UNIT 20

Electricity and magnetism

CD 2-41

Section 1 *Vocabulary*

A. Read the text and look at the diagrams.

Figure 1

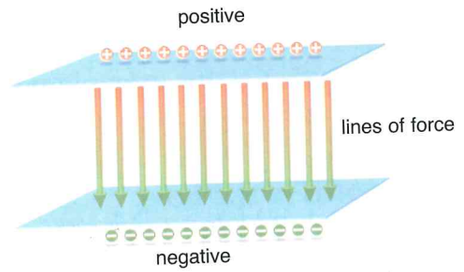


Figure 2

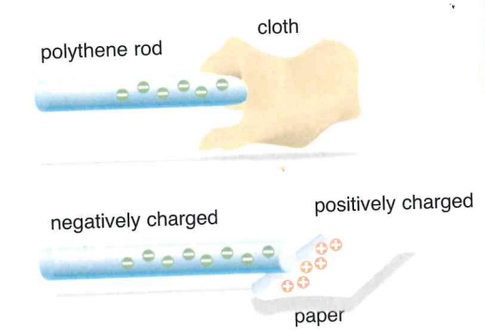
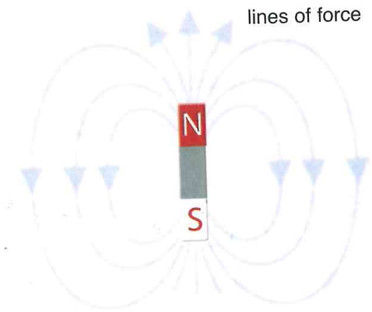
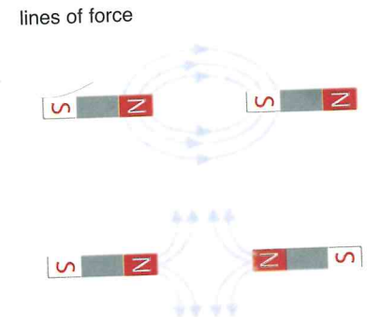


Figure 3





One of the most important forces in nature is **electricity**. Electric effects are caused by **electric charges.** Electric charges can be **positive** or **negative.** If positive and negative charges are brought close to each other, there is an **electrostatic effect** between the two and an **electric field** is created (see Figure 1). An electric charge stays in one place, while an electric **current** flows along a conductor such as a wire.

Atoms are normally **neutral** as we have seen (Unit 8), with equal numbers of protons and electrons. However, an atom can **gain** or **lose** electrons. An atom that does not have an equal number of protons and electrons is called an **ion**. If you rub a polythene rod, it will gain electrons and become **ionized** or **charged** (see Figure 2). If a charged or ionized object is brought close to another object, it can **induce** a charge in the second object. This process is called **induction**. For example, a charged polythene rod will pick up the edge of a piece of paper. The negative charge of the rod will force away or **repel** the electrons on the edge of the paper and so the edge will become positively charged. Opposite or **unlike** charges **attract**, so the rod picks up the edge of the paper.

Another important force in nature is **magnetism** (see Figure 3). Some objects are **magnetic** and will pick up iron and some other metals. Magnets have two ends, a **north pole** and a **south pole**. **Like** poles repel, for example north to north, whereas unlike poles attract, for example north to south.

B. Complete the text. Use the correct words in the box.

attract / charged / current / electricity / fields / induce / magnet / magnetic / magnetism / metal / negative / north / off / pole / positively / repel

