Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | | | | | |

Candidate Number | | | | |

Pearson Edexcel International GCSE (9–1)

Sample assessment material for first teaching 2024

Time 1 hour 10 minutes

Paper reference **4WSD5/1P**

Physics
UNIT 5
Science (Double Award) (Modular)

You must have:
Ruler, calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this unit is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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FORMULAE

You may find the following formulae useful.

energy transferred = current × voltage × time $E = I \times V \times t$

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)

$v^2 = u^2 + (2 \times a \times s)$

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

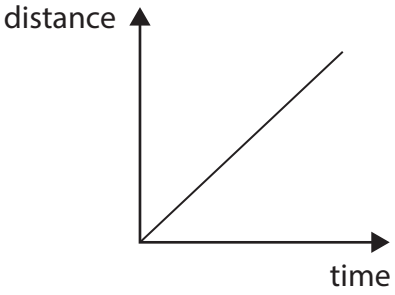
Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

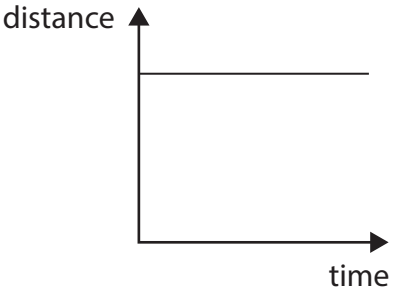
1 The motion of an object can be represented using graphs.

(a) The graphs, P, Q, R and S, show different types of motion.

P



Q



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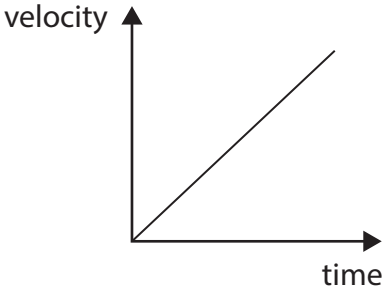
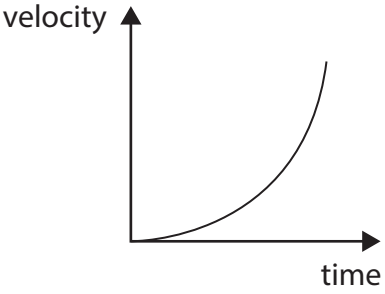


S



The table lists some types of motion.

Place one tick (✓) in each row of the table to show which graph represents which type of motion.

(4)

	Graph			
Types of motion	**P**	**Q**	**R**	**S**
constant acceleration				
increasing acceleration				
moving at constant velocity				
stationary				

(b) State the feature of a velocity-time graph that can be used to determine the distance travelled by an object.

(1)

.....

(Total for Question 1 = 5 marks)

2 A student is given five metal cubes, each with a volume of 1.0 cm^3.

Each cube is made from a different metal.

The student measures the mass of each cube to determine the density of each metal.

These are the student's results for the mass of each cube.

copper = 9.0 g

brass = 8.7 g

aluminium = 2.7 g

iron = 7.9 g

zinc = 7.1 g

Draw a results table of the student's results.

Include a column to show the density of each metal in g / cm^3.

(4)

(Total for Question 2 = 4 marks)

