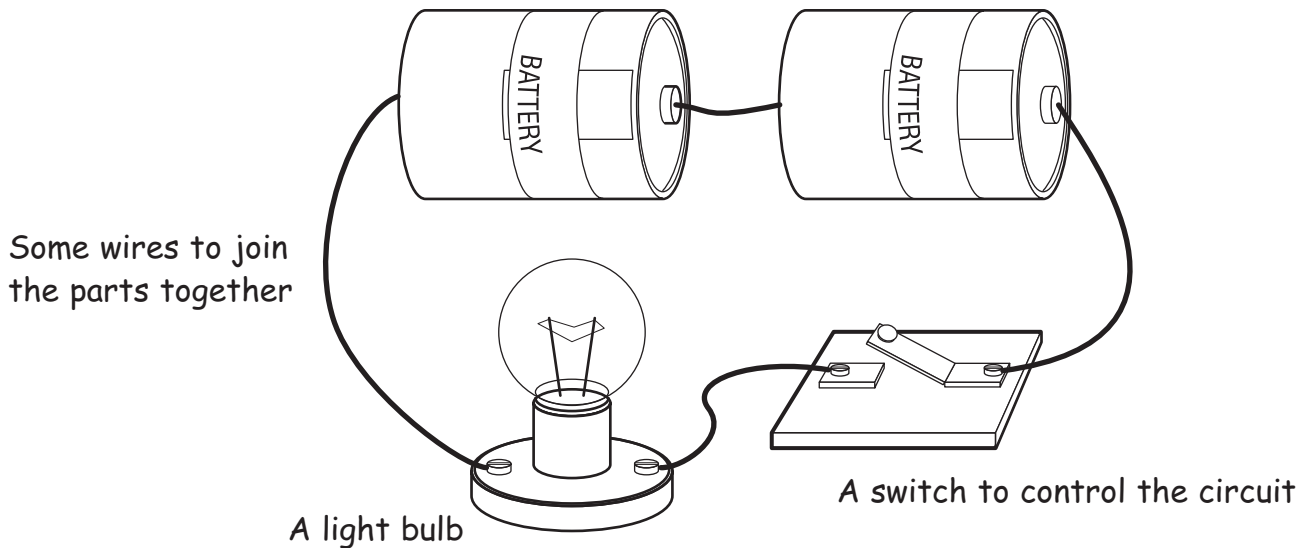


# A simple circuit

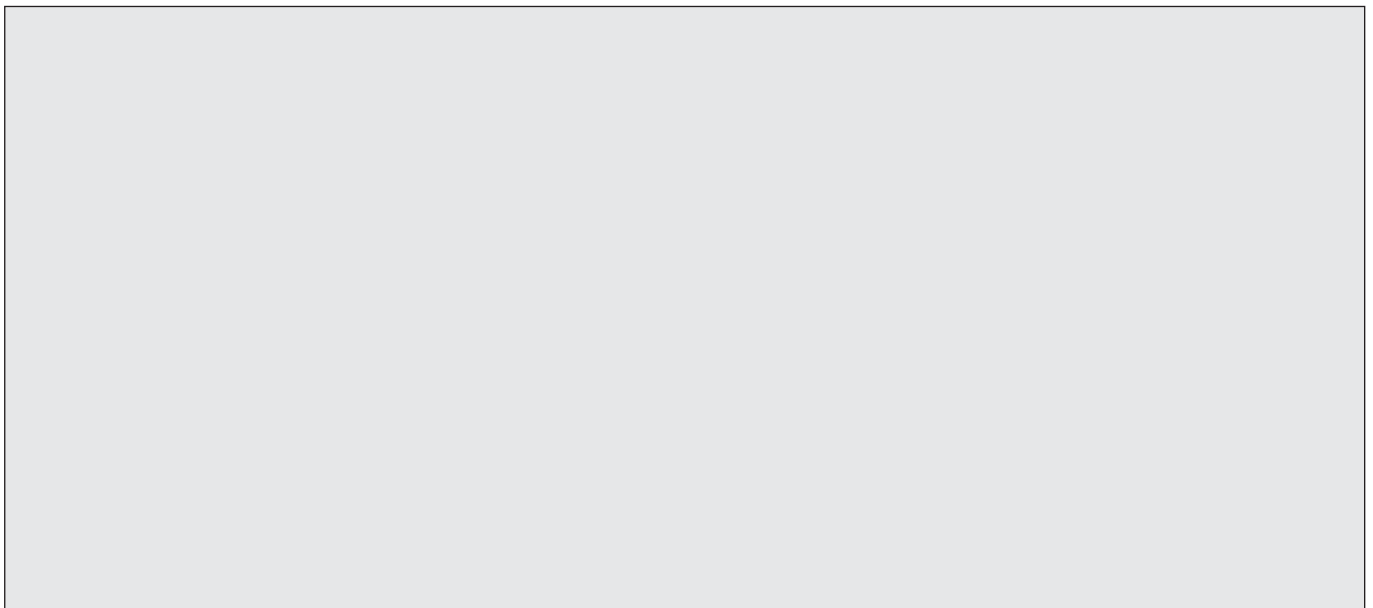


To make an electrical appliance such as a light bulb work, we need to make a **COMPLETE CIRCUIT**. The parts that make up a circuit are:

A supply of electricity/batteries



Can you draw the above circuit as a symbol diagram?



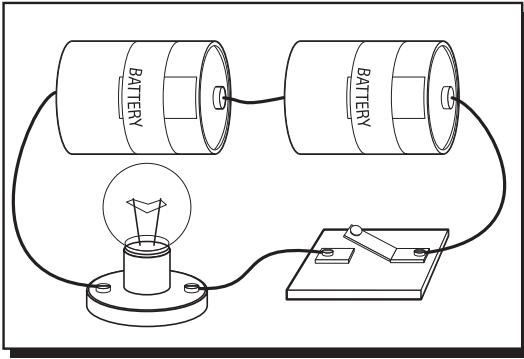
The battery provides the **voltage** to push the electricity around the circuit. The amount of electricity flowing around the circuit is measured in **amperes** (amps).

**IF A CIRCUIT IS INCOMPLETE IT WILL NOT WORK**

# Be an 'Electric Detective'!

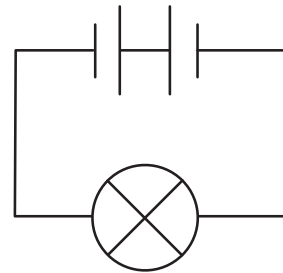
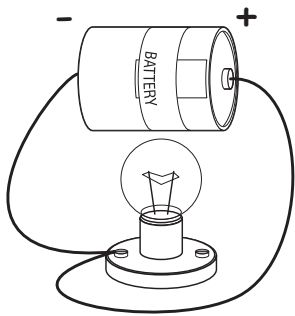


When the switch is closed in this circuit the bulb does not light.  
Can you think of reasons why it does not work?



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

The following circuits do not work. Explain why, and what needs to be done to make them work.



Why it doesn't work:

---



---

What needs to be done:

---



---

Why it doesn't work:

---



