

Physics

Standard and higher level · Predicted paper · November 2026

Paper 1B

40 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- Write your answers in the spaces provided.
- A calculator is required for this paper.
- A clean copy of the physics data booklet is required for this paper.

2 structured questions [20 marks].

Answers must be written within the answer boxes provided.

The maximum mark for this paper is **[20 marks]**.

1. A student determines the specific heat capacity of aluminium.

An aluminium block has two holes. An electric heater is placed in one hole. A digital thermometer is placed in the other hole. The block is surrounded by insulation.

The diagram shows the block and the electrical circuit.

The mass of the block is (0.998 ± 0.001) kg.

The voltmeter reading is (11.8 ± 0.1) V. The ammeter reading is (3.95 ± 0.05) A. These readings do not change during the experiment.

The heater is turned on at time $t = 0$. The student records the temperature θ of the block every 60 s. The uncertainty in each temperature reading is ± 0.5 °C. The uncertainty in t is negligible.

The table shows the data.

diagram not to scale

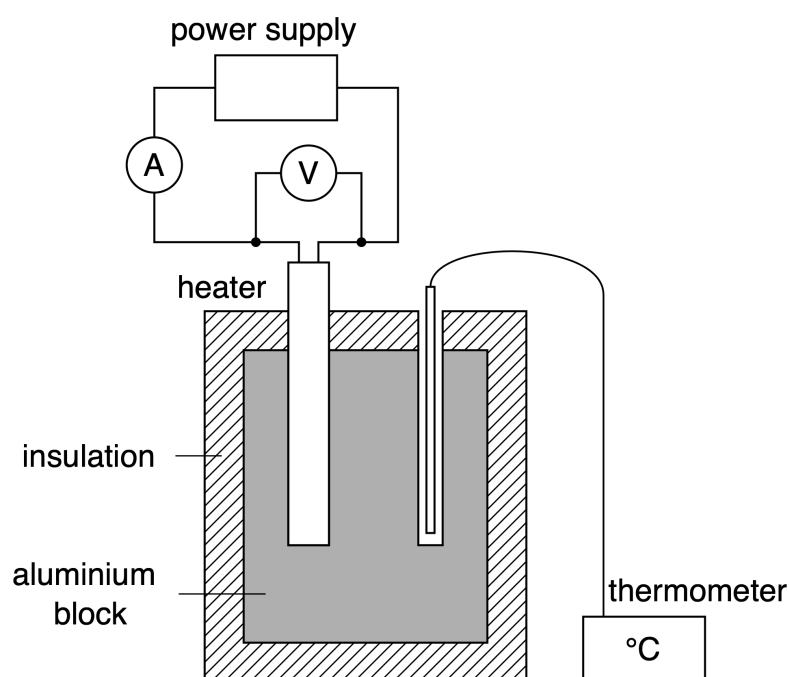


Figure 1

t / s	$\theta / ^\circ\text{C}$
0	21.0
60	24.1
120	27.0
180	30.0
240	33.2
300	36.1
360	39.0
420	41.8
480	44.3
540	46.3
600	48.6

Figure 2

- (a) State why the block is surrounded by insulation. [1]

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- (b(i)) Calculate the power delivered to the heater. [1]

