

Mains Electricity Power

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

State the colour and purpose of each of the three wires in a mains cable. (3 marks)

Step 1 · Live

Brown: carries the alternating p.d. from the supply (about 230 V).

Step 2 · Neutral

Blue: completes the circuit; at or near 0 V.

Step 3 · Earth

Green and yellow stripes: safety wire, normally carries no current.

Answer: Live brown, neutral blue, earth green/yellow

Check: Marks often need both the colour and the job.

2. Now try one with the steps

A 2.5 kW heater runs on 230 V mains. Calculate the normal current and choose a fuse from 3 A, 5 A and 13 A. (3 marks)

Step 1 · Current

Step 2 · Rule

Step 3 · Choose

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. State the potential difference and frequency of UK mains electricity. [2]

2. Describe the difference between direct current and alternating current. [2]

3. State the colour of the live, neutral and earth wires. [3]

4. State the potential difference between the live wire and earth. [1]

5. State the potential of the neutral wire. [1]

6. State what a mains frequency of 50 Hz means. [1]

7. Explain why touching a live wire is dangerous even if the appliance is switched off. [3]

8. Explain how the earth wire and fuse protect a user when a fault makes the metal case of an appliance live. [3]

9. A 2.3 kW kettle runs on 230 V mains. Calculate the current it draws, in amperes. [2]

10. A 920 W toaster runs on 230 V mains. The fuses available are 3 A, 5 A and 13 A. State the fuse rating that should be used, in amperes. [2]

11. Explain why appliances with a plastic case (double insulated) do not need an earth wire. [2]

12. Explain why the fuse is connected in the live wire rather than the neutral wire. [2]

13. Explain why the cable for an electric cooker is much thicker than the cable for a table lamp. [2]

14. Describe what a circuit breaker does and give one advantage it has over a fuse. [2]

4. Before you hand it in

"The earth wire carries the current to make the appliance work."

Live and neutral carry the working current. The earth wire normally carries no current; it is only for safety.

Choosing a 13 A fuse for everything

Calculate $I = P \div V$ and choose the smallest rating just above it (for example 5 A for a 4 A toaster).

"Switching off makes the live wire safe."

The switch only breaks the circuit beyond it. Always unplug before touching any wiring.

"The fuse protects people from electric shocks."

The fuse stops wires overheating; with the earth wire it also disconnects a live case. The earth wire is what gives the safe path.