Easter HW 1 Combined science - Physics (Higher and Foundation)

Physics Paper 1

Topic – Required practicals

You must complete this homework on Lined/ plain A4 paper and bring it in to school on 19/04/22

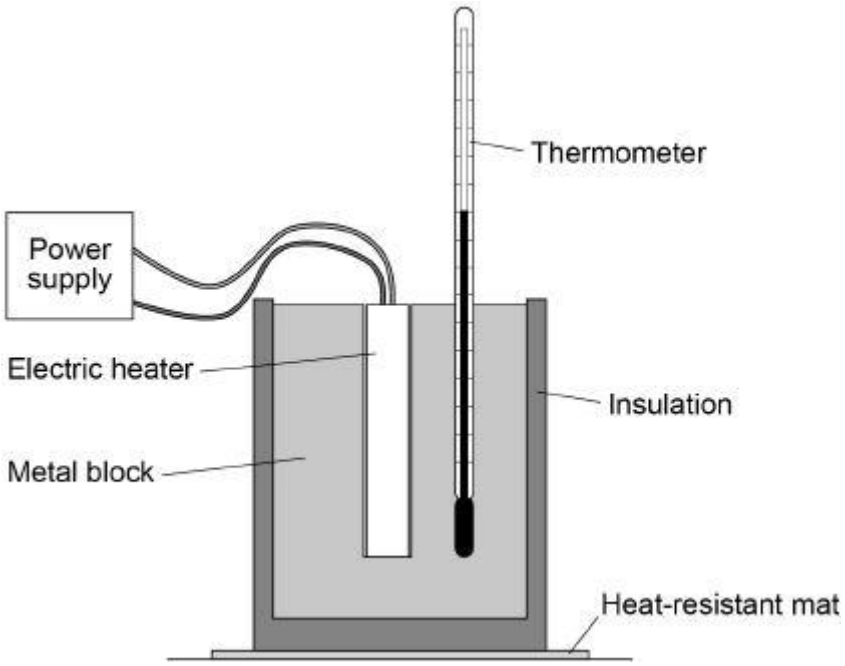
Q1.

A student investigated how the temperature of a metal block changed with time.

An electric heater was used to increase the temperature of the block.

The heater was placed in a hole drilled in the block as shown in **Figure 1**.

Figure 1



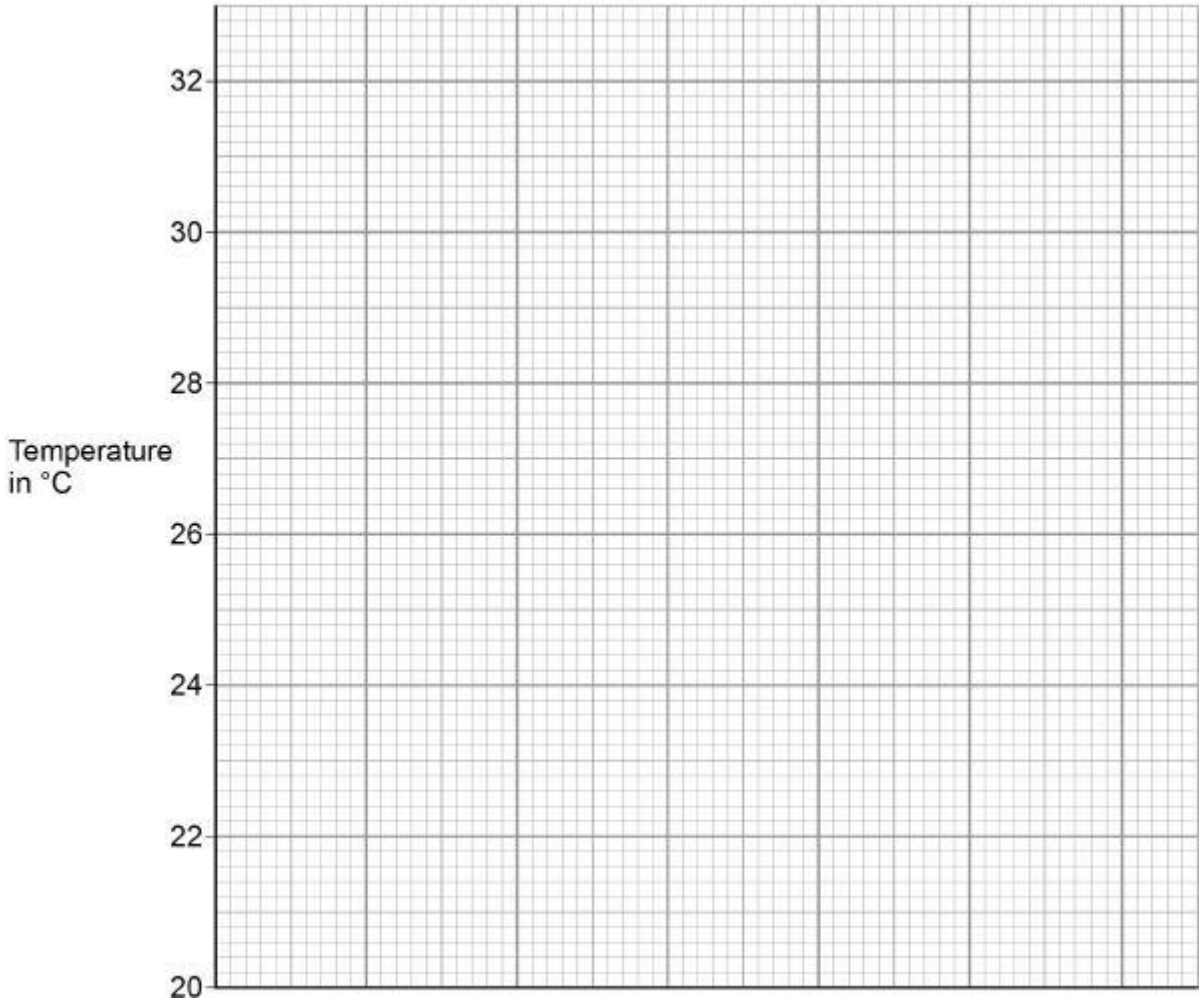
The student measured the temperature of the metal block every 60 seconds.
The table below shows the student's results.