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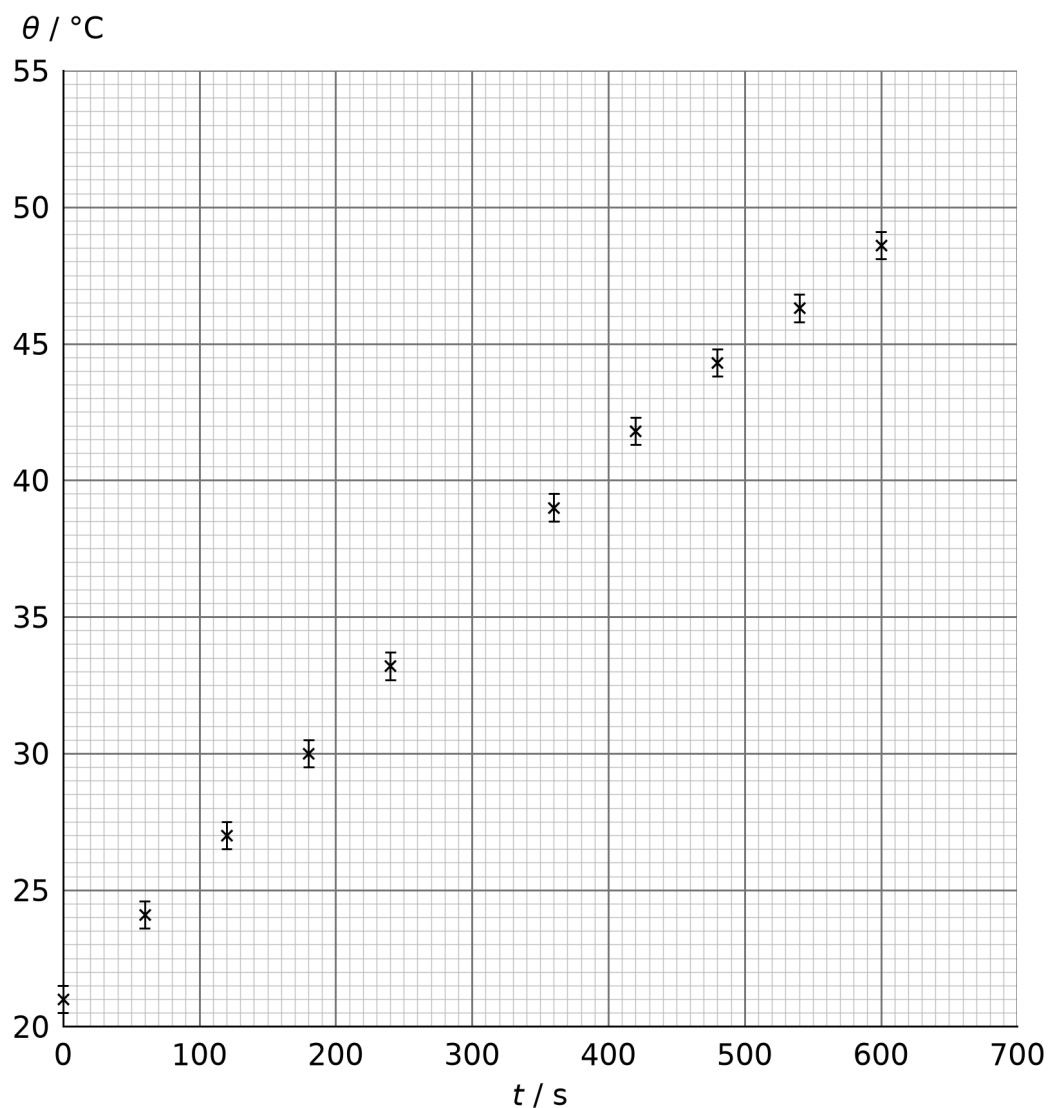
- (b(ii)) Calculate the percentage uncertainty in the power. [2]

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Graph 1

- (c(i)) The graph shows the variation of θ with t . The data point for $t = 300$ s is not plotted. Plot the data point for $t = 300$ s on the graph, including its uncertainty bar. [1]
- (c(ii)) Draw the straight line of best fit for the data in the region where the temperature increases uniformly. [1]
- (c(iii)) Determine the gradient of the line drawn in (c)(ii), including its unit. [2]

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- (d) Calculate the specific heat capacity of aluminium using your answer to (c)(iii). **[1]**

- (e) Explain whether the value calculated in (d) is larger or smaller than the accepted value of the specific heat capacity of aluminium. Refer to the data in the graph in your answer. **[2]**

2. A student investigates the oscillations of a mass that hangs from a vertical spring.

The student hangs a total mass m from the spring. The student pulls the mass down a small distance and releases it. The student uses a stopwatch to measure the time for 20 oscillations. The student makes two measurements, t_1 and t_2 , of this time for each of six values of m . The uncertainty in m is negligible.

The student wants to determine the spring constant k of the spring. The student uses the relationship

$$T^2 = (4\pi^2/k)m + c$$

where

T is the period of the oscillations

m is the total mass hanging from the spring

k is the spring constant

c is a constant.

The table shows the data. T is calculated from the mean of t_1 and t_2 . Two values for $m = 0.400$ kg are missing.

m / kg	t_1 / s	t_2 / s	T / s	T^2 / s^2
0.100	8.9	8.7	0.440	0.194
0.200	11.6	12.0	0.590	0.348
0.300	14.4	14.0	0.710	0.504
0.400	16.5	16.1		
0.500	18.1	18.3	0.910	0.828
0.600	19.6	20.0	0.990	0.980

Figure 3

- (a) Outline why the student measures the time for 20 oscillations rather than the time for one oscillation.