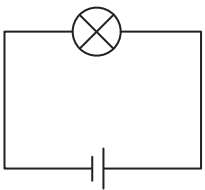
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What needs to be done:

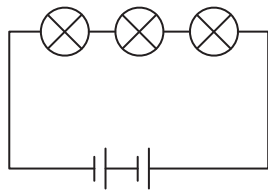
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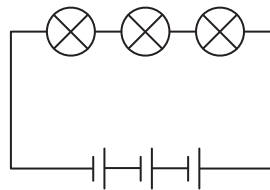
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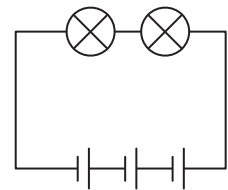
(a)



(b)



(c)



(d)

1. In which circuit will the bulbs be the brightest? \_\_\_\_\_

2. In which circuit will the bulbs be the dimmest? \_\_\_\_\_







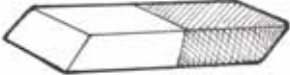

# Conductors or insulators?



CONDUCTORS LET ELECTRICITY FLOW THROUGH THEM

INSULATORS DO NOT LET ELECTRICITY FLOW THROUGH THEM

Test these materials to see if they are conductors or insulators.

Material		Prediction (C) or (I)	Result (C) or (I)
Plastic Ruler			
Piece of String			
Iron Paperclip			
Piece of Fabric			
Piece of Aluminium Foil or Aluminium Wire			
Coin or Copper Wire			
Eraser or Rubber Band			
Wooden Stick			

## WHAT HAVE WE FOUND OUT?

What type of materials are conductors made from? \_\_\_\_\_

These are good conductors.

