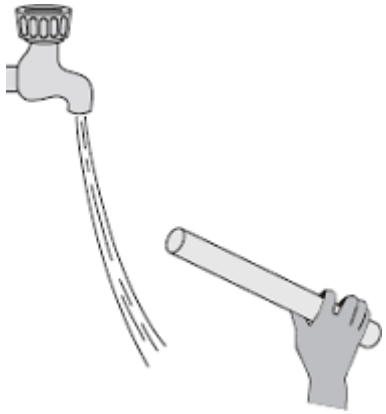
Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

(a) The diagram shows a negatively charged plastic rod held near to a thin stream of water. The water is attracted towards the rod.



Which **one** of the following statements explains what is happening to the charge in the water?

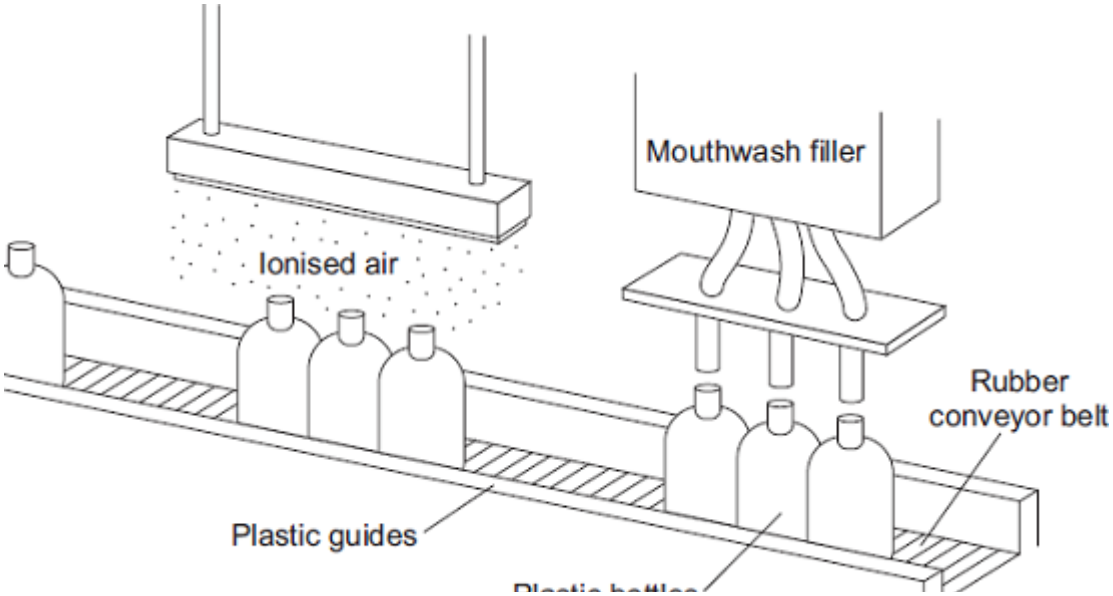
Tick (✓) **one** box.

The positive and the negative charges in the water are attracted to the rod.	☐
The positive and the negative charges in the water are repelled by the rod.	☐
The negative charge in the water is repelled by the rod and the positive charge is attracted to the rod.	☐
The negative charge in the water is attracted to the rod and the positive charge is repelled by the rod.	☐

(1)

(b) A company that produces bottles of mouthwash found a problem with the automatic filling system.

As the bottles go towards the filler, the bottles move around on the conveyor belt and become electrostatically charged. This causes the stream of mouthwash to move sideways, missing the open top of the bottle.



The company came up with an answer to the problem. Before the bottles reach the dfiller, the bottles pass through a stream of ionised air. The ions in the air neutralise the charge on the bottles.

(i) Explain why the plastic bottles became charged.

_____

_____

_____

_____

(2)

(ii) What happens to the structure of an atom to change the atom into an ion?

_____

_____

(1)

(iii) Earthing the conveyor belt with a conducting wire would not have solved this problem. Give a reason why.

_____

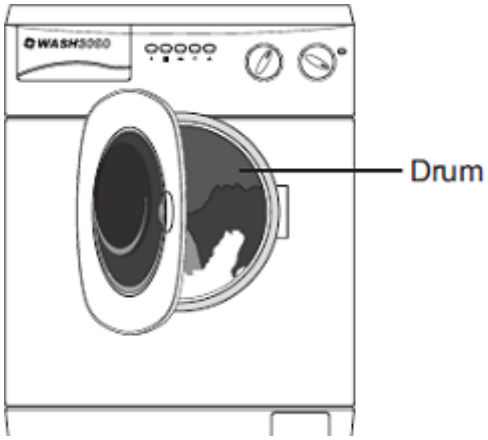
_____

(1)

(Total 5 marks)

Q2.

The picture shows a washing machine. When the door is closed and the machine switched on, an electric motor rotates the drum and washing.



(a) Complete the following sentences.

