

Name of the Student: _____

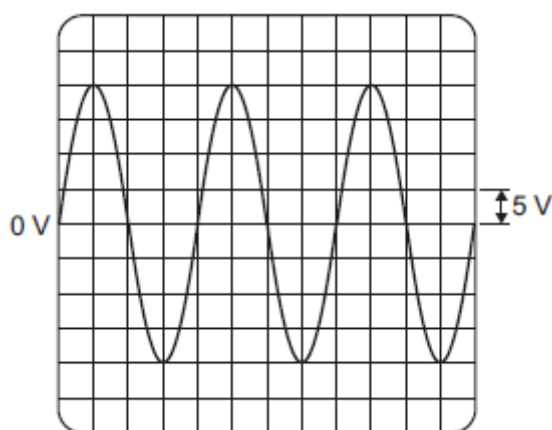
Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

- (a) **Figure 1** shows the oscilloscope trace an alternating current (a.c.) electricity supply produces.

Figure 1



One vertical division on the oscilloscope screen represents 5 volts.

Calculate the peak potential difference of the electricity supply.

Peak potential difference = _____ V

(1)

- (b) Use the correct answer from the box to complete the sentence.

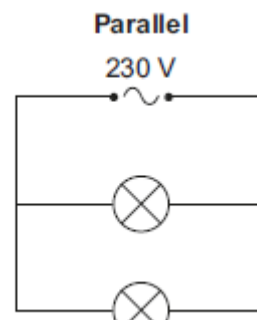
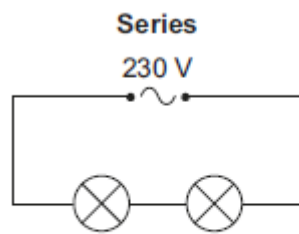
40	50	60
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In the UK, the frequency of the a.c. mains electricity supply is _____ hertz.

(1)

- (c) **Figure 2** shows how two lamps may be connected in series or in parallel to the 230 volt mains electricity supply.

Figure 2



- (i) Calculate the potential difference across each lamp when the lamps are connected in **series**.

The lamps are identical.

Potential difference when in series = _____ V

(1)

- (ii) What is the potential difference across each lamp when the lamps are connected in **parallel**?

Tick (✓) **one** box.

115 V ☐ 230 V ☐ 460 V ☐

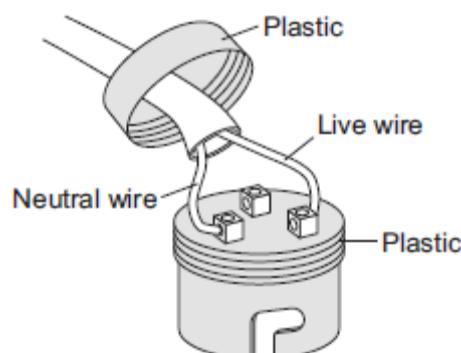
(1)

- (iii) Give **one** advantage of connecting the lamps in parallel instead of in series.

(1)

- (d) **Figure 3** shows the light fitting used to connect a filament light bulb to the mains electricity supply.

Figure 3



The light fitting does **not** have an earth wire connected.

Explain why the light fitting is safe to use.

(2)

- (e) A fuse can be used to protect an electrical circuit.

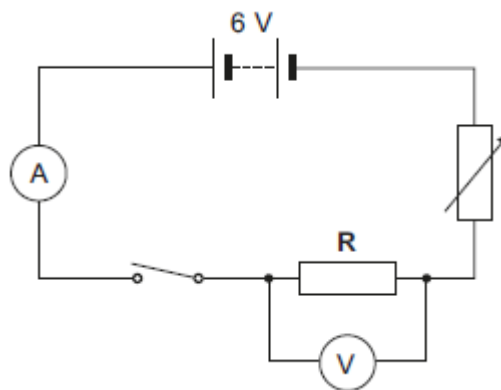
Name a different device that can also be used to protect an electrical circuit.

(1)

(Total 8 marks)

Q2.

The diagram shows an electrical circuit.



- (a) The 6 V battery shown in the diagram is made up of a number of identical 1.5 V cells.

