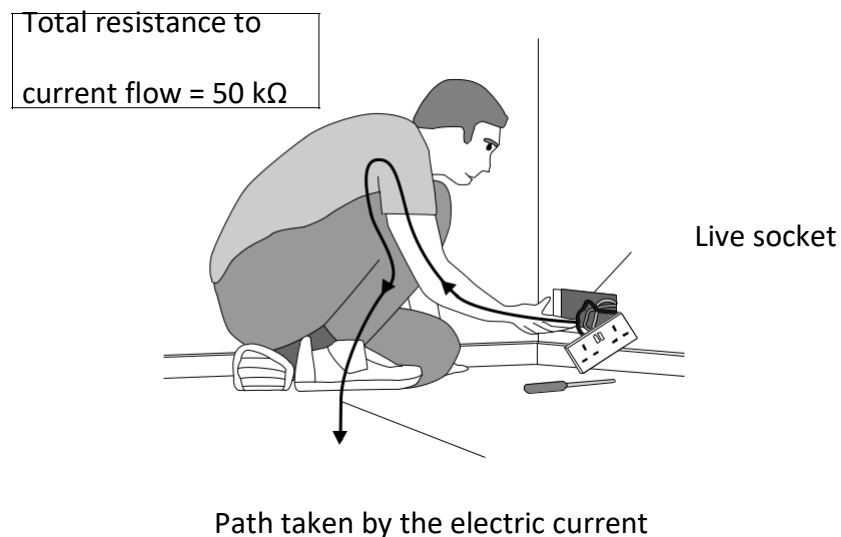


ELECTRICITY IN HOMES 1

Q:1 The diagram shows someone accidentally touching the live wire inside a dismantled 230 volt mains electricity socket. A current flows through the person giving him an electric shock.



(a)(i) Use the equation in the box to calculate the current that will flow through the person.

$$\text{potential difference} = \text{current} \times \text{resistance}$$

Show clearly how you work out your answer.

Current = _____ A (2 marks)

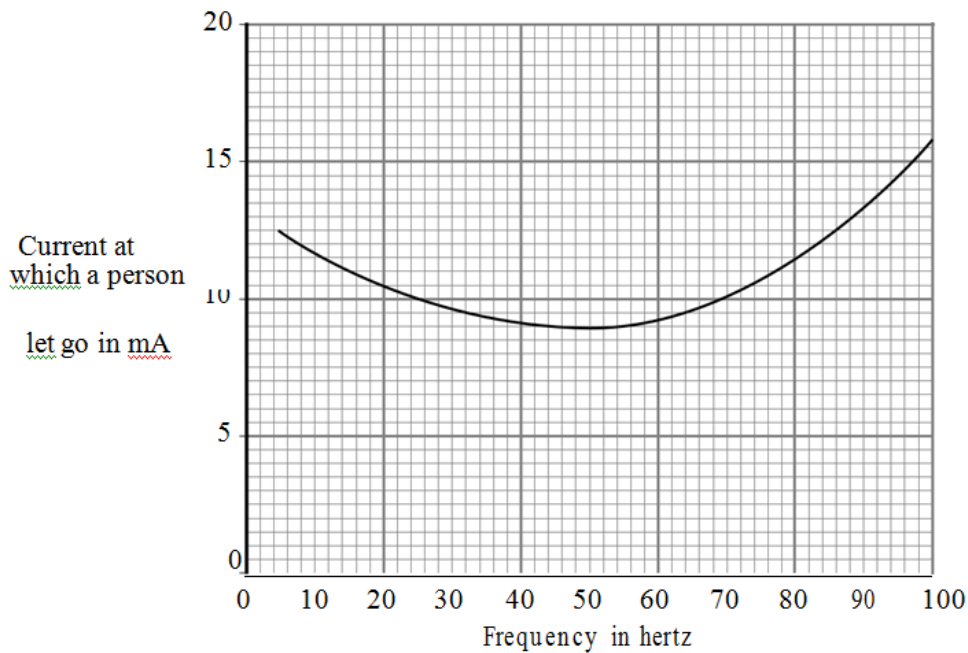
(a)(ii) Rubber is a good insulator. Explain why it is a good idea for electricians to wear rubber soled boots when working.

(2 marks)

(b) If the current flowing through a person is too high, the person cannot let go of the electrical source.

Different people were tested to see whether the ability to let go of an electrical source depended on the frequency of the current.

