1 The table gives the maximum current that can safely pass through electric cables of different diameter.

Diameter in mm	Maximum safe current in amps
1.0	11
1.6	17
2.2	24
2.8	31
3.4	40
4.0	55

1 (a) (i) Describe the relationship between the diameter and the maximum safe current in amps.

Higher the cable diameter, higher the maximum safe current.

A larger increase from 3.4 to 4.0

(2 marks)

1 (a) (ii) The mains electricity in the UK is 230V a.c. The label below comes from a heater that can connect to the mains electricity supply.

Power rating (maximum): 5kW
Voltage: Mains at 230V AC

A new cable with a diameter of 1.6 mm is fixed to the heater to supply it with an electric current from the mains.

Calculate the size of the current that would flow through the heater when switched to the maximum power rating.

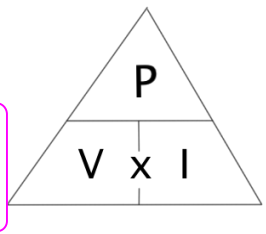
Use the correct equation from the equation sheet to help you.

P = V x I is the correct equation but will need rearranging to I = P / V

5000 / 230 [1 mark]

21.7 [1 mark]

Remember, no marks for writing the correct equation. The formula triangle here might help.



(2 marks)

1 (a) (iii) Can the heater be used safely with the new 1.6 mm cable fitted?

Explain your answer.

Use your answer from 1 (a) (ii) and the table above to help you answer the question.

No [1 mark]

Current is higher than maximum safe current [1 mark]

Cable would blow/overheat/melt [1 mark]

You should avoid saying 'snaps', 'breaks' or 'burns' to describe what happens to the fuse.

(3 marks)

1 (a) (iv) The circuit connecting the heater to the mains electricity supply includes a residual current circuit breaker (RCCB) and not a fuse.

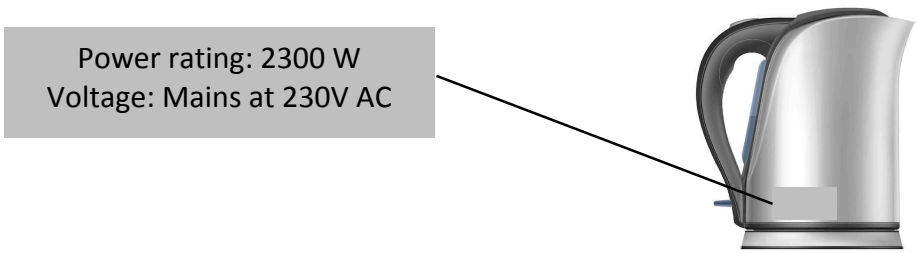
Give **two** advantages of using a RCCB to protect a circuit rather than a fuse.

1 quicker/faster [1 mark]

2 can be reset [1 mark]

(2 marks)
(Total 9 marks)

2. A kettle has the following label attached to it.



2 (a) (i) Use the information given to calculate the current that flows when the kettle is switched on and working normally.

Use the correct equation from the equation sheet.

P = V x I is the correct equation but will need rearranging to I = P / V (see the formula triangle above)

2300 / 230 [1 mark]

10 [1 mark]

(2 marks)

2 (a) (ii) To work safely, the kettle must have a fuse fitted into the three pin plug.

If a current of 12 amps flows to the kettle (this is **not** the correct answer for the question above), which size fuse should be used in the plug.

Circle the correct answer.

13 amp

Give a reason for your choice.

Fuse size must be higher than the current needed [1 mark]

...otherwise the fuse would melt/blow/break [1 mark]

...and the kettle would not work. [1 mark]

(3 marks)

2 (b) The diagram shows two appliances, an iron and a bathroom hairdryer. The table shows some information about each appliance.

Iron

Hairdryer

	Power rating (watts)	**Voltage**
Hairdryer	800	110 V a.c.
Iron	1200	230 V a.c.

2 (b) (i) The energy transferred to the iron during five minutes of use was 360 kJ.

How long would the hairdryer have to be switched on for, in order to transfer the same amount of energy as the iron?

Use the correct equation from the equation sheet.

The correct equation is Power = Energy transferred / time or P = E/t

800 = 360 000 / t [1 mark]

t = 3600 000 / 800 [1 mark]

450 or 7.5 minutes [1 mark]

Alternative method: 1200/800 x 5 = 7.5 minutes

This is a tricky question and needs thinking about. You get full marks for the answer only, but you must make sure you show working, in case you write an incorrect answer.

(3 marks)

2 (b) (ii) For safety reasons, it is important that the iron has an earth wire connected to its outer metal case. Explain why.

Outer casing could become live or live wire could
Connect to/touch the casing [1 mark]

Causing shock if touched [1 mark]

(2 marks)

(Total 10 mark)