Q1. (a) The diagram shows the information plate on an electric kettle. The kettle is plugged into the a.c. mains electricity supply.

230 V	**2760 W**
50 Hz	

Use the information from the plate to answer the following questions.

(i) What is the frequency of the a.c. mains electricity supply?

....

(1)

(ii) What is the power of the electric kettle?

....

(1)

(b) To boil the water in the kettle, 2400 coulombs of charge pass through the heating element in 200 seconds.

Calculate the current flowing through the heating element and give the unit.

Use the correct equation from the Physics Equations Sheet.

Choose the unit from the list below.

        amps   **volts**   **watts**

....

....

....

Current = ...
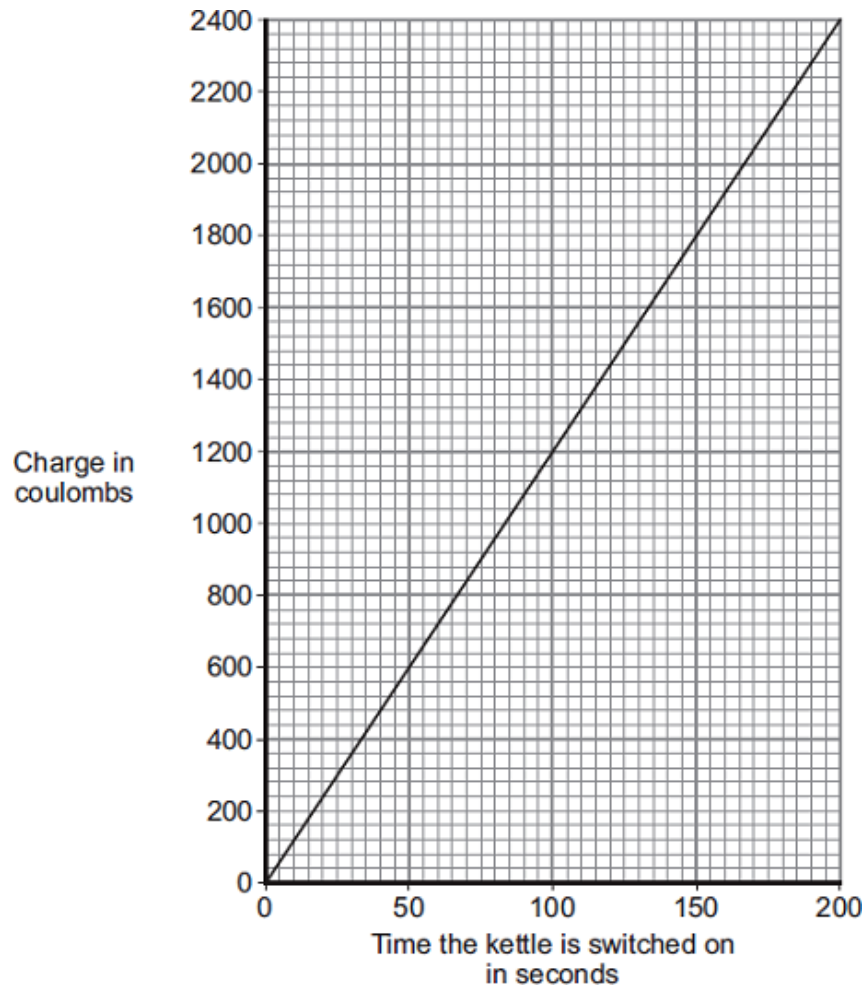
(3)

(c) The amount of charge passing through the heating element of an electric kettle depends on the time the kettle is switched on.
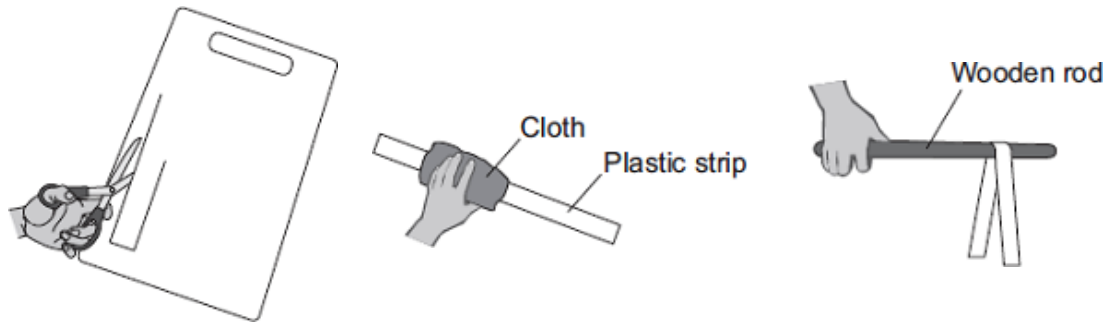

Charge in coulombs

Time the kettle is switched on in seconds

What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

....