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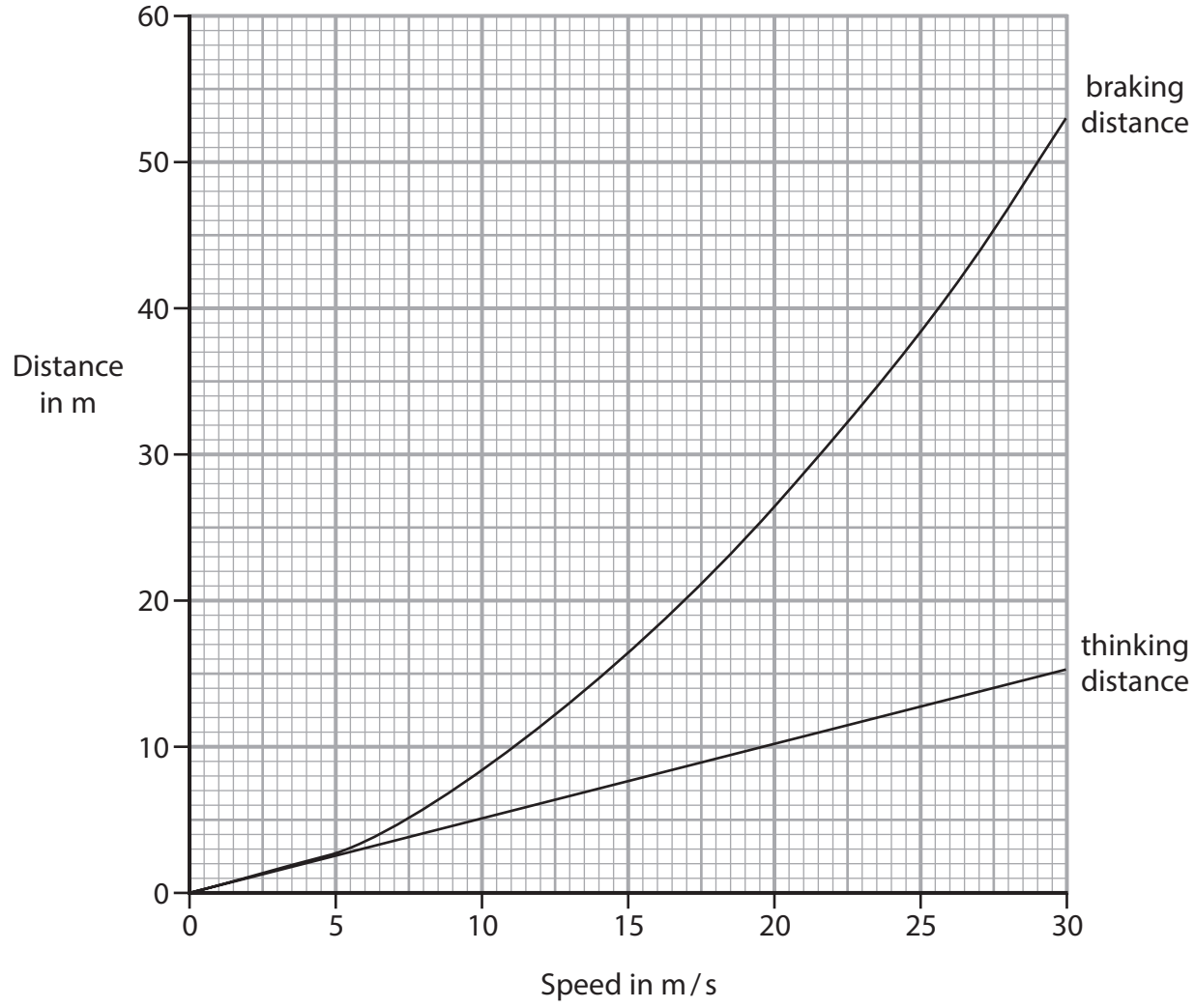
3 The graph shows how the thinking distance and the braking distance vary with the speed of a car.



(a) Which of these does **not** affect thinking distance?

(1)

- ☒ **A** alcohol consumed by the driver
- ☒ **B** condition of the road
- ☒ **C** speed of the car
- ☒ **D** tiredness of the driver

(b) Which of these would increase the braking distance of the car?

(1)

- ☒ **A** faster reaction time of the driver
- ☒ **B** ice on the road
- ☒ **C** more powerful brakes
- ☒ **D** tyres with more grip

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(c) Determine the stopping distance of the car when the speed of the car is 20 m/s.

(3)

stopping distance = ... m

(d) (i) State the formula linking average speed, distance moved and time taken.

(1)

(ii) Determine the reaction time of the driver of the car.

(3)

