

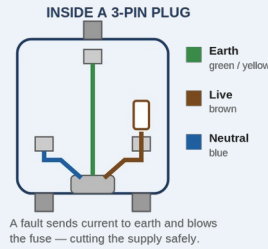
# 2.1 Mains Electricity

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## 1. KEY VOCABULARY

TERM	MEANING
Mains electricity	The a.c. electricity supplied to homes (~230 V in the UK).
a.c.	Alternating current — keeps reversing direction.
d.c.	Direct current — flows one way only (e.g. a battery).
Fuse	A thin wire that melts and breaks the circuit if the current gets too high.
Earth wire	A safety wire that carries current away if there is a fault.

## 2. THE THREE-PIN PLUG



### MAINS FACTS

UK mains: about 230 V, alternating current (a.c.).

a.c. — current keeps reversing direction.

d.c. (battery) — current flows one way only.

power = voltage × current ( $P = V \times I$ )

energy = power × time

The fuse rating must be just above the normal working current of the appliance.

Double-insulated appliances have a plastic case and need no earth wire.

## 3. THE THREE WIRES

**Live (brown):** carries the current in; alternates between + and –.

**Neutral (blue):** completes the circuit; near 0 V.

**Earth (green/yellow):** safety — connects the metal case to the ground.

## 4. ELECTRICAL POWER & ENERGY

power = voltage × current ( $P = V \times I$ )

energy transferred = power × time

Power is in watts (W); energy in joules (J).

## 5. FUSE & EARTH — HOW THEY PROTECT YOU

If a fault connects the live wire to the metal case, a large current flows through the earth wire to the ground.

This surge melts the fuse, breaking the circuit before anyone can get a shock.

## 6. THE WHY

**Why the fuse goes in the live wire:** so that when it blows, the appliance is fully disconnected from the dangerous live supply.

**Why double-insulated appliances need no earth wire:** their plastic case cannot become live, so there is nothing to earth.

## 7. COMMON EXAM MISTAKES

- ✗ "The earth wire carries current all the time."
- ✓ The earth wire only carries current if there is a fault.
- ✗ "Mains electricity is d.c."
- ✓ Mains is a.c.; batteries are d.c.
- ✗ Choosing a fuse far above the working current.
- ✓ Pick the fuse just above the normal working current.

## 8. SELF-CHECK · cover & quiz

Can you...

1. Name the three wires in a plug and their colours?
2. Explain the difference between a.c. and d.c.?
3. Use  $P = V \times I$  and energy = power × time?
4. Explain how the fuse and earth wire keep you safe?
5. Explain why the fuse is in the live wire?
6. Explain why some appliances need no earth wire?