....

(2)

(Total 7 marks)

Q2.   (a)   A student uses some everyday items to investigate static electricity.

| 1 A strip of plastic is cut from a plastic carrier bag | 2 The plastic strip is rubbed with a cloth | 3 The plastic strip is hung over a wooden rod |

(i)   Draw a ring around the correct answer in the box to complete each sentence.

Rubbing the plastic strip with a cloth causes the strip to become negatively charged.

This happens because

| electrons |
| neutrons |
| protons |

move from the cloth onto the plastic strip.

The cloth is left with

| a negative |
| a positive |
| zero |

charge.

(2)

(ii)   When the plastic strip is hung over the wooden rod, the two halves of the strip move equally away from each other.

What **two** conclusions should the student make about the forces acting on the two halves of the plastic strip?

1 ....

....

2 ....

....

(2)

(b)   Electrical charges move more easily through some materials than through other materials.

Through which **one** of the following materials would an electrical charge move most easily?

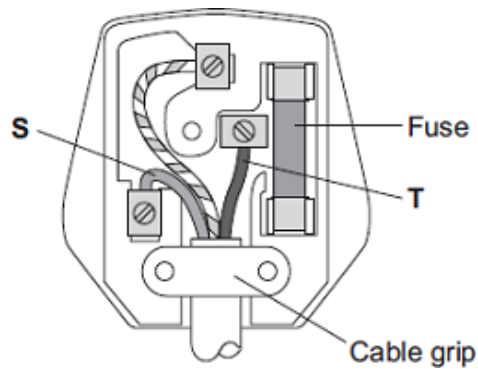Draw a ring around your answer.

aluminium   glass   rubber

(1)
(Total 5 marks)

Q3.   (a)   The diagram shows the inside of a three-pin plug.

(i)   What name is given to the wire labelled **S**?

Draw a ring around the correct answer.

earth   live   neutral

(1)

(ii)   What is the colour of the insulation around the wire labelled **T**?

Draw a ring around the correct answer.

blue   brown   green and yellow
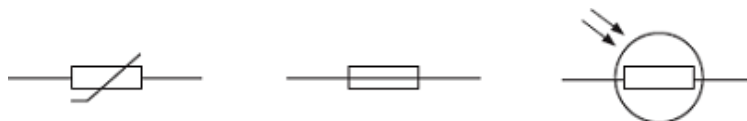
(1)

(b)   The plug contains a 13 amp fuse.
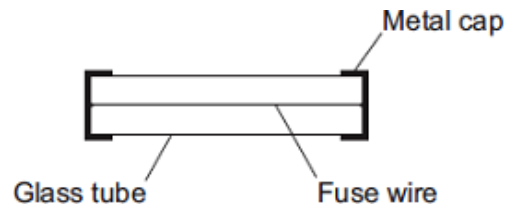
(i)   Which **one** of the following is the correct circuit symbol for a fuse?

Draw a ring around the correct answer.

(1)

(ii) The diagram shows the parts of the fuse.

Metal cap

Glass tube   Fuse wire

What would happen if a current of 20 amps passed through the 13 amp fuse?

....

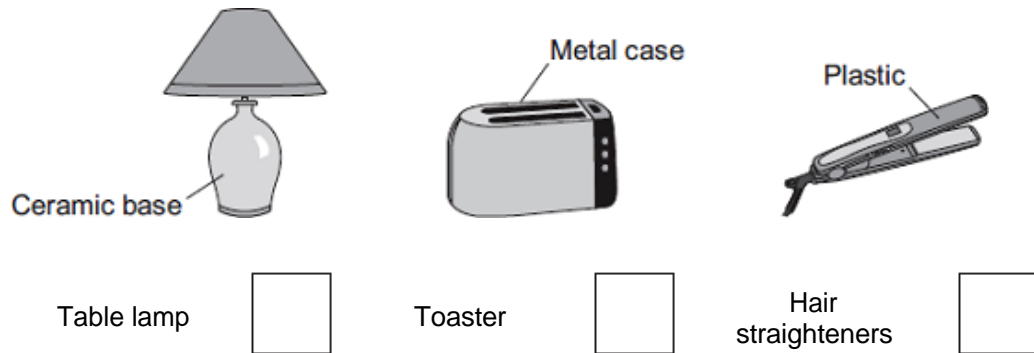...

