Chapter 5: Electricity in the home

Knowledge organiser

Mains electricity

A cell or a battery provides a _____ _____. The current only flows in _____ direction and is produced by a _____ **potential difference**.

Mains electricity provides an _____ _____. The current repeatedly _____ direction and is produced by an _____ **potential difference**.

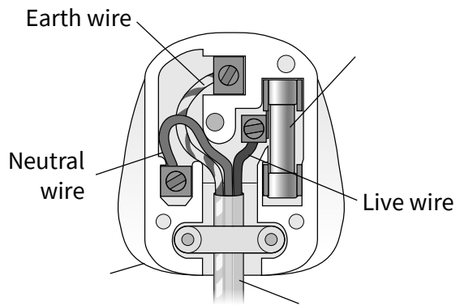
The _____ and _____ terminals of an alternating power supply swap over with a regular _____.

The frequency of the mains electricity supply in the UK is _____ and its voltage is _____.

Plugs

Label the diagram and name the colours of the wires in the table.

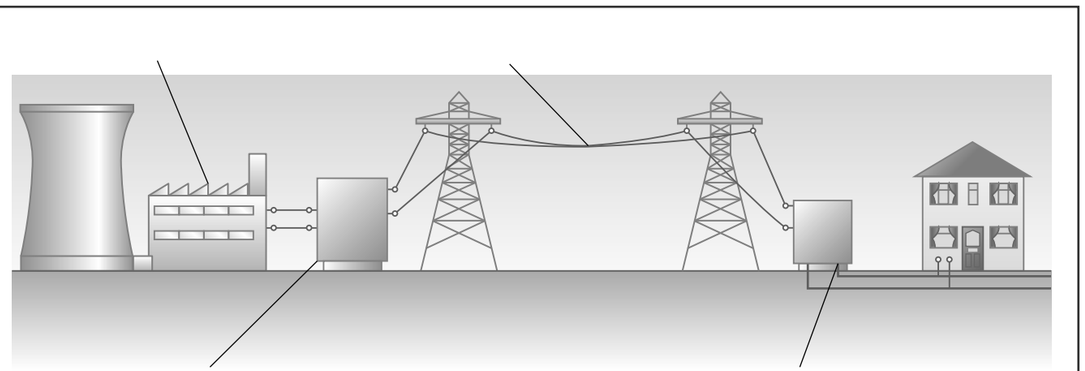
Wire	Colour
Live	
Neutral	
Earth	



The National Grid

The **National Grid** is a nationwide _____ of cables and transformers that link _____ _____ to homes, offices, and other consumers of mains electricity.

Transformers are devices that can change the _____ _____ of an alternating current.



By making the grid potential difference much _____, a smaller current is needed to transfer the same power. Therefore, the National Grid is an efficient way to transfer power due to less _____ loss in the wire.

Why do transformers improve efficiency?

A high potential difference across the transmission cables means that a _____ current is needed to transfer the same amount of power, since:

power (W) = _____ (A) × _____ (*V*)

P = _____ (L)

A lower current in the cables means less electrical power is _____ due to heating of the cables, since the power lost in heating a cable is:

power (W) = _____^{2} (A) × _____ (Ω)

P = _____ (L)

This makes the National Grid an _____ way to transfer energy.

If 100% _____ is assumed:

_____ potential difference × primary current = _____ potential difference × secondary current $V_p I_p = V_s I_s$

Energy transfer in electrical appliances

Electrical appliances _____ energy.

For example, a hairdryer transfers energy electrically from a _____ _____ _____ (e.g., the fuel in a power station) to the _____ _____ _____ of the fan inside the hairdryer and to the _____ _____ _____ of the heating filaments inside the hairdryer.

When you turn an electrical appliance on, the potential difference of the _____ supply causes charge (carried by _____) to flow through it.

You can calculate the **charge flow** using the equation:

(L) *charge flow* (*C*) = _____ (A) × _____ (*s*)

Q = _____

You can find the energy transferred to an electrical appliance when charge flows through it using:

(L) *energy transferred* (J) = _____ (*C*) × _____ (*V*)

E = _____

You can find the energy transferred by an electrical appliance using the equation:

(L) *energy transferred* (J) = _____ (W) × _____ (*s*)

Key terms

Make sure you can write a definition for these key terms.

alternating current *alternating potential difference* *charge flow* *coulombs* *direct current* *direct potential difference* *fuse* *National Grid* *short circuit* *step-down transformer* *step-up transformer*

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Retrieval questions

Answer the following questions using the information from the knowledge organiser.

	P5 questions	Answers
1	Why is the current provided by a cell called a direct current (d.c.)?	
2	What is an alternating current (a.c.)?	
3	What kind of current is supplied by mains electricity?	
4	What is the frequency and voltage of mains electricity?	
5	What colours are the live, neutral, and earth wires in a three-core cable?	
6	What is the function of the live wire in a three-core cable?	
7	What is the function of the neutral wire in a three-core cable?	
8	What is the function of the earth wire in a three-core cable?	
9	When is there a current in the earth wire?	
10	Why is the live wire dangerous?	
11	What is the National Grid?	
12	What are step-up transformers used for in the National Grid?	
13	What are step-down transformers used for in the National Grid?	
14	How does having a large potential difference in the transmission cables help to make the National Grid an efficient way to transfer energy?	
15	What two things does energy transfer to an appliance depend on?	
16	What are the units for power, current, potential difference, and resistance?	