Time in s	Temperature in °C
0	20.0
60	24.5
120	29.0
180	31.0
240	31.5

(a) Complete the graph of the data from the table above on the graph below.

- Choose a suitable scale for the x-axis.
- Label the x-axis.
- Plot the student's results.
- Draw a line of best fit.

Figure 2



(4)

(b) The rate of change of temperature of the block is given by the gradient of the graph.

Determine the gradient of the graph over the first 60 seconds.

_____

_____

_____

_____

Gradient = _____

(2)

(c) The metal block had a mass of 1.50 kg

The specific heat capacity of the metal was 900 J/kg °C

Calculate the change in thermal energy of the metal during 240 seconds.

Use the Physics Equations Sheet.

Give your answer in kilojoules.

_____

_____

_____

_____

_____

_____

_____

_____

Change in thermal energy = _____ kJ

(4)

(d) Another student repeated the investigation.

Give **two** variables this student would need to control to be able to compare their results with the results in the table above.

1. _____

2. _____

(2)

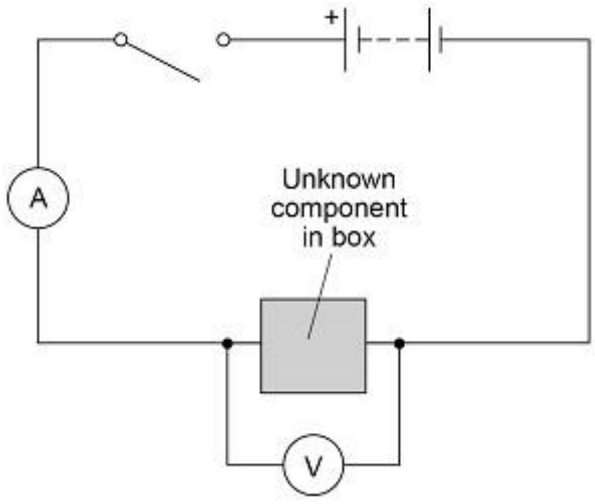
(Total 12 marks)

Q2.

A teacher gave a student an unknown electrical component hidden in a box.

The student connected the box in the circuit shown in **Figure 1**.

Figure 1



(a) The student measured the potential difference across the component and the current in the component.

She repeated this for several values of potential difference.

Give **one** way the circuit could be altered so that the potential difference across the component could be varied.

_____

_____

(1)

(b) Explain why the student needed to switch the circuit off between readings.

_____

_____

_____

_____

(2)

The following table shows the student's results.

