How do you make circuits?

When there's an emergency, an ambulance driver turns on an ear-piercing siren and bright, flashing lights.

You could make a simple circuit that does same thing. What would you need and how would you connect it all together?

Reading the page will help you.

FOCUS ON

what the different parts of a circuit are.

WRONG!

Electricity can flow out of the end of a wire like liquid.

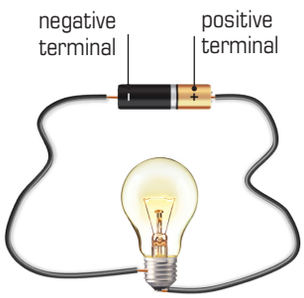
RIGHT!

Electricity can only flow through a complete circuit.

Circuits

This bulb is not lit. There is no complete path, or circuit, for electricity to travel around.

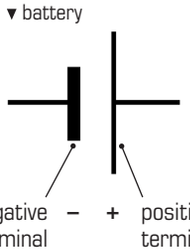
To make a complete circcuit, we connect a wire to both terminals of the battery and bulb.



Circuit Symbols

Drawing the parts of a circuit can be tricky, so scientists use simple symbols instead. Here are some common symbols:

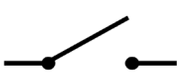
▼ battery



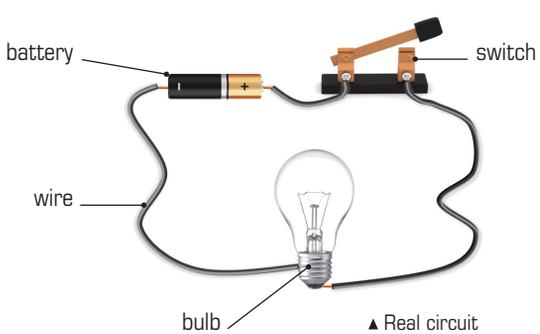
▼ connecting wire

▼ bulb

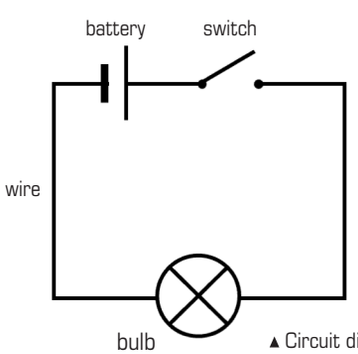
▼ switch



We can use the symbols to redraw a real circuit as a circuit diagram.



▲ Real circuit



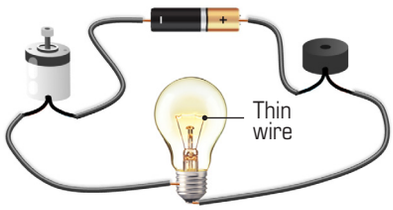
▲ Circuit diagram

Can you draw a circuit with two bulbs?

Devices

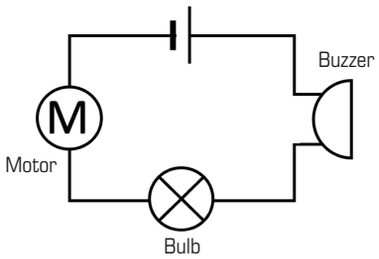
Devices are things like buzzers, bulbs and motors. They can go anywhere in a circuit and they can usually be connected either way round.

A motor rotates to provide movement.



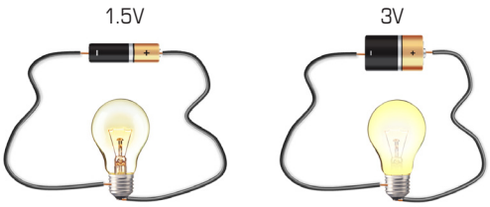
A thin wire inside a bulb gets hot and lights up.

A buzzer has a speaker that produces a sound.



Power Source

A battery provides the force to move electricity around a circuit. It has a number on it called voltage (V). The bigger the voltage, the harder the battery pushes. The 3V battery makes a bulb brighter, or a buzzer louder or a motor faster.

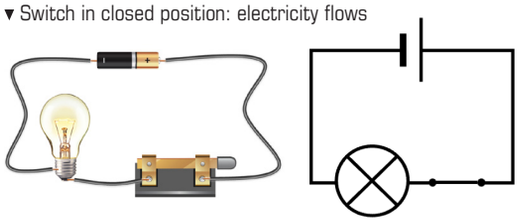


Why is one bulb brighter than the other?