reaction time = ... s

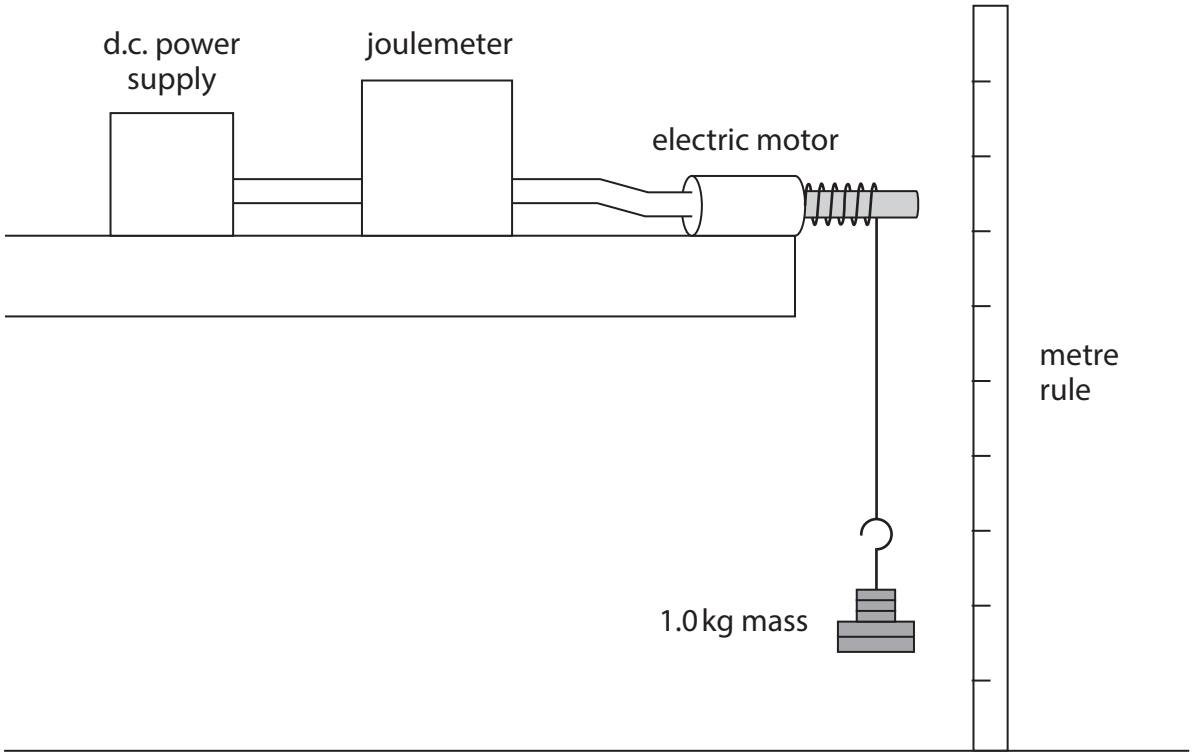
(e) Calculate the mean braking acceleration of the car as it brakes to a stop from an initial speed of 30 m/s.

(4)

acceleration = ... m/s^2

(Total for Question 3 = 13 marks)

4 A student uses this apparatus to investigate how the efficiency of an electric motor varies with its input voltage.



This is the student's method.

- connect the electric motor to a d.c. power supply and a joulemeter
- attach a 1.0 kg mass to the electric motor using a length of string
- set the voltage of the power supply to 10 V and switch on the power supply
- switch off the power supply when the mass has been lifted through a distance of 50 cm
- record the input energy to the motor from the joulemeter
- calculate the energy transferred to the gravitational store of the mass
- calculate the efficiency of the motor

The student repeats this process, setting the power supply to a different voltage each time.

(a) Give **two** control variables for the investigation.

(2)

1 .....

2 .....

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(b) Show that the gravitational store of the 1.0 kg mass increases by 5.0 J when it is lifted through a distance of 50 cm.

(2)

(c) The table shows the student's results.

Power supply voltage in V	Joulemeter reading in J	Motor efficiency (%)
3.0	99.4	5.0
3.5	25.5	19.6
4.0	16.5	30.3
5.0	13.5	37.0
6.0	12.6	39.7
8.0	12.8	39.1
10.0	12.7	