Now connect the test wires to the graphite tips of the double-ended pencil, and push the switch.



Graphite is not a metal, but what happened to the bulb when you tested it?

\_\_\_\_\_

Can you think of a reason for your result?

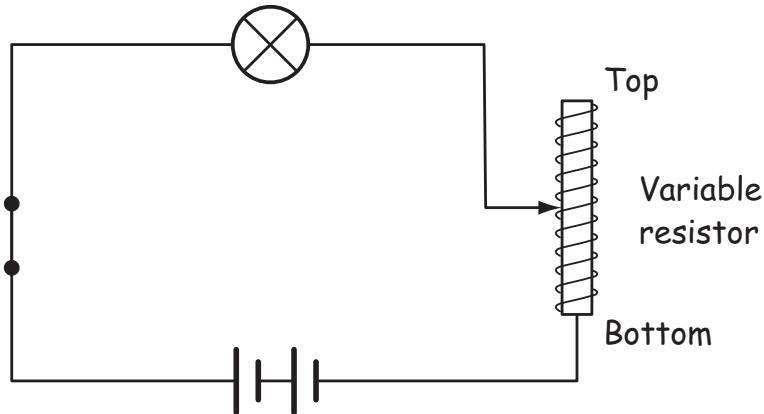
\_\_\_\_\_

Metals are better \_\_\_\_\_ than graphite.

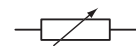
# Varying the brightness of the bulb



We connected a variable resistor into a circuit as shown in the circuit diagram below:



Note: The actual symbol for a variable resistor is:



This experiment shows the effect of changing the \_\_\_\_\_ of resistor wire in the circuit. We noticed that when the slider was near the top of the variable resistor, there is more wire in the circuit and the bulb appeared to be:

off       bright       dim

When the slider was near the middle of the variable resistor, the bulb appeared to be:

off       bright       dim

When the slider was near the bottom of the variable resistor, there is less wire in the circuit and the bulb appeared to be:

off       bright       dim

What have we learnt?

The longer the wire the \_\_\_\_\_ the bulb.

The shorter the wire the \_\_\_\_\_ the bulb.

Changing the length of resistor wire can make the bulb brighter or dimmer.

Changing the \_\_\_\_\_ of the wire would do the same.



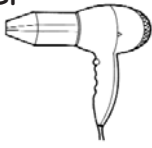

As the wire gets thicker the bulb gets \_\_\_\_\_

As the wire gets thinner the bulb gets \_\_\_\_\_



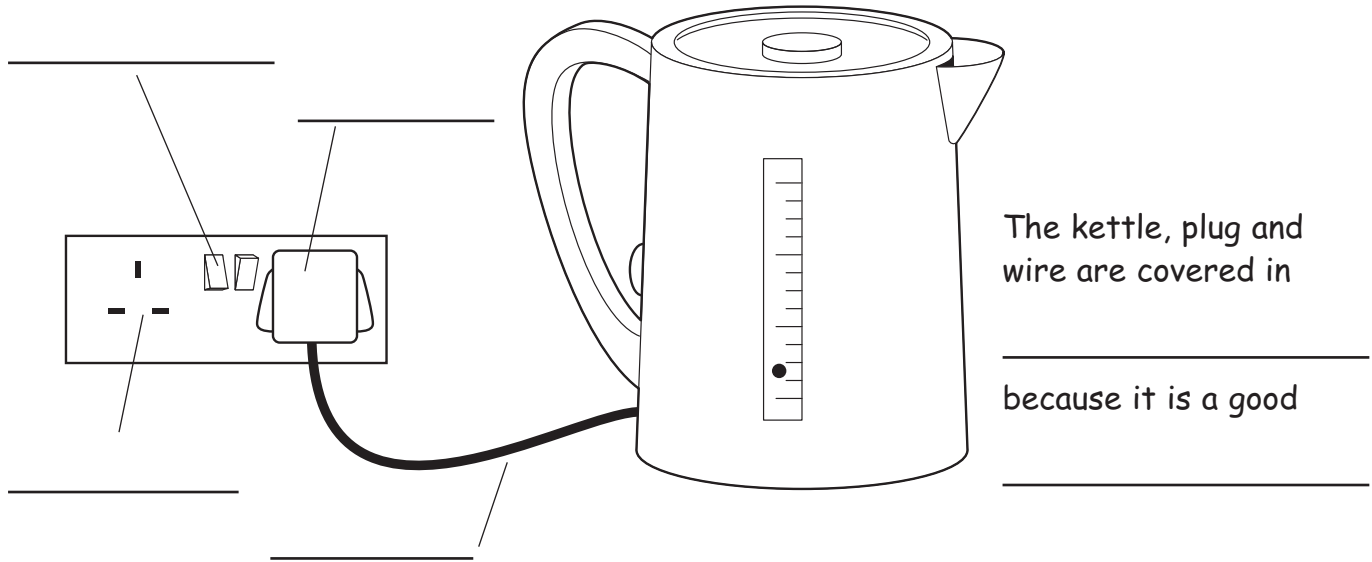
Electricity can be turned into Heat, Light, Sound and Movement.