(i) An electric motor is designed to transform electrical energy into

_____ energy.

(1)

(ii) Some of the electrical energy supplied to the motor is wasted as

_____ energy and _____ energy.

(1)

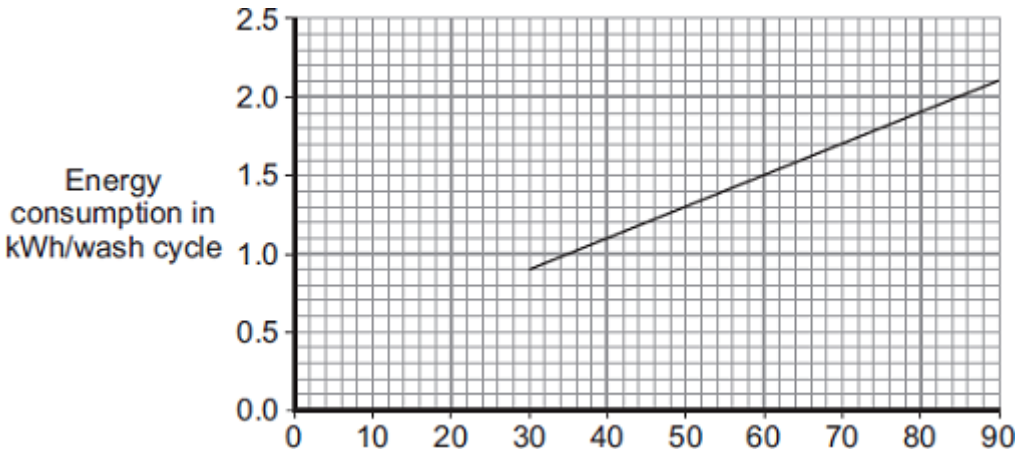
(b) What happens to the energy wasted by the electric motor?

_____

_____

(1)

(c) The graph shows that washing clothes at a lower temperature uses less energy than washing them at a higher temperature. Using less energy will save money.



(i) Electricity costs 15p per kilowatt-hour (kWh).

The temperature setting is turned down from 40 °C to 30 °C.

Use the graph and equation in the box to calculate the money saved each wash cycle.

total cost = number of kilowatt-hours x cost per kilowatt-hour

Show clearly how you work out your answer.

_____

_____

Money saved = _____

(2)

(ii) Reducing the amount of energy used by washing machines could reduce the amount of carbon dioxide emitted into the atmosphere.

Explain why.

_____

_____

_____

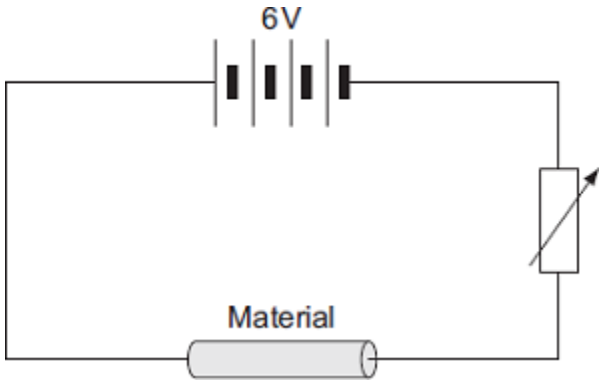
_____

(2)

(Total 7 marks)

Q3.

(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?

_____

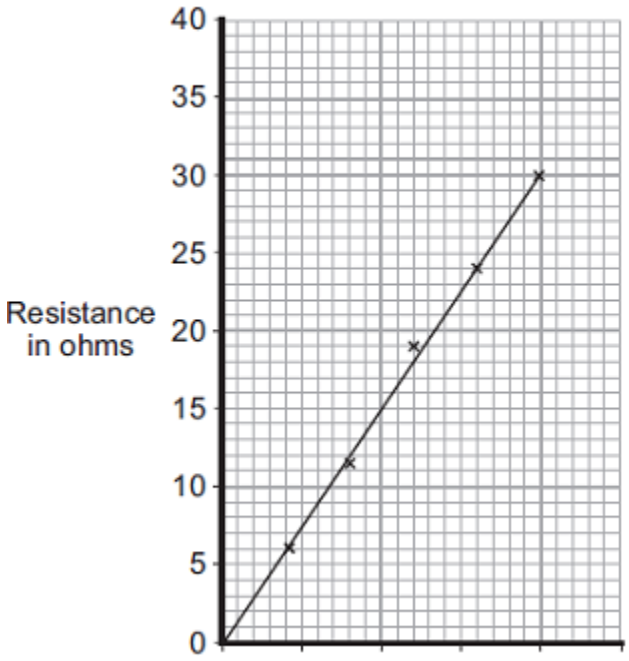
_____

(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



(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)** to calculate the potential difference across a 25 cm length of conducting putty.

Show clearly how you work out your answer.

_____

_____

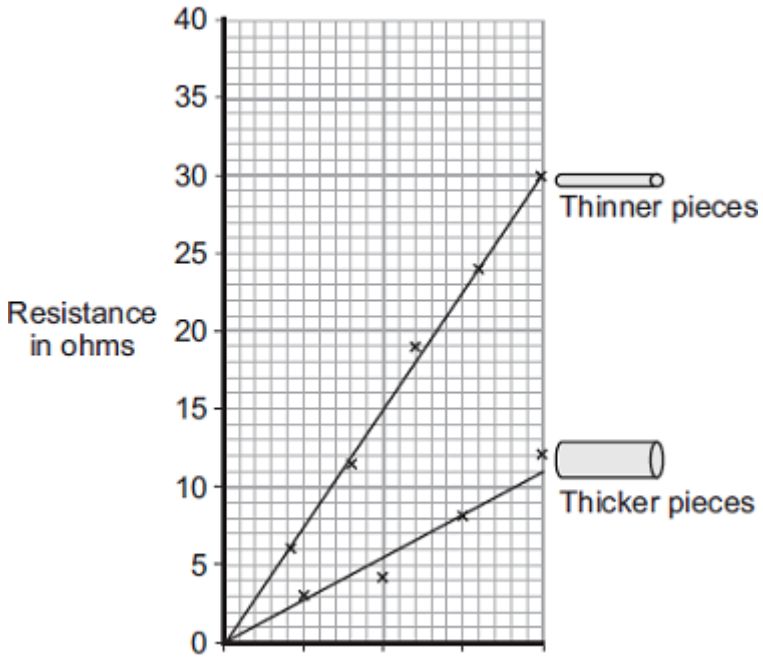
_____

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



(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)

(Total 8 marks)