The results of the test are shown in the graph.



(b)(i) What is the frequency of the mains electricity supply in the UK?

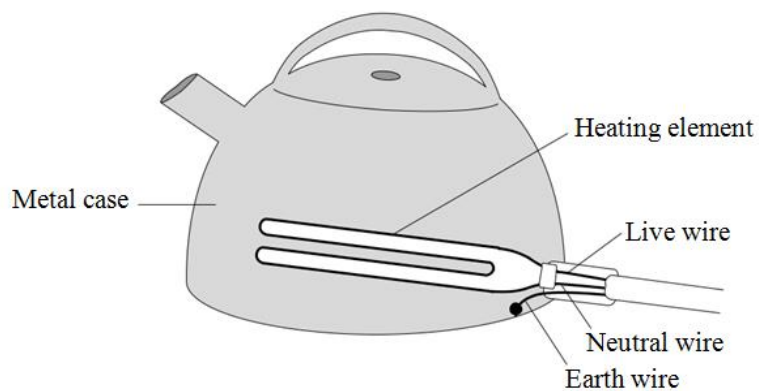
(1 mark)

(b)(ii) From a safety point of view, is the frequency of the UK mains electricity supply suitable?

Give a reason for your answer.

(1 mark)

(c) The diagram shows how the electric supply cable is connected to an electric kettle. The earth wire is connected to the metal case of the kettle.



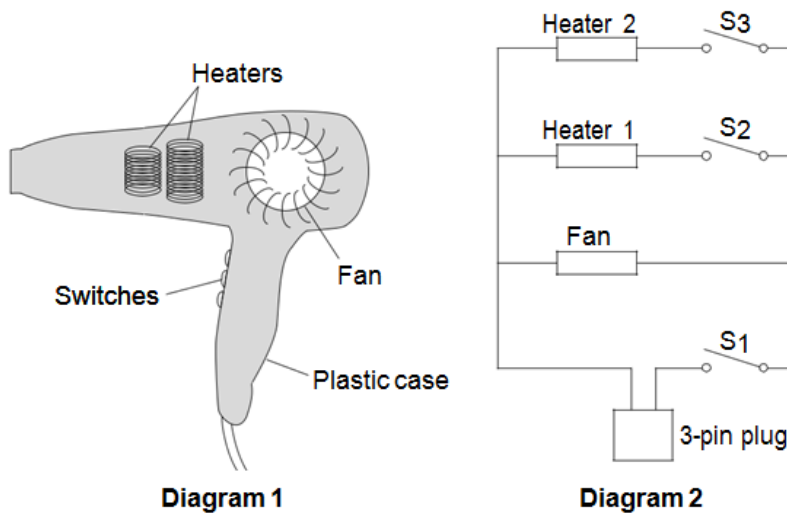
If a fault makes the metal case live, the earth wire and the fuse inside the plug protect anyone using the kettle from an electric shock.

Explain how.

(2 marks)

Q:2 Diagram 1 shows a hairdryer.

Diagram 2 shows how the heaters and fan of the hairdryer are connected to a 3-pin plug. The hairdryer does not have an earth wire.



(a) What colour is the insulation around the wire connected to the live pin inside the plug?

(1 mark)

(b) Why does the hairdryer not need an earth wire?

(1 mark)

(c) All the switches are shown in the OFF position.

(c) (i) Which switch or switches have to be ON to make:

(1) only the fan work;

(2) heater 2 work?

(2 marks)

(c) (ii) The heaters can only be switched on when the fan is also switched on. Explain why.

(2 marks)

(d) The table shows the current drawn from the 230 volt mains electricity supply when different parts of the hairdryer are switched on.

	Current in amps
Fan only	1.0
Fan and heater 1	4.4
Fan and both heaters	6.5

Use the equation in the box to calculate the maximum power of the hairdryer.

$\text{power} = \text{current} \times \text{potential difference}$
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Show clearly how you work out your answer and give the unit.

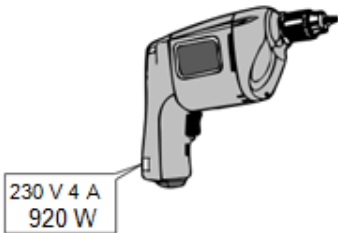
Maximum power = _____

(3 marks)

Q:3 (a) Look at this electrical safety information poster.