Complete the sentences with the correct words.

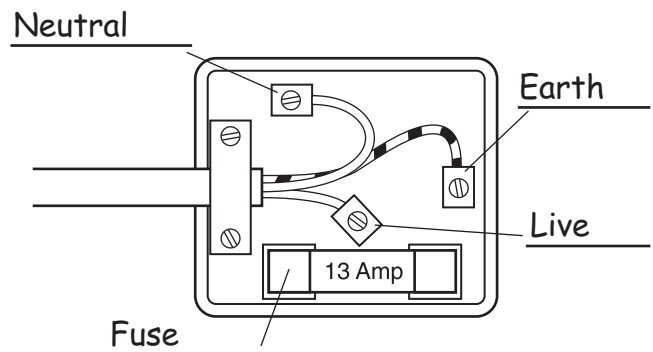
<b>Television</b> 	<b>Kettle</b> 	<b>Hair dryer</b> 	<b>Lamp</b> 
A television needs electricity to produce _____ and _____	A kettle needs electricity to produce _____	A hair dryer needs electricity to produce _____ and _____	A lamp needs electricity to produce _____

### Mains Electricity

Can you label these things?



Electric Plugs have a fuse inside them. If anything goes wrong, this fuse 'blows'. The wire inside it melts to cut off the electricity from the faulty equipment.

