

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**.

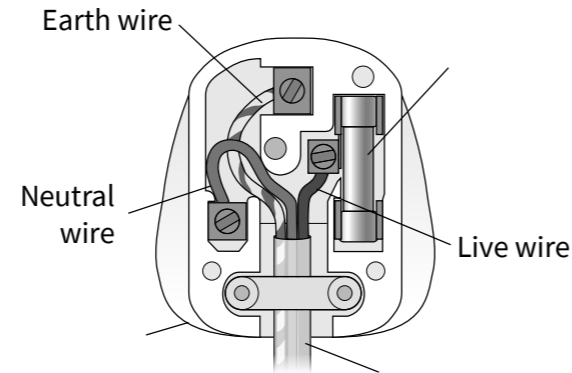
The _____ and _____ terminals of an alternating power supply swap over with a regular _____.

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	



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:

$$\text{power (W)} = \text{_____ (A)} \times \text{_____ (V)}$$

$$P = \text{_____} \quad \text{Ⓛ}$$

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:

$$\text{power (W)} = \text{_____}^2 \text{ (A)} \times \text{_____} \text{ (}\Omega\text{)}$$

$$P = \text{_____} \quad \text{Ⓛ}$$

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

If 100% _____ is assumed:

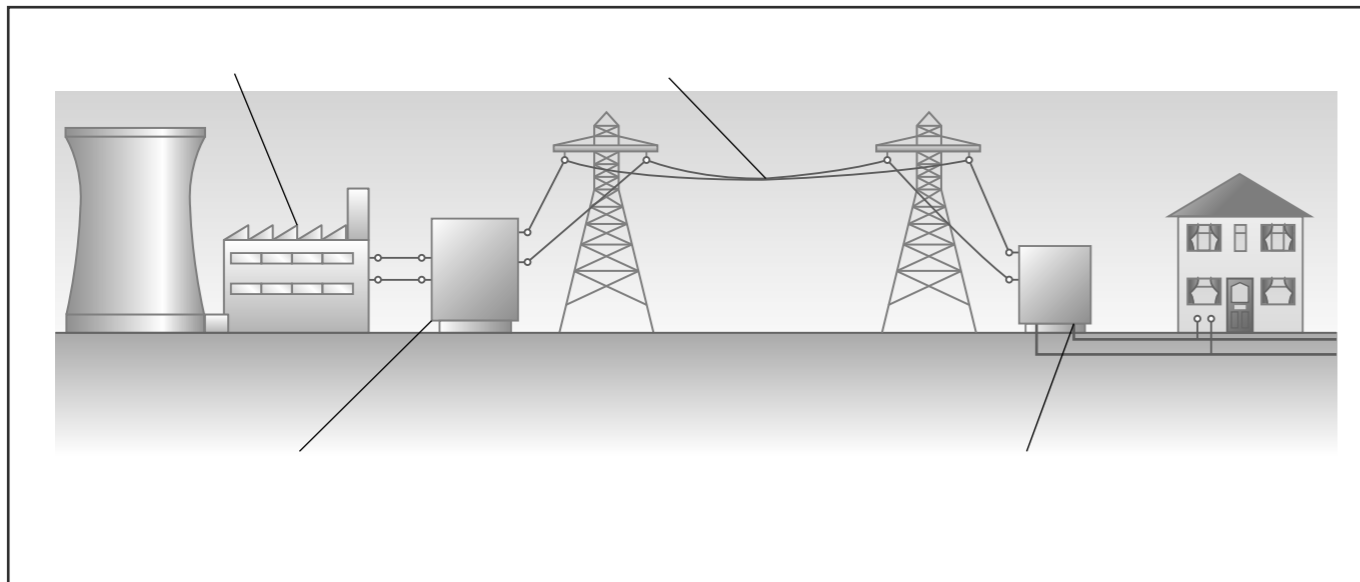
$$\text{_____ potential difference} \times \text{primary current} = \text{_____ potential difference} \times \text{secondary current}$$

$$V_p I_p = V_s I_s$$

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.

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:

$$\text{Ⓛ charge flow (C)} = \text{_____ (A)} \times \text{_____ (s)}$$

$$Q = \text{_____}$$

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

$$\text{Ⓛ energy transferred (J)} = \text{_____ (C)} \times \text{_____ (V)}$$

$$E = \text{_____}$$

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

$$\text{Ⓛ energy transferred (J)} = \text{_____ (W)} \times \text{_____ (s)}$$



Key terms

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

alternating current

fuse

alternating potential difference

National Grid

charge flow

short circuit

coulombs

step-down transformer

direct current

step-up transformer

direct potential difference

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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?