Potential difference in volts	**Current in amps**
0.00	0.00
0.20	0.00
0.40	0.00
0.60	0.13
0.80	0.68
1.00	1.50

(c) What was the resolution of the ammeter?

Tick (✓) **one** box.

0.01 A ☐

0.05 A ☐

0.10 A ☐

1.50 A ☐

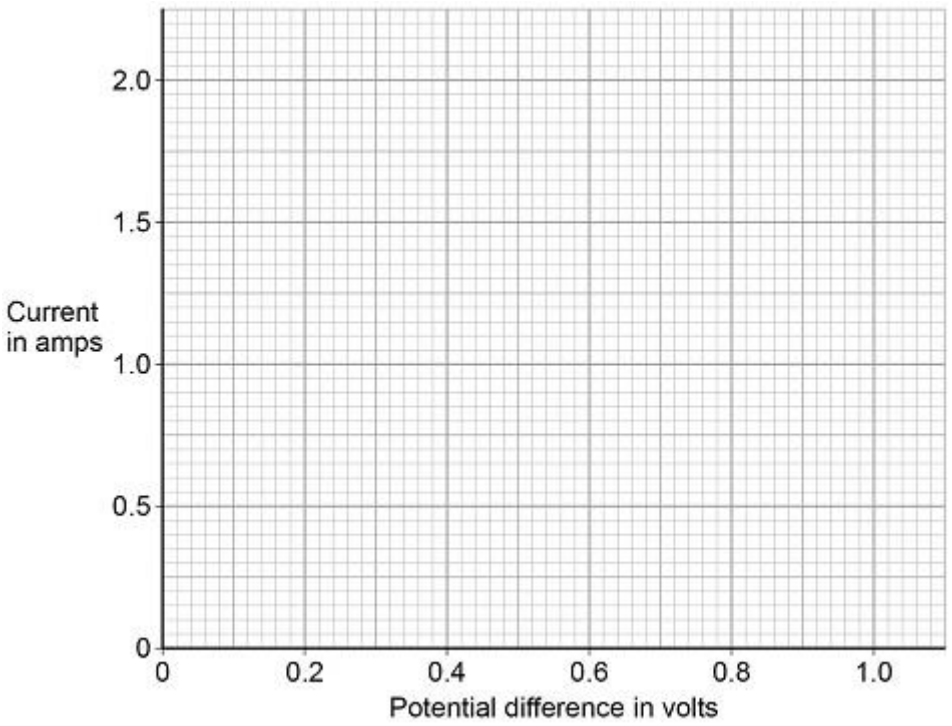
(1)

(d) Complete **Figure 2**.

You should:

- plot the data from the table above
- draw a line of best fit.

Figure 2



(3)

(e) What was the unknown electrical component given to the student?

Tick (✓) **one** box.

Diode ☐

Filament lamp ☐

Resistor ☐

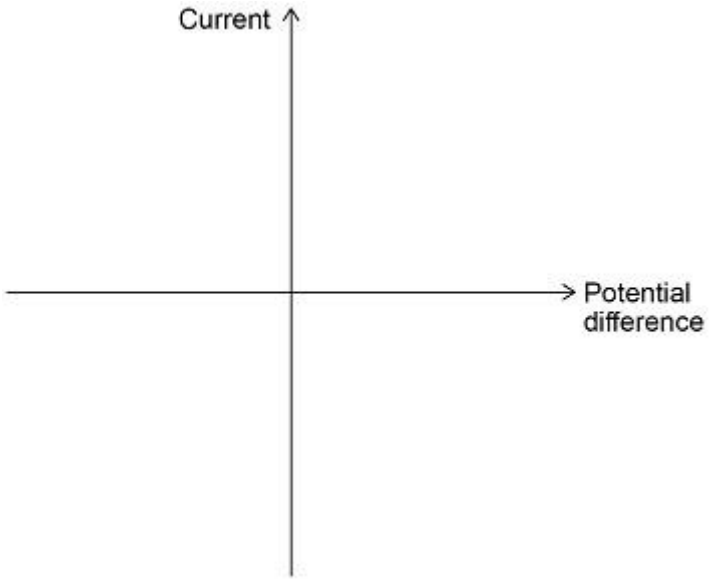
Thermistor ☐

(1)

(f) An ohmic conductor has constant resistance when its temperature is constant.

Sketch a current-potential difference graph for an ohmic conductor at constant temperature on **Figure 3**.

Figure 3



(2)

(Total 10 marks)