(1)

(c) Not all electrical appliances are earthed.

(i) Which **one** of the following appliances must be earthed?

Tick (✔) **one** box.

Metal case

Plastic

Ceramic base

Table lamp ☐   Toaster ☐   Hair straighteners ☐

Give a reason for your answer.

....

....

(2)

(ii) Earthing an appliance helps to protect a person against a possible risk.

What is the risk?

....

(1)

(d)   The diagrams show how two lengths of mains electrical cable were joined. The individual wires have been twisted together and covered with insulating tape. This is not a safe way to join the cables.
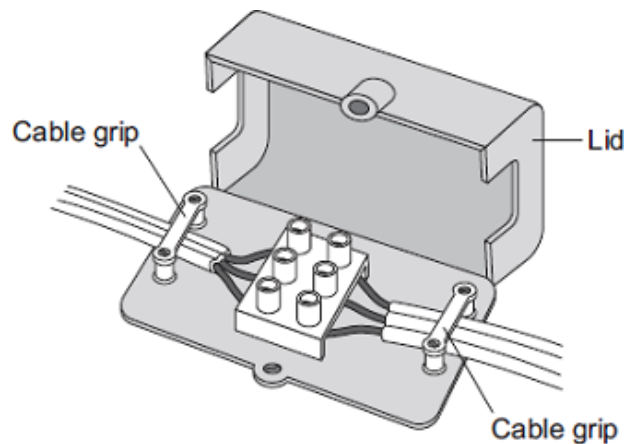

Wires twisted together   Insulating tape   Insulating tape
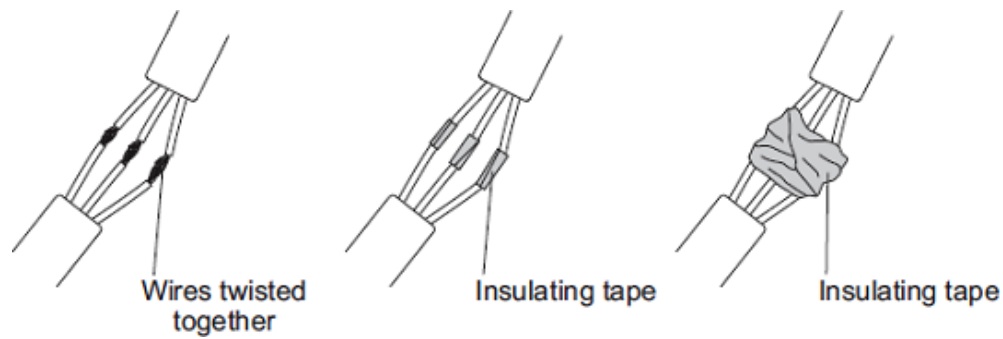
What is the possible risk from joining the two lengths of mains electrical cable in this way?

....

....

(1)

(e)   The diagram below shows a connecting box being used to join two lengths of electrical cable. This is a safe way to join the cables.

The cable grips are important parts of the connecting box.

Explain why.

....

....

....

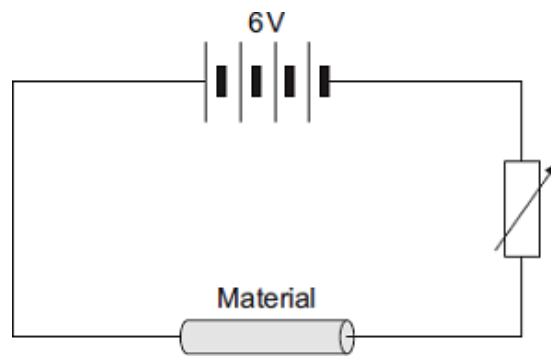...

(2)
(Total 10 marks)

Q4.   (a)   The diagram shows the circuit used to investigate the resistance of a sample of a material.
The diagram is not complete; the ammeter and voltmeter are missing.

(i)   Draw the symbols for the ammeter and voltmeter on the diagram in the correct places.

(2)

(ii)   How can the current through the material be changed?

....

....

