

IGCSE Cambridge Topical Past Papers

PHYSICS

0625 Paper 6

2017 — 2025

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1 - (0625/61_Summer_2017_Q3)



The class is investigating the cooling of water.

Fig. 3.1 shows the apparatus.

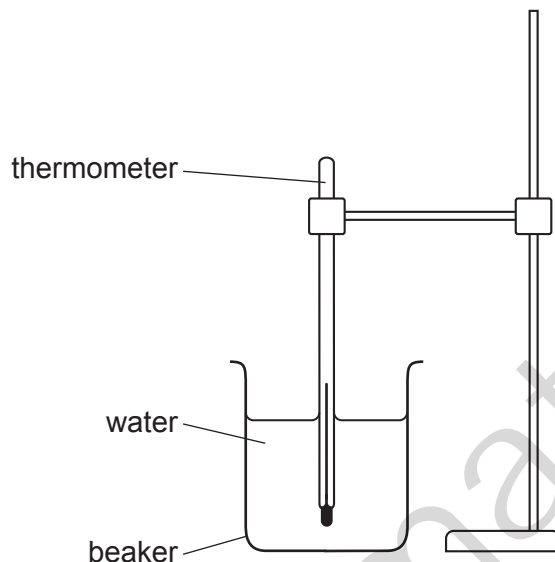


Fig. 3.1

- (a) The thermometer in Fig. 3.2 shows the room temperature θ_R at the beginning of the experiment.

Record θ_R .

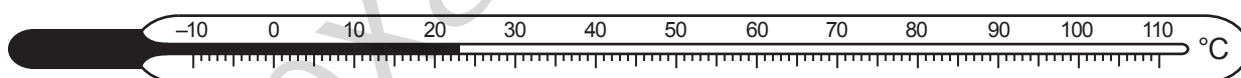


Fig. 3.2

$\theta_R = \dots\dots\dots$ [1]

- (b)
- A student pours 200 cm^3 of hot water into the beaker.
 - She measures the temperature θ of the hot water in the beaker.
 - She immediately starts a stopclock.
 - After 180 s, she measures the temperature θ of the hot water.
 - After 360 s, she measures the temperature θ of the hot water again.

The readings are shown in Table 3.1.

Table 3.1

t/s	$\theta/^\circ\text{C}$
0	85
180	74
360	66

- (i)
- Calculate the temperature fall $\Delta\theta_1$ during the first 180 s.

$$\Delta\theta_1 = \dots\dots\dots$$

- Calculate the temperature fall $\Delta\theta_2$ during the next 180 s.

$$\Delta\theta_2 = \dots\dots\dots [1]$$

- (ii) Suggest why $\Delta\theta_1$ is different from $\Delta\theta_2$.

.....

..... [1]

- (c) Another student plans to investigate the factors affecting the difference between the values of $\Delta\theta_1$ and $\Delta\theta_2$.

Suggest **two** changes that he could make to the procedure to obtain a larger value of this difference.

1.

2.

[2]

- (d) The volume of water used in this experiment is measured using a measuring cylinder. Fig. 3.3 shows a measuring cylinder.

A, **B**, **C** and **D** are four possible lines of sight that could be used to read the volume of the water.

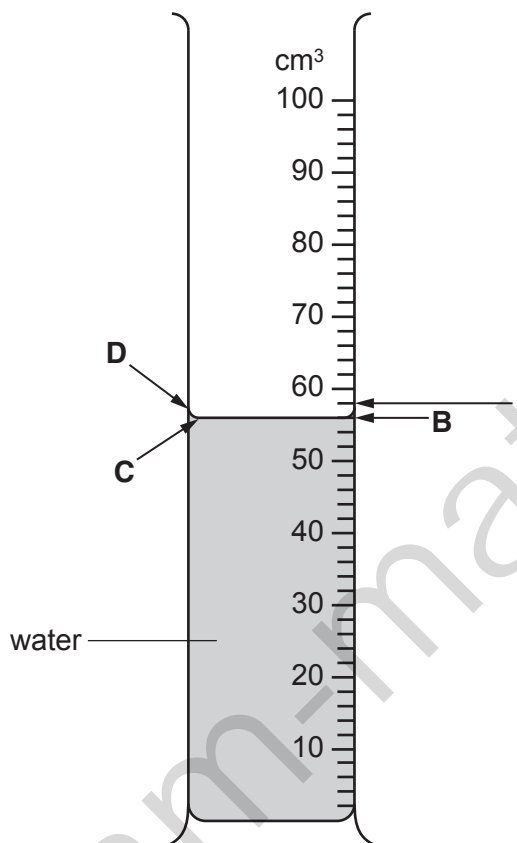


Fig. 3.3

Give **two** reasons why **B** should be used to obtain the most accurate reading.