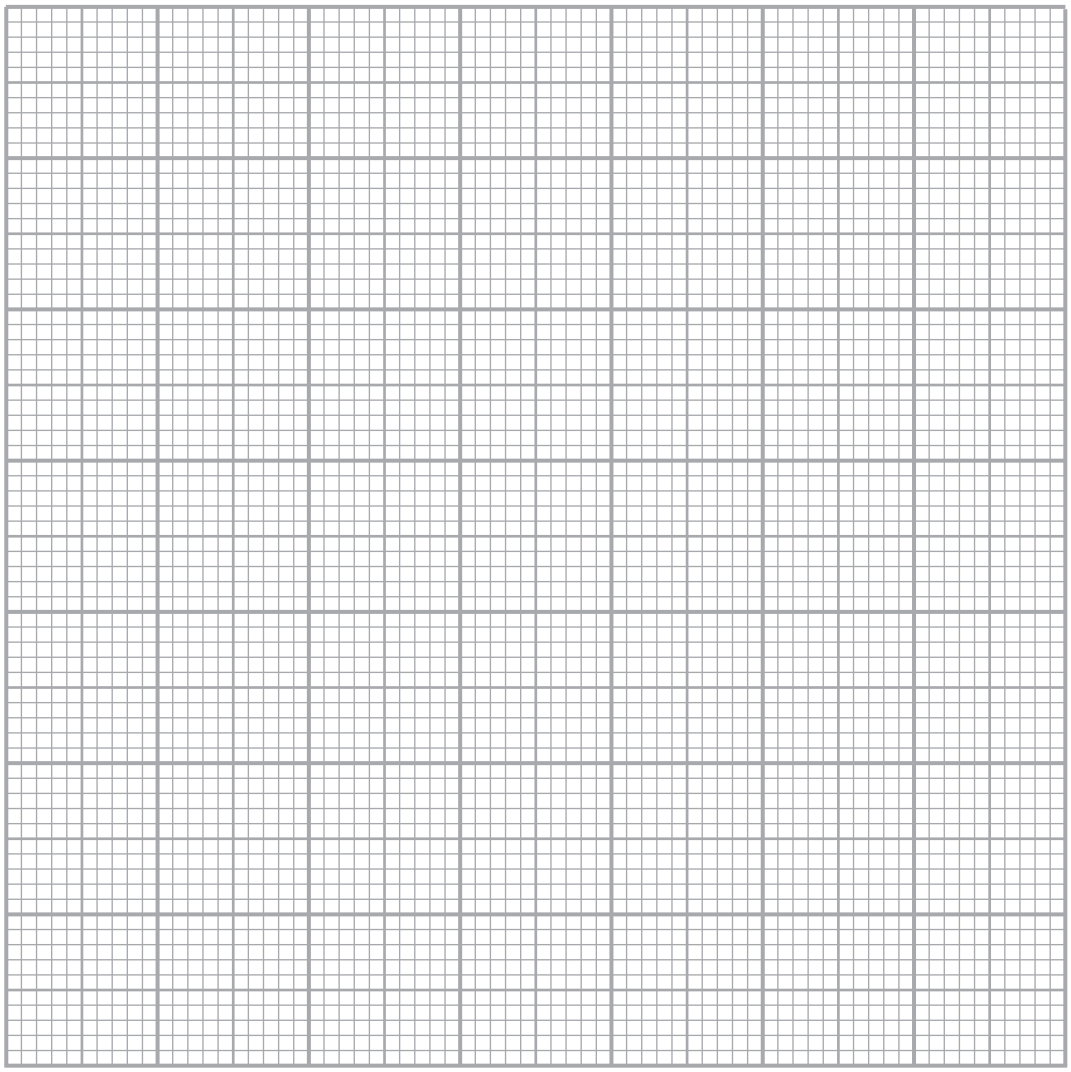
(i) Calculate the motor efficiency when the power supply is set to a voltage of 10 V.

(3)

efficiency = ... %

(ii) Plot a graph of the motor efficiency on the y-axis against the power supply voltage on the x-axis.

(3)



(iii) Draw a curve of best fit.

(2)

(iv) Using the graph, determine the minimum power supply voltage that will allow the electric motor to operate at maximum efficiency.

(1)

power supply voltage = ... V

(Total for Question 4 = 13 marks)

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5 A student uses the circuit shown in diagram 1 to investigate how the current changes with voltage for a filament lamp.

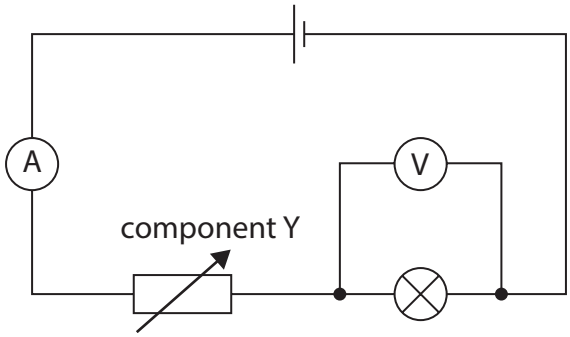


Diagram 1

(a) (i) Give the name of component Y.

(1)

.....

