Your notes

KS3 Science: revision notes

P3.4 Home electricity

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Mains electricity and plugs

- Mains electricity in the UK is **alternating current** (a.c.): the current keeps changing direction. It is 230 V at 50 Hz. Batteries give **direct current** (d.c.), which flows in one direction.
- A three-pin plug has a **live wire** (brown), which carries the 230 V; a **neutral wire** (blue), which completes the circuit; and an **earth wire** (green and yellow stripes), a safety wire that stops the case becoming live if there is a fault.
- The **fuse** is in the **live wire**. If the current gets too big, the **fuse** melts and breaks the circuit. Appliances with plastic cases are double insulated and don't need an earth wire.

Power and the cost of electricity

- **Power** is the rate of energy transfer, measured in watts (W). 1 kW = 1000 W.
- **Power** = energy ÷ time (P = E ÷ t), and **power** = potential difference × current (P = V × I). A kettle that transfers 180 000 J in 60 s has a **power** of 3000 W.
- Electricity companies charge for energy in **kilowatt-hours**: energy (kWh) = **power** (kW) × time (hours).
- A 2 kW heater used for 3 hours uses 6 kWh. At 30p per kWh, that costs 6 × 30 = 180p (£1.80).

Energy resources

- **Non-renewable resources** will run out: coal, oil, natural gas and nuclear fuel. Burning fossil fuels releases carbon dioxide, which causes global warming.
- **Renewable resources** won't run out: solar, wind, hydroelectric, tidal, wave, geothermal and biofuels. Some depend on the weather, so they aren't always available.

- The **National Grid** connects **power** stations to homes. Step-up **transformers** raise the voltage (to hundreds of thousands of volts), which lowers the current, so less energy is wasted as heat in the cables. Step-down transformers lower it to 230 V for homes.

Static electricity

- Rubbing two insulators together transfers electrons from one to the other. The one that gains electrons becomes negatively charged; the one that loses them becomes positively charged.
- Like charges repel; unlike charges attract.
- Static can cause sparks, which is dangerous when refuelling aircraft, so they are earthed. It is useful in photocopiers and paint sprayers.

Key terms

Alternating current	Current that keeps changing direction (a.c.).
Direct current	Current that flows in one direction only (d.c.).
Live wire	The brown wire, which carries the alternating potential difference.
Neutral wire	The blue wire, which completes the circuit.
Earth wire	The green and yellow safety wire.
Fuse	A thin wire that melts and breaks the circuit if the current is too high.
Power	The rate of energy transfer, measured in watts (W).
Kilowatt-hour	The energy used by a 1 kW appliance in one hour.
Renewable resource	An energy resource that won't run out, such as wind.
Non-renewable resource	An energy resource that will run out, such as coal.
National Grid	The network of cables and transformers that carries electricity across the country.
Transformer	A device that changes the voltage of an alternating current.
Static electricity	A build-up of electric charge on an insulator.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the voltage of UK mains electricity?
2. What colour is the live wire in a UK plug?
3. What does the earth wire do?
4. What does a fuse do?
5. What is the difference between a.c. and d.c.?

Your notes

6. What is power?
7. A kettle transfers 180 000 J of energy in 60 s. What is its power?
8. A 2 kW heater is on for 3 hours. How much energy does it use?

Answers

1. 230 V
2. Brown
3. Stops the case of an appliance becoming live if there is a fault
4. Melts and breaks the circuit if the current is too high
5. a.c. keeps changing direction; d.c. flows in one direction
6. The rate of energy transfer
7. 3000 W
8. 6 kWh

What to do next

Practise 15 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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