

GCSE Physics A (Gateway)

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 9

1

A student investigates how the thickness of insulation affects the cooling of a cup of tea.

Fig. 1.1 is a diagram of her apparatus.

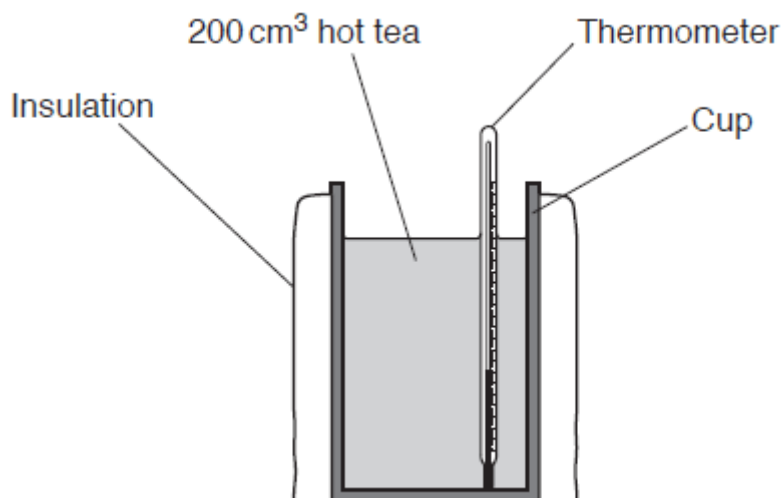


Fig. 1.1

The student wraps a layer of insulation around a cup containing 200 cm³ of hot tea.

She measures the temperature of the tea at the start of the experiment and after 10 minutes.

She repeats the experiment with different thicknesses of the insulation.

Table 1.1 shows her results.

Thickness of the insulation (mm)	Temperature of tea (°C)		
	Start	End	Difference
2	90	65	25
4	88	66	22
6	91	72	19
8	89	73	16
10	98	84	14
12	100	60	

Table 1.1

- (a) (i) Calculate the temperature **difference** when the thickness of insulation is 12 mm.

$$100 - 60 = 40$$

Temperature difference =40..... °C

[1]

(ii) The result when the thickness of the insulation is 12 mm is anomalous.

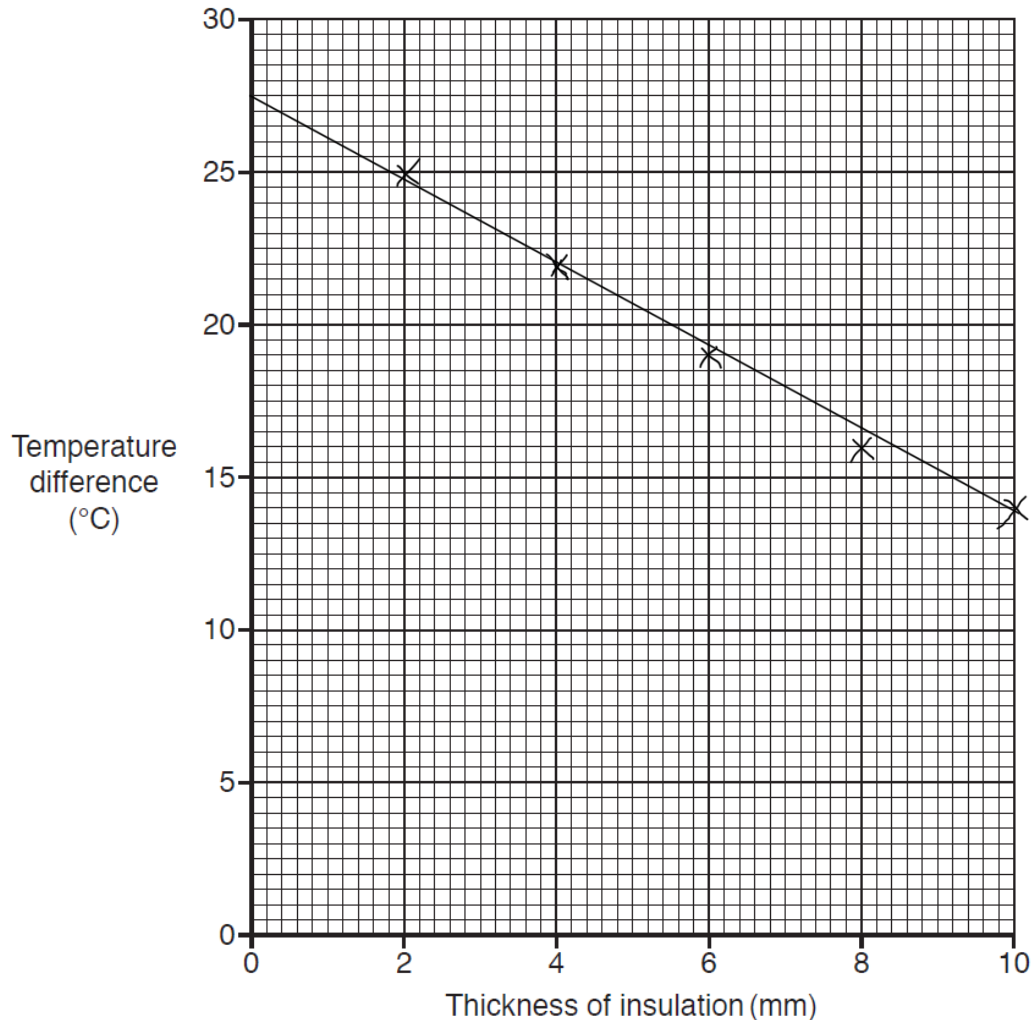
Suggest a reason why this result appears to be anomalous.

There may have been a tear/gap in the insulation.

[1]

(b) Plot a graph of the results in **Table 1.1** and draw a line of best fit.

Ignore the anomalous result for 12 mm.



[2]

(c) Describe how the temperature difference is affected as the thickness of the insulation increases. As the thickness of the insulation increases, temperature difference decreases.

[1]

(d) Suggest how the thickness of the insulation affects the rate of cooling of the tea. The rate of cooling remains constant (Negative).

[1]

(e) This experiment could be improved.

Describe two different ways of improving the experiment.

- Use a larger range of thicknesses.

- Use cup with a smaller thickness.

[2]

Total Marks for Question Set 9: 8

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