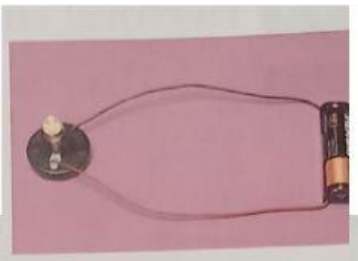
Electricity 1

1) Read the texts and solve the crossword puzzle below.



Electric current

The photo on the opposite page shows a simple electric circuit (or circuit). A cell provides an electric current (or current). This flows through wires, which conduct the electricity (provide a way for it to travel). The current is used to light a lamp. So, like all circuits, the example includes:

- an electrical supply – in this case, the cell
- an electrical conductor (or conductor) – an electrical path – in this case, wires
- one or more electrical components (or components) – electrical devices (in this case, the lamp) which have a function.

Current – measured in amperes, or amps (A) – is the rate of flow of electric charge. Electric charge is carried by electrons – particles with a negative charge (–), which are normally attached to atoms. When an electric current flows through a conductor, the electrons move from one atom to another – in the case of a copper wire, from one copper atom to the next. If the number of electrons flowing through a conductor increases, then the amperage, or ampage (current) increases. When electrons flow, carrying a current, they can be called charge carriers.

Notes: In everyday English, cells are called batteries. In technical English, a battery is a number of cells placed together.
Lamps are often called bulbs in everyday English.

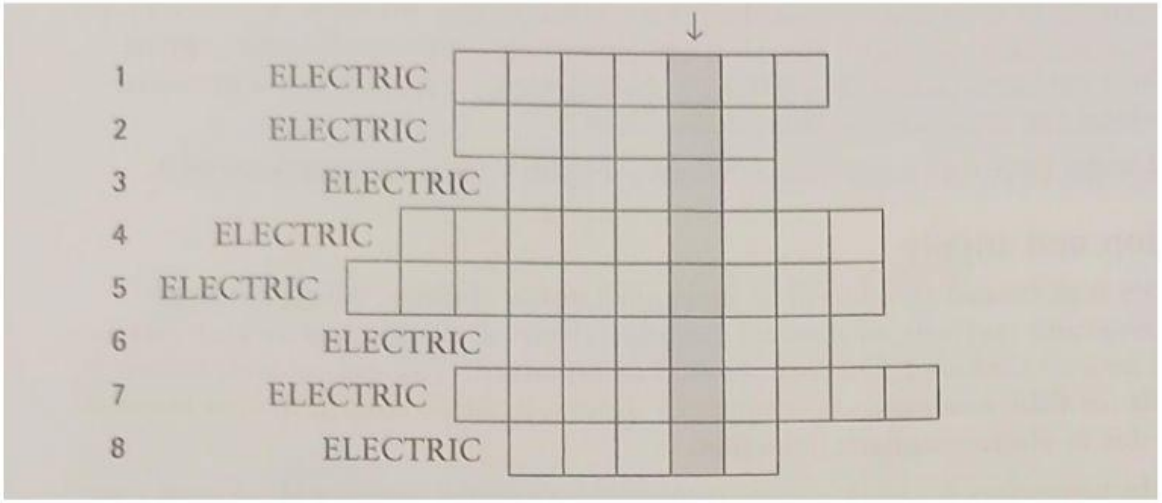
Voltage and resistance

The amount of current (in amps) flowing through a circuit will partly depend on the electromotive force (EMF) of the electrical supply. Electromotive force is measured in volts (V), and is generally called voltage. The voltage depends on the 'strength' of the electrical supply. In the diagram above, adding a second cell would supply a higher voltage.

The amount of current will also depend on electrical resistance (or resistance). This value – in ohms (Ω) – is a measure of how easily current can flow through the conductors and components in a circuit. For example, a lamp creates resistance because the filament – the metal wire inside it – is very thin. This limits the amount of current that can flow. Resistance also depends on the materials used as conductors. For example, copper has a low resistance and so is a good conductor.

Materials with very high resistance, such as plastics, are called electrical insulators (or insulators). Only very high voltages cause current to flow through them. Materials that are good insulators are used to insulate conductors. An example is plastic insulation around electric wires. This stops people from touching the conductor and – if it is live (carrying current) – from getting a dangerous electric shock.

1. another term for amperage
2. provided by a battery or mains
3. measured as a wattage
4. allows current to flow through it
5. has very high electrical resistence
6. carried by moving electrons
7. another term for an electrical ‚device'
8. the consequence of a person touching a live conductor



2) Read the last part of the text. Then complete the explanation of current and power calculations using the given words.

Electrical power

The text below, about **electrical power**, is from a home improvements magazine.

The amount of current, in amps, required by an **electrical appliance** – such as a TV or an electric kettle – depends on the **power** of the appliance. This number – expressed in **watts** (**W**) – will be marked somewhere on the appliance. To calculate the required current, simply take the **wattage** and divide it by the voltage of the electrical supply in your home – around 230 volts in most of Europe. Therefore, for an electric kettle with a **power rating** of 2,000 watts (as specified by the manufacturer), the current required is:

$$\frac{2{,}000 \text{ watts}}{230 \text{ volts}} = 8.7 \text{ amps}$$

amps, components, conductor, circuit, current, ohms, resistence, supply, voltage, volts, wattage, watts

In electrical calculations, electromotive force is expressed by the letter E, resistance by the letter R and current by the letter I (this comes from the word ‚intensity').

Ohm's Law: I=E/R. In other words, the _____ flowing through a _____, measured in _____, equals the _____ of the electrical _____ measured in _____, divided by the total _____, mesured in _____.

To work out the value of R, it is necessary to calculate the total resistance of all the _____ and connecting lengths of _____ that make up the circuit.

Once the voltage and amperage are known, it is possible to work out the power that will be consumed, measured in _____. Power (P) can be calculated using the equation P = EI. Therefore _____ equals voltage multiplied by amperage.

3) Match the units and their explanations

Ampere (A)	the amount of el. energy used
Coulomb (C)	rate at which work is done
Kilowatt (kW)	the number of electrons passing a given point in a conductor in 1 second
Volt (V)	the quantity of elektricity transferred by a steady current of one ampere
Watt (W)	the difference of potential between two points of a conductor

4) Make calculations, write the results:

1. Calculate the current which will flow when a total resistance of 500 ohms is placed in a circuit which has a 15 volt supply. A

2. Find the size of the resistor which would allow a current of 0.02 A to flow when connected to an 8 V supply. ohms

3. Calculate the voltage supply needed to produce a current of 12A when used with a 48 ohm resistor. V

4. What value of resistor would be used to permit a current of 0.2 A to flow using a 6V supply? ohms