Calculate the minimum number of cells needed to make the battery.

Number of cells = _____

(1)

- (b) The switch in the diagram is shown in the open position. Closing the switch completes the circuit.

Charge flows through the completed circuit and a reading is shown on both the ammeter and the voltmeter.

- (i) In 10 seconds, 20 coulombs of charge flows through the circuit.

Calculate the current reading shown on the ammeter.

Current = _____ A

(2)

- (ii) For 20 coulombs of charge to flow through the resistor R, 100 joules of work must be done.

Calculate the potential difference reading given by the voltmeter.

Potential difference = _____ V

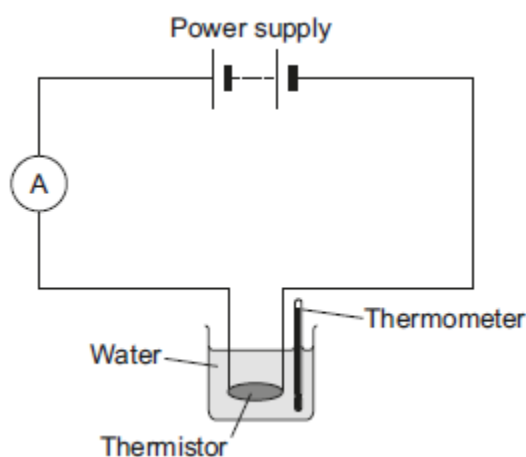
(2)

(Total 5 marks)

Q3.

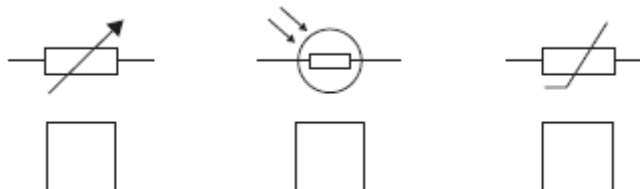
Figure 1 shows the apparatus used to investigate how the current through a thermistor depends on the temperature of the thermistor.

Figure 1



- (a) Which **one** of the following is the correct circuit symbol for a thermistor?

Tick (✓) **one** box.

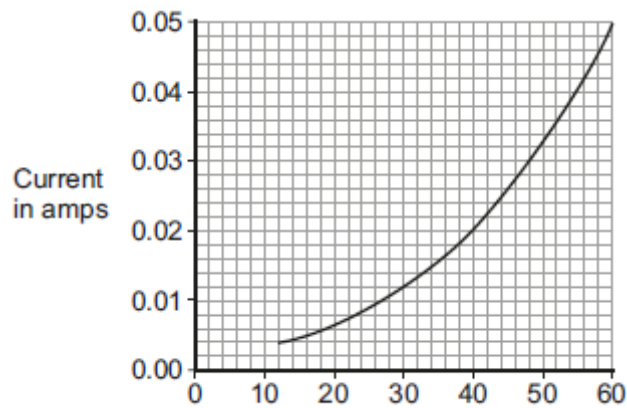


(1)

- (b) To get a range of results, hot water at 60 °C was poured into the beaker. The temperature of the water and current through the thermistor were then recorded as the water cooled.

The results of the investigation are shown in **Figure 2**.

Figure 2



- (i) Suggest **one** way the investigation could have been changed to give a wider range of temperatures.

(1)

- (ii) Describe how the current through the thermistor depends on the temperature of the thermistor.

(1)

- (iii) Use **Figure 2** to determine the current through the thermistor at 40 °C.

Current at 40 °C = _____ A

(1)

- (iv) At 40 °C the thermistor has a resistance of 250 Ω.

Use your answer to part (iii) and the resistance of the thermistor to calculate the potential difference across the thermistor.

Potential difference = _____ V

(2)

- (v) The potential difference across the thermistor stays the same all through the investigation.

What conclusion can be made from the results in **Figure 2** about the resistance of the thermistor as the temperature of the thermistor **decreases**?

Tick (✓) **one** box.

the resistance increases

☐

the resistance does not change

☐

the resistance decreases

☐

(1)
(Total 7 marks)