(1)

(b) The material, called conducting putty, is rolled into cylinders of different lengths but with equal thickness.

Graph 1 shows how the resistance changes with length.

Graph 1

Length in centimetres
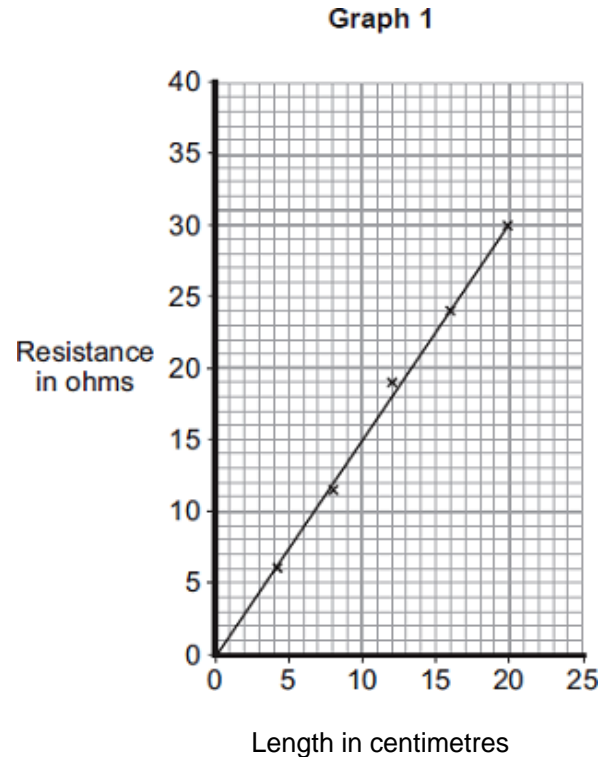
(i) The current through a 25 cm length of conducting putty was 0.15 A.

Use **Graph 1** to find the resistance of a 25 cm length of conducting putty.

Resistance = ... ohms

(1)

(ii) Use your answer to **(b) (i)** and the equation in the box to calculate the potential difference across a 25 cm length of conducting putty.

potential difference = current x resistance

Show clearly how you work out your answer.

....

....

....

Potential difference = ... volts

(2)

(c) A second set of data was obtained using thicker pieces of conducting putty. Both sets of results are shown in **Graph 2**.

Graph 2

Length in centimetres
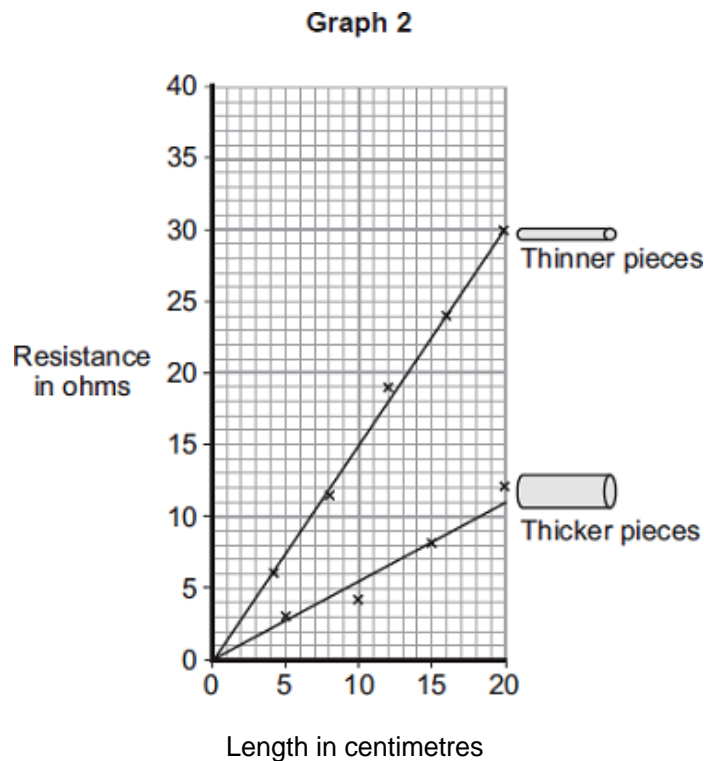
(i) What is the relationship between the resistance and the thickness of the conducting putty?

....

....

(1)

(ii) Name **one** error that may have reduced the accuracy of the results.

....

(1)

(iii) How could the reliability of the data have been improved?

....

....

(1)
(Total 9 marks)