

Electricity

Before you read

Discuss these questions with your partner.

- What household appliances use electricity?
- Where does electricity come from?
- What does a magnet do?



A Vocabulary

Choose the correct word to complete the sentences.

- 1 is something through which electricity can pass.
- 2 An electrical supplies power in our home.
- 3 The electromagnetic field a force on the particles.
- 4 To power you need a way to control electricity.
- 5 Normally, electricity is carried through homes by
- 6 Is 6 o'clock a time for your meeting?

- | | | |
|-----------------|------------|--------------|
| 1 A A conductor | B A magnet | C Static |
| 2 A bulb | B current | C particle |
| 3 A put | B exerted | C applied |
| 4 A attract | B exert | C generate |
| 5 A wires | B charges | C forces |
| 6 A comfortable | B fitting | C convenient |

Reading 1

Electricity and magnetism

Electromagnetism is everywhere. It is a field that exists throughout space. When particles are electrically charged, the electromagnetic field exerts a force on them. These particles then move and exert a force on the electromagnetic field. By generating these fields when and where we want them and by controlling these forces, we have electricity. This gives us the power we use in the modern world. All our TVs, phones, street lights and cars depend on electromagnetism.

So what is electromagnetism? Actually, it is two things, but they are so closely connected that it is convenient for us to think of them as one, as two sides of the same coin. There are two types of field: electric and magnetic. Electrically-charged particles result in an electric field, static electricity. When there is a conductor, a material which will allow electric field to pass through it, then we can create an electric current. In our homes, the conductors are the wires that run through our house to the light bulbs or the TV. A magnetic field results from the motion of an electric current and is used to generate the electricity we use.

Electricity

In the 19th century, James Clerk Maxwell, the Scottish physicist, produced the equations that proved the two forces acted as one. One effect of this was for physicists all over the world to hurry back to their libraries and laboratories to rewrite the theories on the motion of objects. Maxwell's equations showed that what physicists had believed for centuries was in fact not correct. It was not until Einstein, in the 20th century, that the theory of motion was put right – at least for now.

How do we know the two things are one? Well, sailors had known for centuries that lightning affected the magnetic compasses on their ships. No one, however, made the connection between lightning and electricity until Benjamin Franklin, the American politician and scientist, flew a kite in a thunderstorm to attract the lightning. In other parts of the world, physicists were experimenting with magnets and electricity. Most passed a current across a magnetic needle and watched it move. The Frenchman André Marie Ampère eventually applied mathematics to electromagnetism. It is from his work that we have our modern understanding of electromagnetism.

One piece of the jigsaw remained. No one had discovered a way of generating electricity. True, there were batteries. Alessandro Volta invented the Voltaic pile in 1800, but it was of limited use. Certainly no battery could provide enough electrical power to operate a machine. For that the world would have to wait for Michael Faraday to find a way of creating an electrical current, when and where it was needed.

Pronunciation guide

Ampère /æmpəʁə/

Voltaic Pile /vɒl'teɪk paɪl/

B Comprehension

Read the text and choose the correct answer.

- We can make electricity by
 - exerting a force.
 - creating electromagnetic fields.
 - charging particles.
 - moving particles.
- Electrical and magnetic fields
 - are opposites.
 - are two different things.
 - are very closely related.
 - need a conductor.

- Maxwell's equations
 - corrected the theory of motion.
 - caused scientists to rethink.
 - rewrote older theories.
 - have completely ensured the theory of motion now.
- Our modern knowledge of electromagnetism comes from
 - Ampère.
 - lightning.
 - Benjamin Franklin.
 - experiments with magnets.
- The electric battery
 - could operate a machine.
 - could create an electric current.
 - was invented by Faraday.
 - was invented in 1800.

Before you listen

Discuss these questions with your partner.

- Can you think of some different ways of generating electricity?
- What are the advantages and disadvantages of each?

C Listening

Listen to the extract from a lecture on generating electricity. Then listen again and complete the table.

Ways of generating electricity	
Advantages	Disadvantages
Fuel	
1	2
Nuclear power	
3	4
Hydroelectricity	
5	6
Wind power	
7	8