1.
.....
2.
.....

[2]

[Total: 7]

2 - (0625/63_Summer_2017_Q1)



A student is determining the density of water by two methods.

Method 1

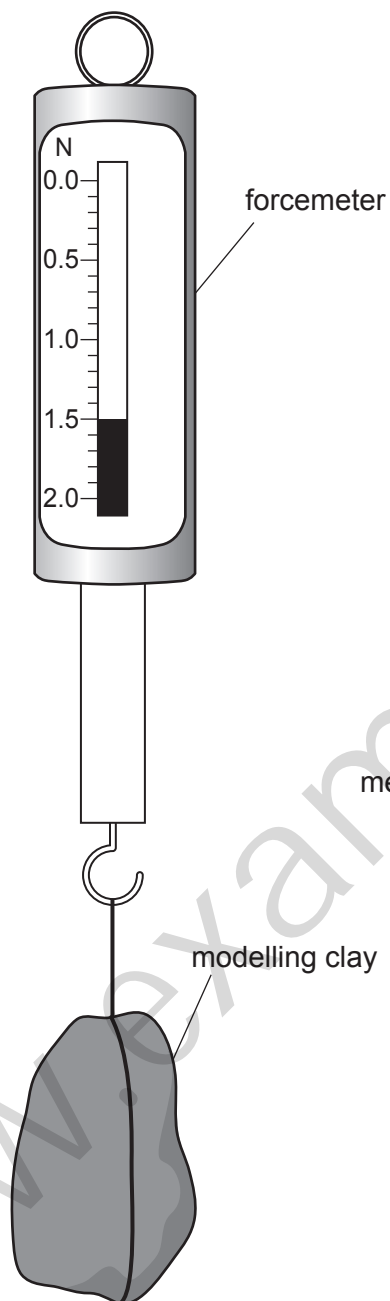


Fig. 1.1

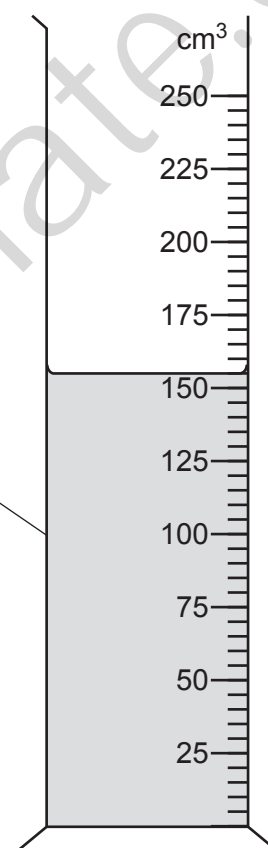


Fig. 1.2

- (a) Record the weight W_1 of the piece of modelling clay shown in Fig. 1.1.

$$W_1 = \dots\dots\dots \text{N} [1]$$

- (b) (i) Record the volume V_1 of the water in the measuring cylinder shown in Fig. 1.2.

$$V_1 = \dots\dots\dots \text{cm}^3 [1]$$

- (ii) Describe briefly how a measuring cylinder is read to obtain an accurate value for the volume of water. You may draw a diagram.

.....[2]

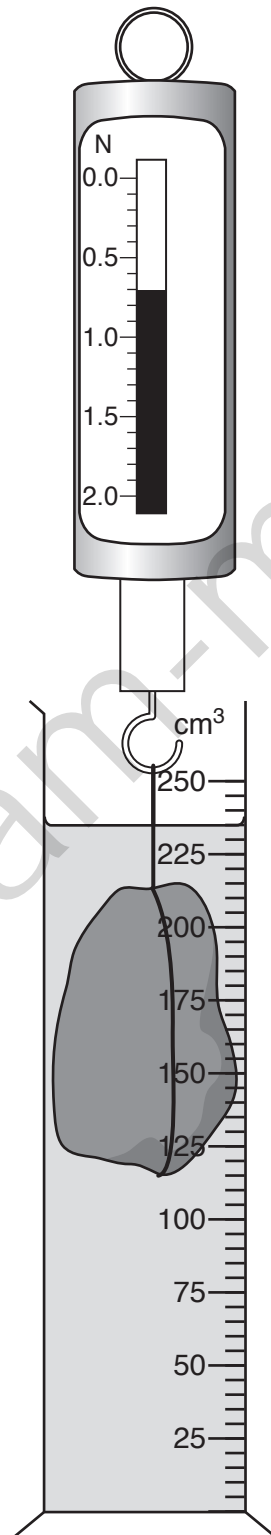


Fig. 1.3

(c) The student lowers the modelling clay into the water, as shown in Fig. 1.3.

