

MR SULLY UNFOLDS PHYSICS ANSWERS

Mains electricity and safety

AQA 4.2.3
Electricity · Paper 1
Foundation & Higher

Name _____ Class _____ Date _____

The electricity supply in our homes is very different from a battery, and it can be dangerous.

KEY IDEAS

- Cells and batteries supply **direct current (d.c.)**: it flows in one direction only.
- Mains electricity is **alternating current (a.c.)**. In the UK it is about **230 V** at **50 Hz**.
- Three-core cable: **live** (brown), **neutral** (blue), **earth** (green and yellow stripes).

Section A · Recall

Grade 4–5

1 What is the difference between direct current and alternating current? [2]

d.c. flows in one direction only.

a.c. keeps changing direction.

2 State the frequency and p.d. of UK mains electricity. [2]

50 Hz and about 230 V

3 Complete the table. [6]

Wire	Colour	Job
Live	Brown	Carries the alternating p.d. from the supply
Neutral	Blue	Completes the circuit; at or close to 0 V
Earth	Green and yellow	Safety wire; only carries current if there's a fault

Section B · Explain

Grade 5–6

4 State the p.d. between: (a) the live wire and earth; (b) the neutral wire and earth. [2]

(a) About 230 V

(b) About 0 V

5 A metal kettle develops a fault so that the live wire touches the metal case. Explain how the earth wire protects the user. [3]

Current flows through the low-resistance earth wire to the ground.

This large current blows the fuse (or trips the circuit breaker),

disconnecting the live supply, so the case isn't left live.

Section C · Stretch

Grade 7+

6 Explain why touching the live wire is dangerous even when the appliance's switch is off. [3]

The live wire can still be at about 230 V when the switch is open.

Your body is at about 0 V (earth), so there's a large p.d. across you.

A current flows through your body to earth, giving an electric shock.

Exam-style question

AQA style

7 A hairdryer has a plastic case and is connected using a two-core cable with no earth wire.

a Explain why the hairdryer is still safe to use without an earth wire. [2]

The plastic case is an electrical insulator,

so even if a live wire came loose, the case can't become live.

b The hairdryer draws a current of 7 A. Choose the best fuse from 3 A, 5 A and 13 A. Explain your choice. [2]

13 A

It's the smallest rating above the normal working current, so it won't blow in normal use.

Total: _____ / 22

How confident am I?	Not yet	Nearly	Got it
I can describe a.c. and d.c.	☐	☐	☐
I can name the three wires in a cable and their jobs	☐	☐	☐
I can explain why the live wire is dangerous	☐	☐	☐