[1]

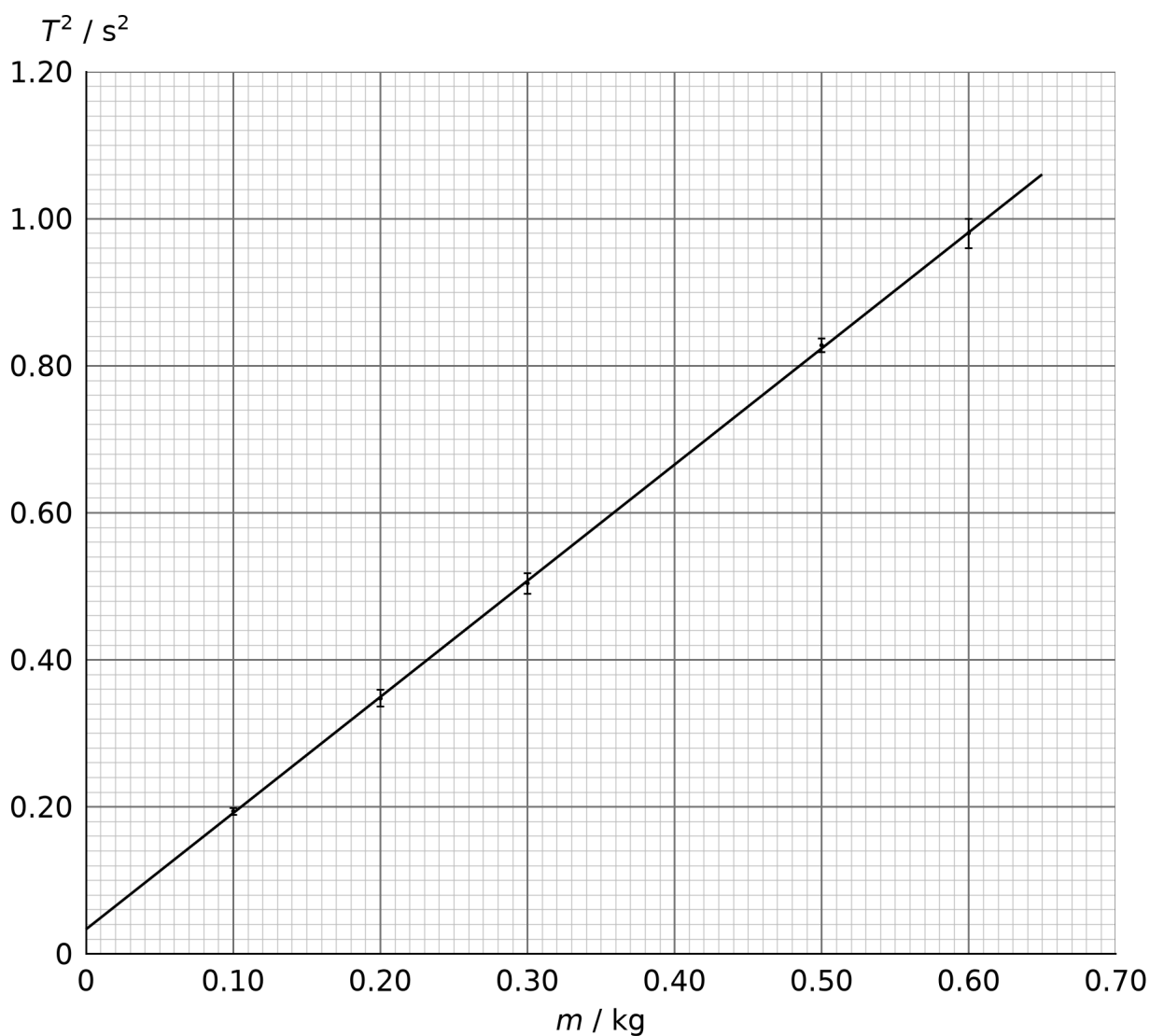
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(b(i)) Calculate T for $m = 0.400$ kg. [1]

(b(ii)) Determine the absolute uncertainty in T^2 for $m = 0.400$ kg. [2]



Graph 2

(c) The student plots a graph of T^2 against m . The graph shows the data for five values of m with their uncertainty bars. The student's line of best fit for all six values of m is drawn.

Plot the data point for $m = 0.400$ kg and its uncertainty bar on the graph.

[1]

(d) Determine k using the line of best fit. State an appropriate unit for your answer. [2]

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(e) Suggest why the line of best fit does not pass through the origin. [1]

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(f) Explain why the student plots T^2 against m rather than T against m . [1]

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Want the mark scheme?

This paper is free to use and free to share. The full mark scheme for Paper 1B — with the marking points, the accepted alternatives and the examiner notes on what does *not* earn the mark — is at the link below, along with the mark schemes for the rest of the predicted set.

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