- Record the new reading W_2 of the forcemeter.

$$W_2 = \dots\dots\dots \text{ N}$$

- Record the new reading V_2 of the measuring cylinder, with the piece of modelling clay in the water.

$$V_2 = \dots\dots\dots \text{ cm}^3$$

[1]

(d) Calculate a value ρ_1 for the density of water, using your readings from (a), (b) and (c) and the equation

$$\rho_1 = \frac{(W_1 - W_2)}{(V_2 - V_1)} \times k$$

where $k = 100 \text{ g/N}$.

Method 2

(e) The student removes the modelling clay from the water and places the measuring cylinder on a balance.

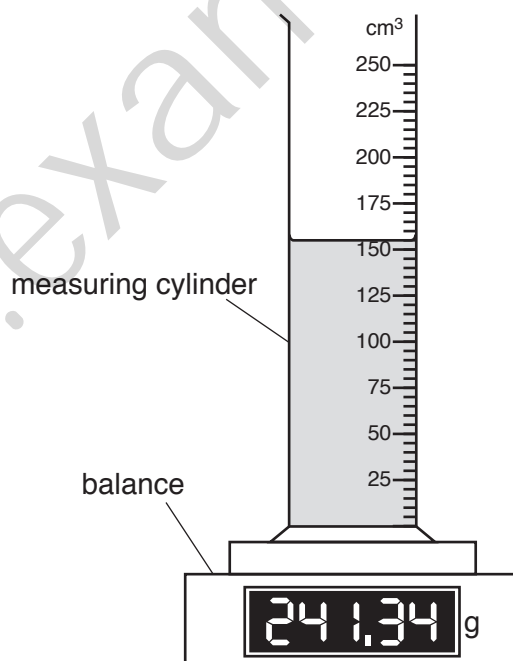


Fig. 1.4

The reading for the mass m_1 of the measuring cylinder and water is shown in Fig. 1.4.

Record m_1 to the nearest gram.

$$m_1 = \dots\dots\dots [1]$$

- (f) The student pours the water out of the measuring cylinder and measures the mass m_2 of the empty measuring cylinder.

$$m_2 = \dots\dots\dots 93 \dots\dots\dots \text{g}$$

- Calculate a second value ρ_2 for the density of water, using your readings from (b), (e) and (f) and the equation

$$\rho_2 = \frac{(m_1 - m_2)}{V_1} .$$

$$\rho_2 = \dots\dots\dots$$

- Calculate an average value ρ_{AV} for the density of water, using your results for ρ_1 and ρ_2 .

$$\rho_{AV} = \dots\dots\dots [1]$$

- (g) Suggest a possible source of inaccuracy in either **Method 1** or **Method 2**, even when they are carried out carefully.

Explain how an improvement might be made to reduce this inaccuracy.

suggestion

.....

improvement

.....

[2]

[Total: 11]

3 - (0625/61_Winter_2017_Q3)



A student is investigating whether the diameter of a pendulum bob affects the period of a pendulum. The period is the time taken for one complete oscillation of the pendulum. Fig. 3.1 shows a pendulum.

Fig. 3.2 shows one complete oscillation.

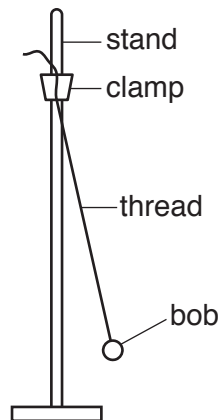
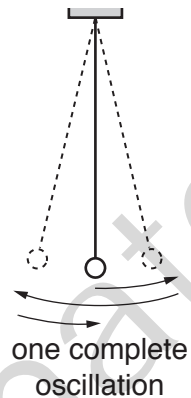


Fig. 3.1



Fi 3.2

The student has the following apparatus:

pendulum bobs made of polystyrene with diameters 1 cm, 2 cm, 3 cm, 4 cm and 5 cm
a supply of thread and a pair of scissors
clamp and stand.

Plan an experiment to investigate whether the diameter of a pendulum bob affects the period of a pendulum.

You should:

- list additional apparatus that you would require
- explain briefly how you would carry out the investigation
- state the key variables that you would control
- draw a table with column headings, to show how you would display your readings (You are **not** required to enter any readings in the table.)
- explain briefly how you would use your readings to reach a conclusion.

.....[7]

[Total: 7]

4 - (0625/62_Winter_2017_Q1)

ANSWER

A student is comparing the oscillations of two pendulums. Fig. 1.1 shows the first pendulum.