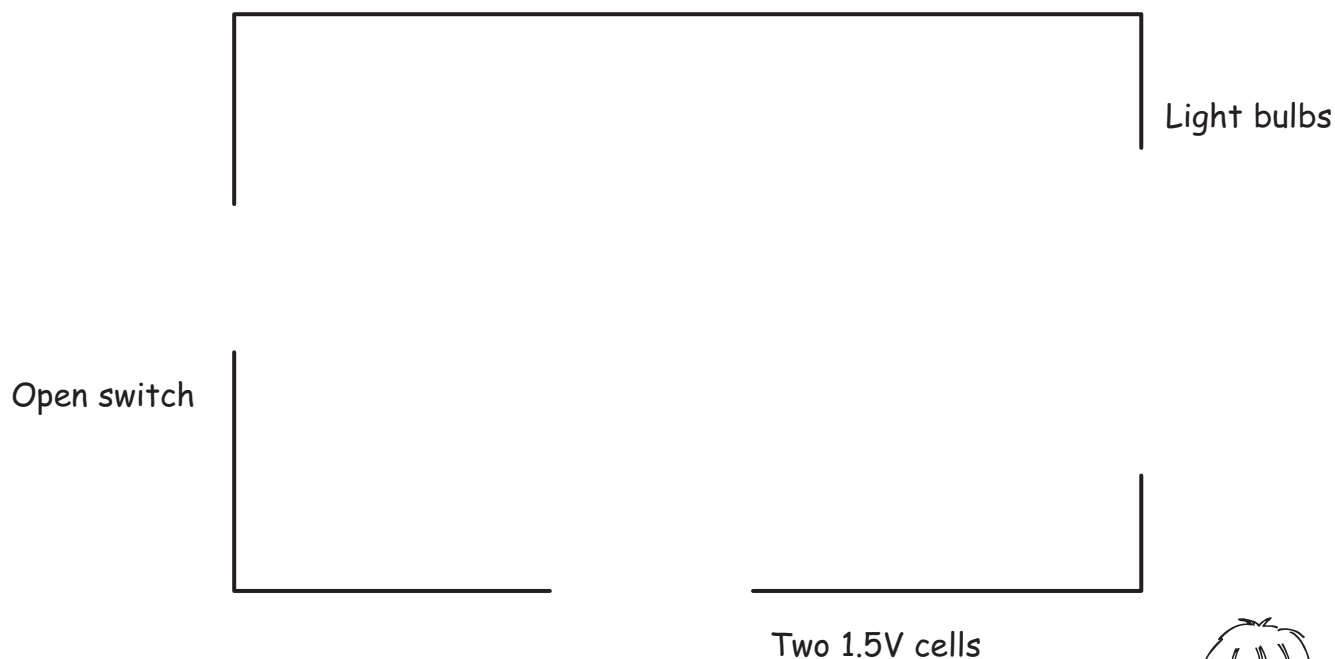


# A series circuit



We made a circuit with three light bulbs in series by connecting the light bulbs one after the other as shown on the circuit diagram below.

Complete this circuit with the correct symbols from page 2.



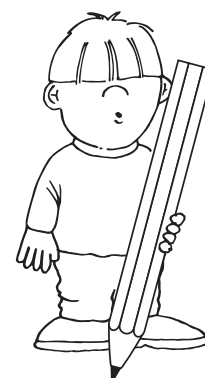
When we closed the switch the light bulbs were

On

Bright

Off

Dim



When we unscrewed one of the bulbs to make it faulty, what happened?

The other bulbs stayed on

They all went out

## Remember

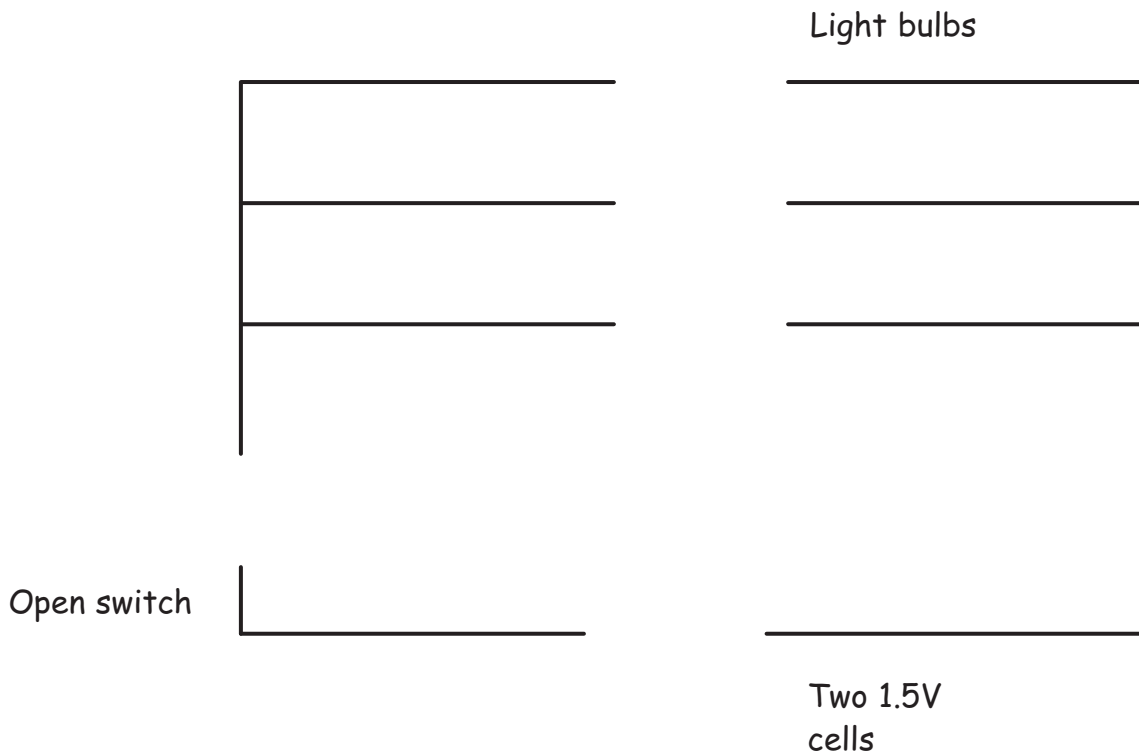
A series circuit is a continuous chain of components.  
The light bulbs share the power from the battery.