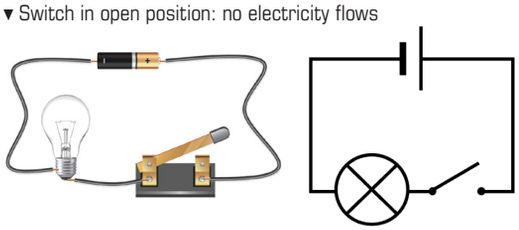
Switch

A switch starts and stops electricity. It has two different positions, closed and open, so it can be used to turn devices on and off.

▼ Switch in closed position: electricity flows

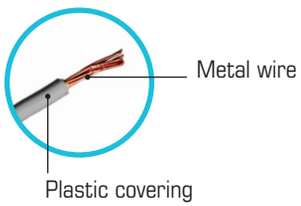


▼ Switch in open position: no electricity flows



Connecting Wires

Metal wires connect the different parts of a circuit. They're made of metal because metals are conductors, which means that electricity passes easily through them. The wires are covered in plastic so you don't get an electric shock. Electricity does not pass easily through plastics. They are insulators.

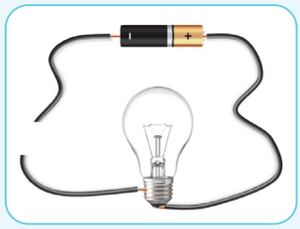


What is the difference between a conductor and an insulator?

REVIEW

1. Give the terms for each of the definitions below.
   a) A complete path for electricity to move around.
   b) A device that makes a noise when electricity goes through it.
   c) A power source.
   d) They connect the different parts of a circuit.

2. Why doesn't this bulb light up?



3. Copy and complete this table.

Name	Symbol	Function
Bulb		
Switch		
Battery		
Wire		

4. Suki builds a circuit with 2 batteries and 2 bulbs. Draw a circuit diagram of her circuit.

5. You build a circuit with one battery and one bulb. Describe how you could change the circuit to make the bulb brighter.

6. Draw a diagram of a circuit that lights up and makes a noise when you press a switch.

What is current?

This glow stick lights up, as if by magic, when you touch both its ends.

How do you think it works?

TERMS

Amp

Ammeter

FOCUS ON

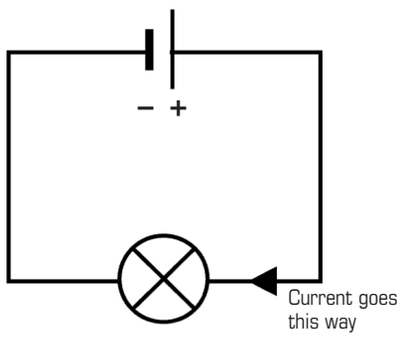
how to imagine current like a rope.

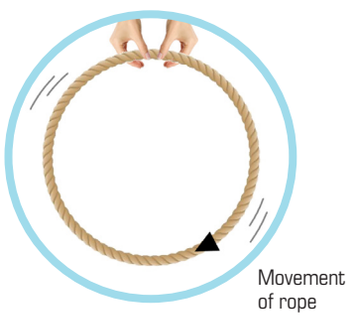
Current

Current is the name for the flow of electricity around a circuit. What makes current flow is the voltage from the battery.

Imagine current is like a loop of rope. Your hands are like a battery. When you give the rope a push (like voltage), you make the rope move around (like current).

What does the arrow represent in each drawing?



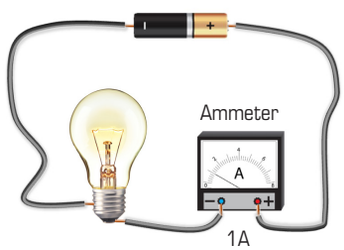


We show current as moving from the positive terminal of the battery to the negative terminal.

Current Is Measured In Amps

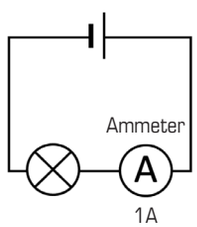
We can measure how big the current is in a circuit using a device called an **ammeter**.

The current here is 1 **Amp**. Amp is short for Ampere, which is the unit of current. Amp is usually just written as A. So the current here is 1A.