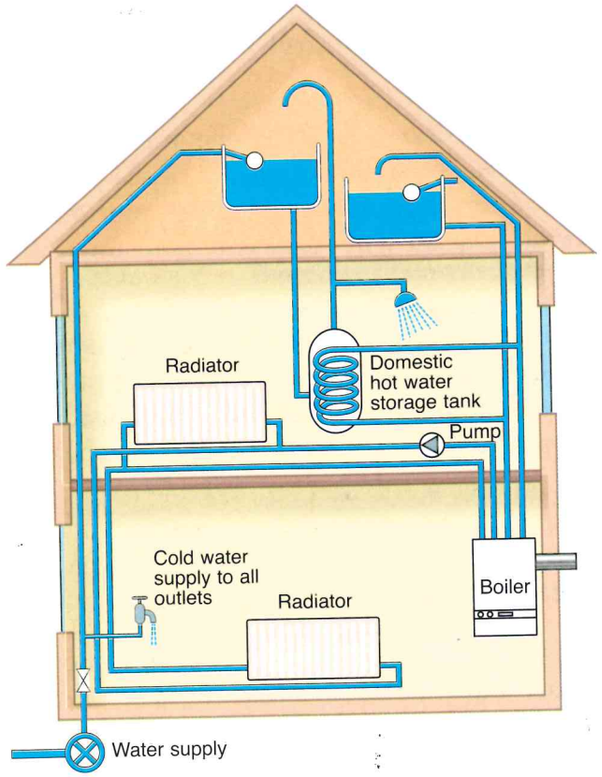
There are great similarities between electricity and _____.

- Both create force _____ around them.
- Both have two "forces". With electricity, it is positive and _____ charging. With magnetism, it is a north and a south _____.
- In both cases, like forces _____, whereas unlike forces _____. So a negatively _____ polythene rod will attract _____ charged paper, while the north pole of a _____ will repel the _____ pole of a second magnet.
- Both can _____ a force in a nearby object.

There is also a strong relationship between _____ and magnetism. If you pass an electric _____ through a wire, you create a _____ field with a north pole and a south pole. This device is called an electromagnet. The magnetism can be switched on and _____ with the current. Electromagnets are used in switches and bells, and in factories to pick up heavy _____ objects and place them in another location.

CD 2-42

Section 2 Reading



A hot water and domestic heating system

Facts about electricity

Electricity and water do not mix, but an electric circuit is very similar to a domestic heating system.

What is an electric circuit?

An electric circuit is a path along which an electric current runs. It is like the pipes through which water flows in your heating system. The water has to go back to the boiler to complete the circuit.

Why does electricity flow?

Electrons are forced out of atoms and flow from the negative terminal of a battery to the positive terminal. Again, think of your heating system. The battery is the pump.

What is voltage?

The voltage is the strength of the battery. The abbreviation is V. If you increase the size of the battery, you will increase the force in the circuit.

What are amps?

An ampere (A), or amp, is a measure of the amount of movement – the current, in other words. It's like the diameter of the pipes in your heating system. If you only have thin pipes, not much water can flow, even if the pump is very strong. Thicker wires give you more amps.

And watts?

When you put an appliance, like a radio or a washing machine, into an electric circuit, it takes power from the circuit. The power is measured in watts (W). It's like putting a radiator into your heating system. A big radiator will take a lot more water (or current) than a heated towel rail.

A. Choose the best answer in each case.

1. This article tells you:
   a. to mix electricity and water
   b. about similarities between electricity and water
   c. about similarities between electric circuits and heating systems
   d. how to make an electric circuit
2. The battery in a circuit is like:
   a. the pump in a heating system
   b. the pipes in a heating system
   c. the radiators in a heating system
   d. the storage tank in a heating system
3. The abbreviation for an amp is:
   a. V
   b. A
   c. W
   d. V × A
4. To increase the current in a circuit:
   a. use wire of a larger diameter
   b. use thicker pipes
   c. use a bigger battery
   d. put in an extra appliance
5. Watts measure the amount of:
   a. heat in an electric circuit
   b. current in an electric circuit
   c. movement in an electric circuit
   d. power in an electric circuit

B. Study the table. Note the verb(s) in each example in the second column.

Imperative	■ **Think** of your heating system.
Simple present	■ An electric circuit **is** a path. ■ Electrons **flow** from the negative terminal of a battery to the positive terminal. ■ Electricity and water **do not mix**.
Simple present passive	■ The power **is measured** in watts (W). ■ Electrons **are forced** out of atoms.
Simple past	■ It **was** too late. ■ At one time, people **thought** that they **flowed** from positive to negative.
Simple past passive	■ When the truth **was discovered**…
Conditionals	■ **If** you only have thin pipes, not much water **can** flow. ■ **If** you increase the size of the battery, you **will** increase the force in the circuit.

