

1.2 Circuits and current

P2 Chapter 1: Electricity and magnetism

Learning objectives

After this topic you will be able to:

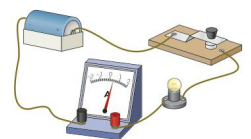
- describe what is meant by current
- describe how to measure current.



▲ A baby is kept warm using electric circuits.



▲ Divers need a torch to explore underwater caves.



▲ You connect an ammeter in a circuit to measure current.

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Doctors use an incubator to help keep a premature baby alive. An electric current flows through a heater that keeps the baby warm.

What is current?

- When you complete a circuit, charged particles or charges move in the metal wires.
- The **current** is the amount of charge flowing per second.

When you press the **switch** on a torch the light comes on. The switch opens and closes a gap in the circuit. You need to close the gap and make a complete circuit for a current to flow.

When people talk about 'electricity' they usually mean 'electric current'.

A Describe what a current is.

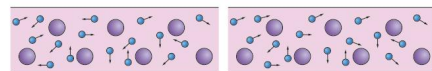
You can measure the current with an **ammeter**.

- Current is measured in amperes or **amps**.
- The symbol for amps is A. For example, the current in the circuit opposite is 0.4 A.

B Name the meter that you use to measure current.

Where do the charges come from?

The **cell** or **battery** pushes charges around the circuit. The battery does not produce the charges that move. They were already there in the wires. In a metal the charged particles that move are electrons.

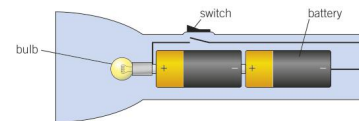


▲ The electrons are already in the wire.

▲ The electrons move when you connect the battery.

Using circuit symbols

You can build circuits using components such as batteries, bulbs, and **motors**. It would take a long time to draw a picture of each circuit so you can use circuit symbols instead.



▲ This is a picture of a torch...

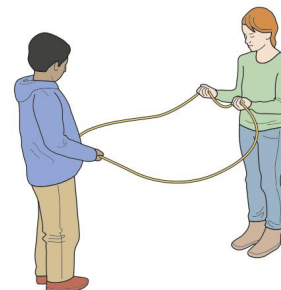
In the torch diagram there are two cells. Cells used together like this are called a battery. People often use the word 'battery' for a single cell, but in physics we call it a cell.

You must make sure that you connect cells the right way round or they will not work.

Modelling electric circuits – part 1

You cannot see what happens in the wires when a current flows. Scientists use models such as the rope model to show what is happening. One person pulls the rope, and another person grips the rope lightly. The rope moves around. In this model:

- The rope represents the charges in the circuit.
- The amount of rope moving past a point per second is the current.

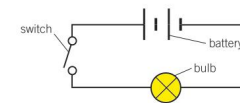


▲ A rope model can help you to understand circuits.

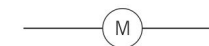
Confusing words?

For each of these words write one sentence using the word with its correct scientific meaning. Write a second sentence where it has a different, everyday meaning.

- charge
- current
- cell



▲ ...and this is the circuit diagram.



▲ Circuit symbols make it simpler to draw circuits.

Key Words

current, switch, ammeter, amps, cell, battery, motor

Summary Questions

- Copy and complete the sentences below.
Current is the amount of _____ flowing per _____. In a metal wire charged particles called _____ move when you connect a battery. You can use a meter called an _____ to measure current. Current is measured in _____, which has the symbol _____. (6 marks)
- Draw a circuit diagram to show how you could use a switch to turn a battery-powered motor on and off. (2 marks)
 - Describe what happens in the wires when you close the switch. (1 mark)
- Explain how you would use equipment and models to teach a primary-school student that the charges do not originate in the battery. (6 marks)

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