An ammeter is shown using this symbol:

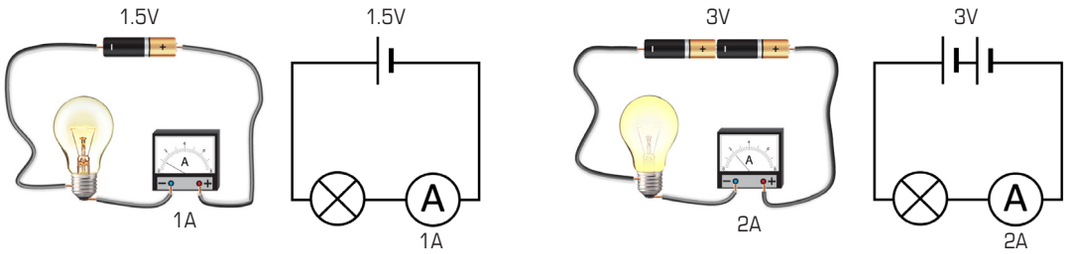
So, a circuit diagram for measuring current looks like this:



Can you draw a circuit where the ammeter is in between two bulbs?

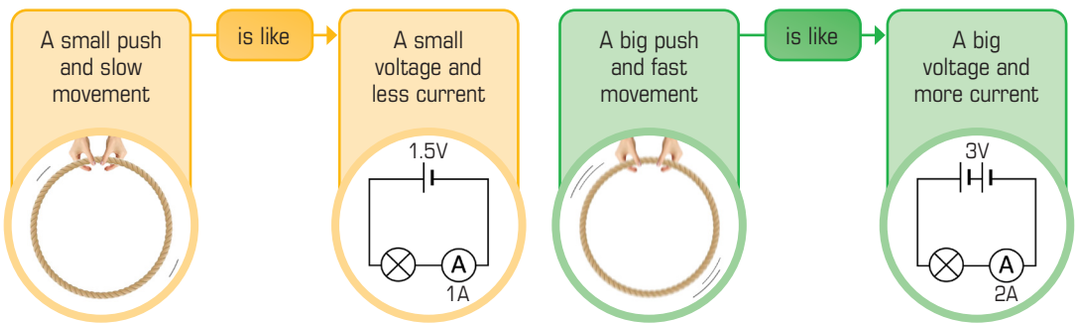
Bigger Voltage Means More Current

One way to make more current and a brighter bulb is to use a battery with a bigger voltage.
You can also increase the current by joining several batteries together.



What happens when current increases?

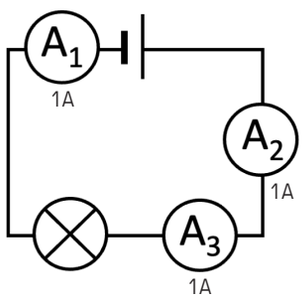
Why does a bigger voltage mean more current? Picture the loop of rope again.



Current Is The Same Everywhere

Wherever you put the ammeter in this circuit, it measures 1A.

To see why the current is the same everywhere, just picture the loop of rope. It's all one piece, so it has to all move at the same speed or it would bunch up (on the next page we will explain this using particles).



WRONG!
Devices use up current, so current gets smaller as it goes around a circuit.

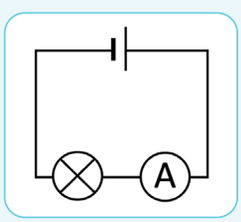
RIGHT!
Current is the same everywhere in a circuit.

REVIEW

1. Describe what current is.

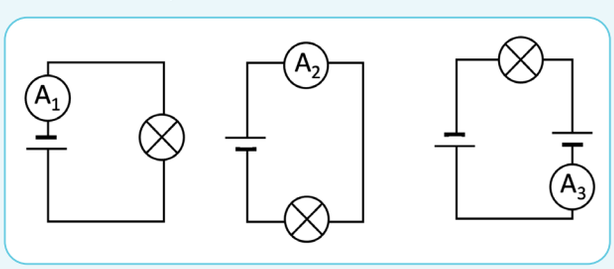
2. True or false?
a) Current is pushed around a circuit by a bulb.
b) The unit for current is the Amp.
c) Current decreases as it goes around a circuit.

3. This diagram shows a simple circuit. Draw and name the part which:
a) Measures current.
b) Varies the amount of current.
c) Turns on when there is a current.



4. Imagine a second pair of hands pulls the rope. This is like adding another battery to a circuit. Use the loop of rope to explain why a second battery has to be put the correct way round for the current to flow.

5. In which ammeter (A_1, A_2, or A_3) is the current highest? Give a reason for your answer.



6. This diagram shows what is inside the glow stick.
How does it work?
Hint: Current can flow through your body.