C. Put the verbs in parentheses into the correct form.

Electricity and water _____ (*mix*), but an electric circuit _____ (*be*) very similar to a domestic heating system. An electric circuit is a path along which an electric current _____ (*run*). It is like the pipes through which water _____ (*flow*) in your heating system. Electrons _____ (*force*) out of atoms and _____ (*flow*) from the negative terminal of a battery to the positive terminal. At one time, people _____ (*think*) the flow _____ (*be*) from positive to negative. When the truth _____ (*discover*), it _____ (*be*) too late. Again, _____ (*think*) of your heating system. The battery _____ (*be*) the pump. The voltage _____ (be) the strength of the battery. If you _____ (*increase*) the size of the battery, you _____ (*increase*) the force in the circuit. When you _____ (*put*) an appliance, like a radio or a washing machine, into an electric circuit, it _____ (*take*) power from the circuit. The power _____ (*measure*) in watts (W).

CD 2-43

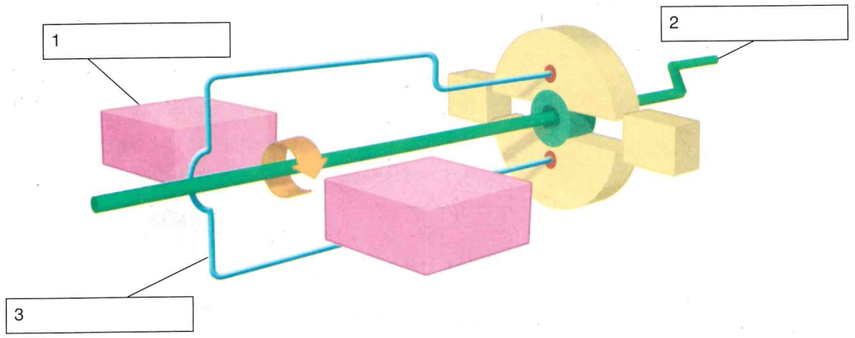
Section 3 *Listening*

A **Complete the summary of the reading text in Section 2. Write one word in each space.**

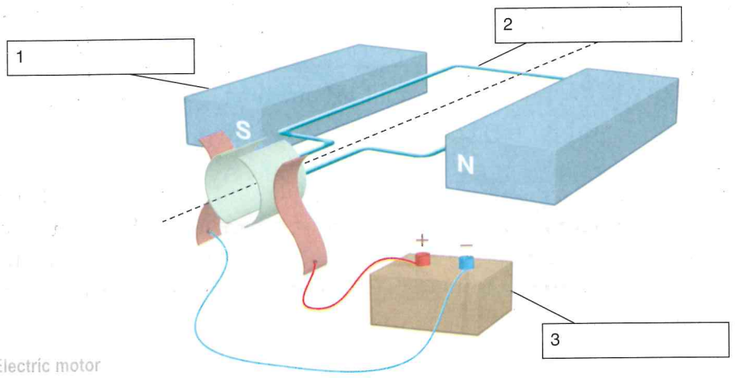
An electric _____ is a path along which electric current runs. Electrons _____ from the negative terminal of a battery to the _____ terminal. The voltage is the _____ in the circuit supplied by the battery. The number of amps is the amount of current and the number of watts is the _____ of an appliance in the circuit.

CD 2-44

B **Listen to the lecture. Label the numbered items in each diagram.**



Hand-powered generator



Electric motor