**Get it right!
Choose the right fuse.**

Most fuses are 3 A or 13 A.
To choose the right fuse you must know the power of the appliance.



Power is marked on the information plate.

Power over 700 W use a 13 A fuse. <ul style="list-style-type: none">• Fan heaters• Kettles• Dishwashers• Washing machines	Power under 700 W use a 3 A fuse. <ul style="list-style-type: none">• Radios• Table lamps• Portable TVs• Electric blankets
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(i) Complete the table to show which size fuse, 3 A or 13 A, should be fitted to each of the appliances.

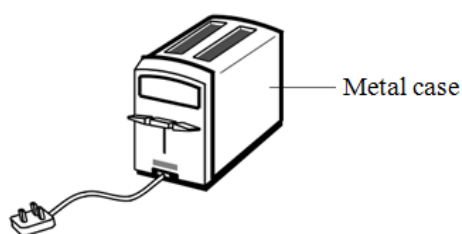
Appliance	Power rating	Fuse
Hairdryer	1600 W	
Electric saw	350 W	
Food mixer	1200 W	

(2 marks)

(ii) The plug of an electric kettle has been wrongly fitted with a 3 A fuse. What will happen to the fuse when the kettle is switched on?

(1 mark)

(b) The drawing shows a toaster, which takes a current of 4 A from the 230 V mains electricity supply.



(i) Use the equation in the box to calculate the power of the toaster.

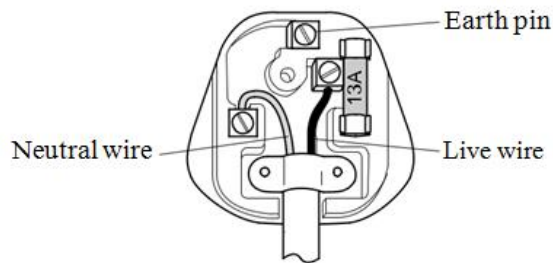
$$\begin{array}{l} \text{Power} \quad = \quad \text{current} \quad \times \quad \text{potential difference} \\ \text{(watt, W)} \quad \quad \quad \text{(ampere, A)} \quad \quad \quad \text{(volt, V)} \end{array}$$

Show clearly how you work out your answer.

Power = _____ W

(2 marks)

(ii) A householder rewires the toaster with a new cable and plug. The diagram shows how the new cable has been connected to the plug.



Explain why the toaster may not be safe to use.

(2 marks)

Q:4 (a) Use numbers given in the box to complete the following sentences.

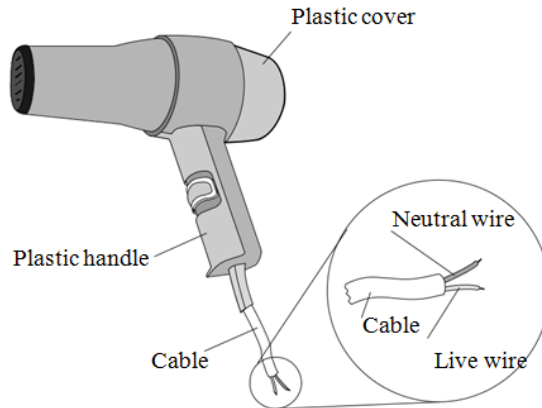
12	50	110	230
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In the UK, the mains electricity supply is _____ volts.

The frequency of the UK mains electricity supply is _____ hertz.

(2 marks)

(b) The diagram shows a hairdryer designed to be used with the UK mains supply. The cable connecting the hairdryer to the plug does not have an earth wire.



(b)(i) Why does the hairdryer not need a cable with an earth wire?

(1 mark)

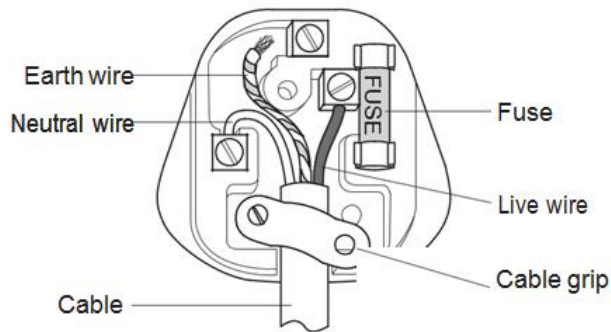
(b)(ii) Which one of the following materials are the two wires inside the cable made from?