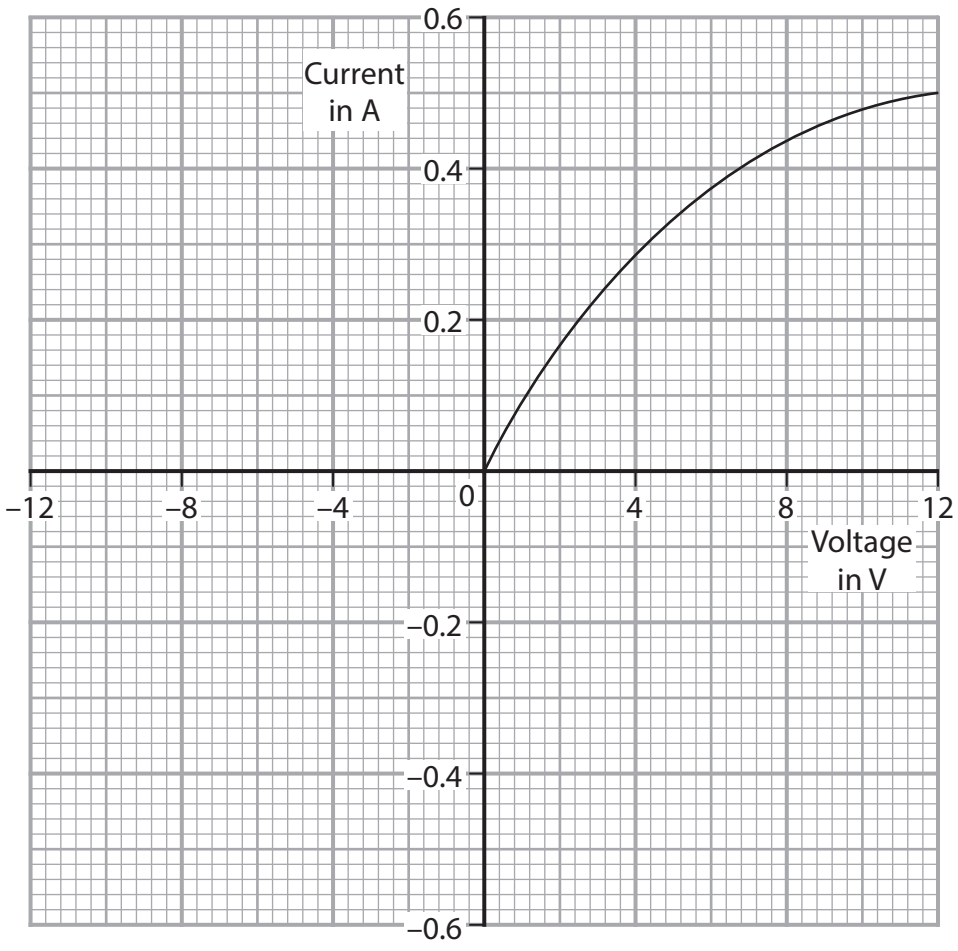
(ii) Give a reason why component Y is included in the circuit.

(1)

.....

.....

(b) The graph shows some of the student's results.



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(i) State the formula linking charge, current and time.

(1)

(ii) Determine the current in the lamp when the voltage across the lamp is 10 V.

(1)

current = ... A

(iii) Calculate the charge transferred through the lamp in 30 s when the voltage across the lamp is 10 V.

Give the unit.

(3)

charge = ... unit .....

(iv) Calculate the time for the lamp to transfer 250 J of energy when the voltage across the lamp is 10 V.

(3)

time = ... s

(v) The student disconnects the cell and reconnects it with its terminals reversed.

Complete the graph to show how the current in the lamp varies with voltage across the lamp when the cell is connected with its terminals reversed.

(2)

(c) The student replaces the filament lamp with a light emitting diode (LED) and replaces the cell with an alternating current (a.c.) power supply, as shown in diagram 2.

The student also removes the ammeter and voltmeter from the circuit.

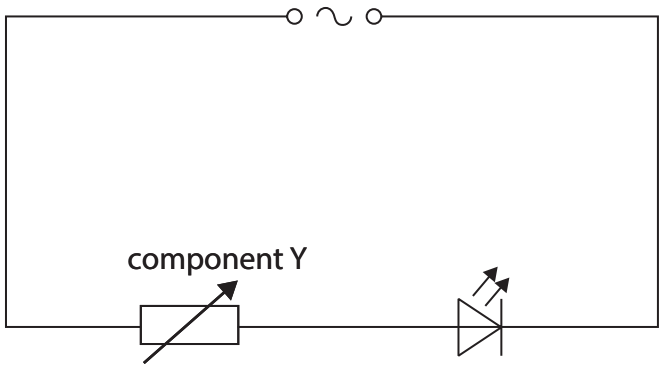


Diagram 2

Explain why the LED flashes on and off in this circuit.

(2)

.....

.....

.....