# A parallel circuit



We then connected the light bulbs in parallel by connecting the bulbs alongside each other as shown on the circuit diagram below.

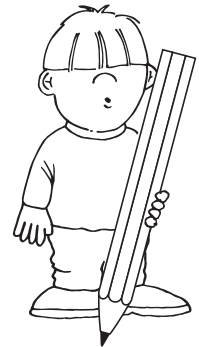
Complete this circuit with the correct symbols from page 2.



When we closed the switch the light bulbs were

Bright

Dim



When we unscrewed one light bulb to make it faulty, what happened?

The other bulbs stayed on

They all went out

Which circuit would you use for the lights in your house?

Parallel

Series

# Experimenting with motors

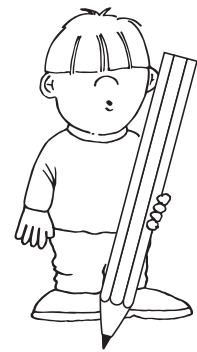
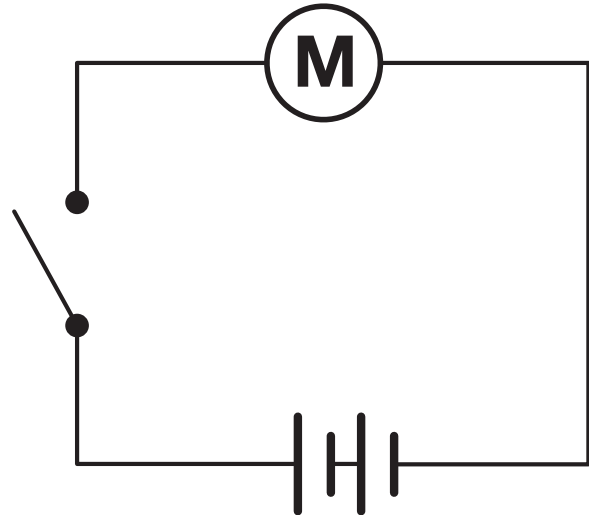


Make the simple circuit shown in the diagram, using 3 leads, the motor, the battery and the switch.

When the switch is closed, in which direction is the motor going?

clockwise

anticlockwise



Now swap the wires which connect up the motor, and press the switch.

What happens now?

The motor stops working.

The motor changes direction.

The motor keeps working in the same direction.

This happens because:

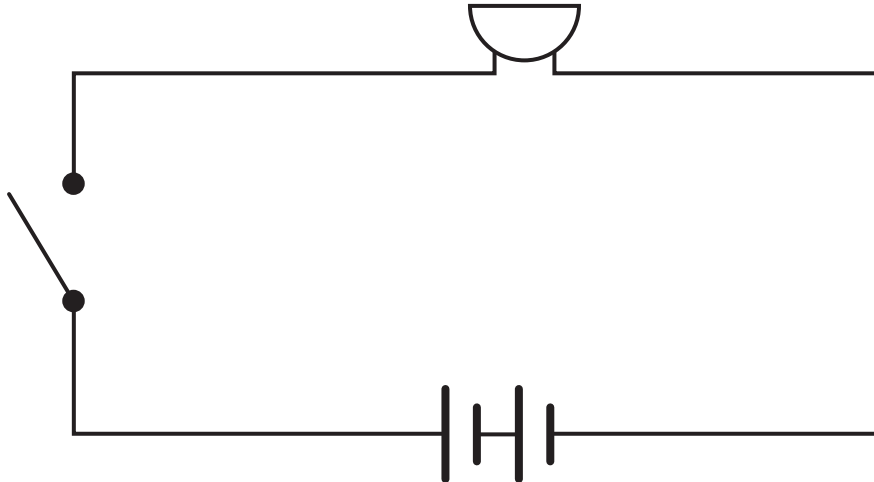
We turned the motor around.

We swapped the wires to the motor, which changed the direction of the flow of electricity through the motor.

# Experimenting with buzzers



Make a simple circuit shown in the diagram, using 3 leads, the buzzer, the battery, and the switch.



What happens when you close the switch?

Buzzer working.

Buzzer not working.

Now swap the leads which connect to the buzzer.

What happens?

Buzzer working.

Buzzer not working.