Draw a ring around your answer.

aluminium copper steel

(1 mark)

Q:5 The diagram shows the inside of an incorrectly wired three-pin plug.



(a) (i) What two changes need to be made so that the plug is wired correctly?

1. _____

2. _____

(2 marks)

(a) (ii) Which one of the wires inside a plug is there to make an appliance with a metal case safer to use?

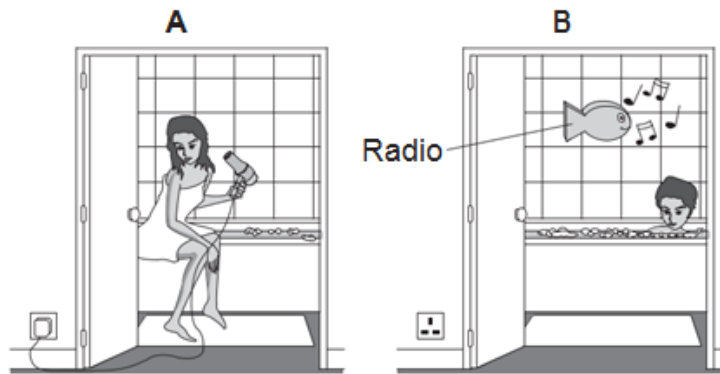
(1 mark)

(a) (iii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

(2 marks)

(b) Each of these pictures shows an electrical appliance being used in a bathroom.



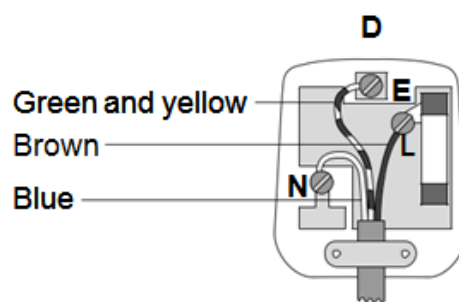
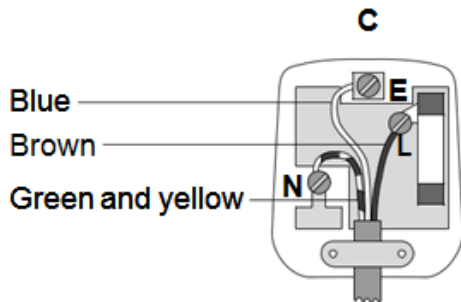
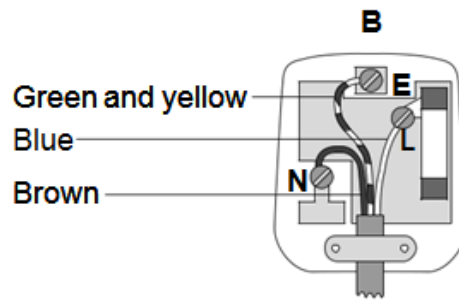
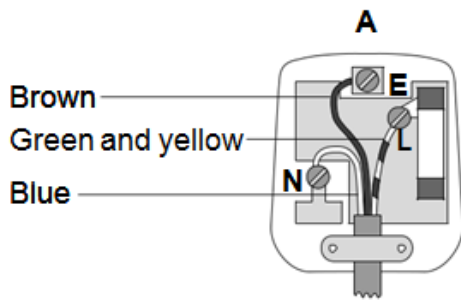
Using the hairdryer in picture A is dangerous. However, it is safe to use the battery-operated radio in picture B.

Explain why.

(2 marks)

Q:6 (a) (i) Which one of the plugs, A, B, C or D, is correctly wired?

Write your answer, A, B, C or D, in the box.



The plug that is correctly wired is .

(1 mark)

(a) (ii) What material is the outside casing of a plug made from?

(1 mark)

4 (b) An electric drill draws a current of 2 amps from the 230 volt mains electricity supply.

Use the equation in the box to calculate the power of the drill.

power = current \times potential difference

Show clearly how you work out your answer.

Power _____ watts

(2 marks)

(c) A householder needs to replace a damaged plug. Most replacement plugs are sold with a 13 amp fuse fitted inside. The householder thinks it would be better for shops to sell the plugs without a fuse. He could then buy either a 3 A, 5 A or 13 A fuse to fit inside the plug.

Explain an advantage of selling plugs without a fuse, rather than with a 13 amp fuse fitted.

(2 marks)

TOTAL MARKS=40