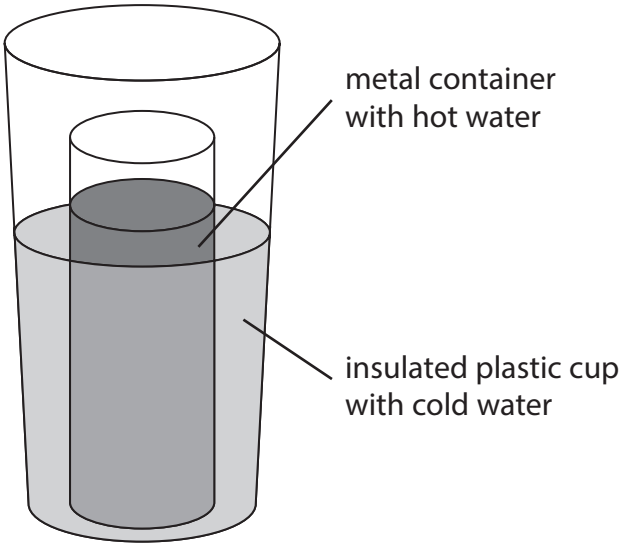
.....

.....

.....

(Total for Question 5 = 14 marks)

6 A student pours a known volume of hot water into a metal container. They place the metal container into an insulated plastic cup containing an equal volume of cold water.

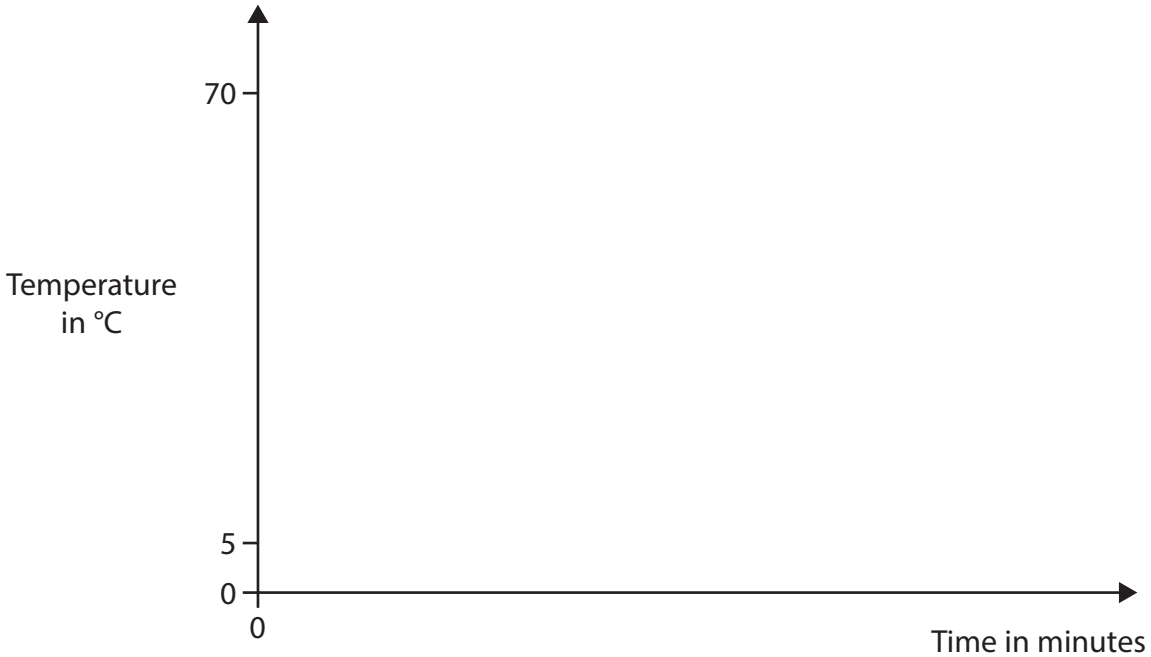


The student uses temperature probes to measure the temperatures of both the water in the metal container and the water in the plastic cup.

The hot water has an initial temperature of 70 °C and the cold water has an initial temperature of 5 °C.

(a) On the axes, sketch how the temperature of the hot water and the temperature of the cold water vary with time.

(4)



(b) Explain why the temperatures of the hot water and the cold water change.

You should refer to different types of thermal energy transfer in your answer.

(4)

(c) Explain how placing a lid on the plastic cup would affect the results.

(3)

(Total for Question 6 = 11 marks)

TOTAL FOR UNIT = 60 MARKS

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