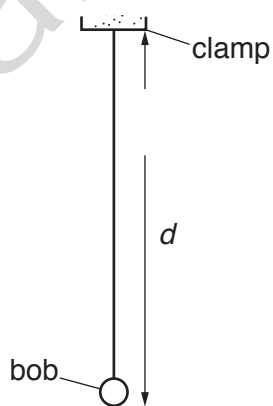


Fig. 1.1

- (a) (i) On Fig. 1.1, measure the distance d , from the bottom of the clamp to the bottom of the bob.

$d =$ cm [1]

- (ii) Fig. 1.1 is drawn $1/10^{\text{th}}$ actual size. Calculate the actual distance D from the bottom of the clamp to the bottom of the bob.

$$D = \dots\dots\dots \text{cm} [1]$$

- (iii) Explain briefly how to use a set-square to avoid a parallax (line-of-sight) error when measuring the length of this pendulum. You may draw a diagram.

.....
 [1]

- (b) The student displaces the bob slightly and releases it so that it swings. She measures the time t for 20 complete oscillations. The time t is shown on the stopwatch in Fig. 1.2.



Fig. 1.2

- (i) Write down the time t shown in Fig. 1.2.

$$t = \dots\dots\dots [1]$$

- (ii) Calculate the period T_1 of the pendulum. The period is the time for one complete oscillation.

$$T_1 = \dots\dots\dots [2]$$

- (c) The student repeats the procedure using another pendulum as shown in Fig. 1.3. This has a long, thin pendulum bob. The distance D from the bottom of the clamp to the bottom of the pendulum bob is the same as for the first pendulum.

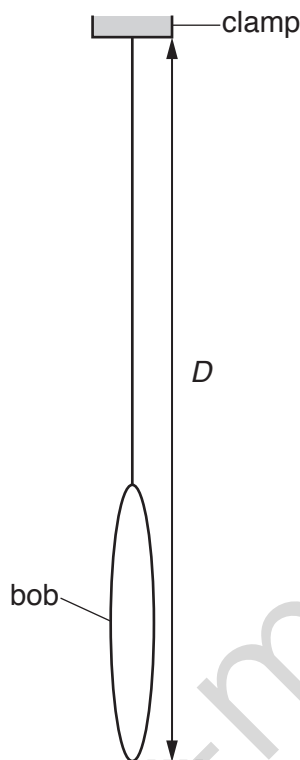


Fig. 1.3

She determines the period T_2 of this pendulum.

$T_2 = \dots\dots\dots 1.37 \text{ s}$

In this experiment, both pendulum bobs have the same mass. A student suggests that since both pendulums have the same overall length D and mass, the periods T_1 and T_2 should be equal. State whether the results support this suggestion. Justify your answer by reference to the results.

statement

justification

.....

..... [2]

- (d) The period T of a pendulum can be determined by measuring the time t for 20 complete oscillations and then calculating the period. Some students are asked to explain the reason for this method being more accurate than measuring the time taken for a single oscillation.

Tick the box next to the sentence that gives the best explanation.

- The method eliminates errors from the measurements.
- The method is more accurate because the experiment is repeated.
- The method includes more readings so there is less chance for errors.
- The method reduces the effect of errors when starting and stopping the stopwatch.

[1]

- (e) A student plans to carry out more pendulum experiments. He considers possible variables and precautions to improve accuracy.

In the following list, mark the possible variables with the letter **V** and the precautions with the letter **P**.

- amplitude of swing
- length of pendulum
- mass of pendulum bob
- shape of pendulum bob
- use of a reference point to aid counting
- viewing the rule at right-angles when measuring the length

[2]

[Total: 11]

1 - (0625/61_Summer_2017_Q3)



(a)	23 with unit °C	1
(b)(i)	11 AND 8	1
(b)(ii)	Starting temperature closer to room temperature in the second case (or further from room temperature in the first case)	1
(c)	Two from: Increase draught (over surface of water) Increase temperature of hot water Increase surface area of water Longer time intervals Decrease room temperature Decrease volume of water Use metal can instead of glass beaker Stirring	2
(d)	Any 2 from: Uses bottom of meniscus Perpendicular (to reading) That is where the scale markings are, owtte	2
	Total:	7

2 - (0625/63_Summer_2017_Q1)



(a)	$W_1 = 1.5 \text{ (N)}$	1
(b)(i)	$V_1 = 155 \text{ (cm}^3\text{)}$	1
(b)(ii)	line of sight perpendicular	1
	to bottom of meniscus	1
(c)	$W_2 = 0.7 \text{ (N)}$ <u>and</u> $V_2 = 235 \text{ (cm}^3\text{)}$	1
(d)	$\rho_1 = 1.0$ or ecf	1
	unit g/cm^3	1
(e)	$m_1 = 241 \text{ (g)}$	1
(f)	$\rho_{AV} 0.978 / 0.977 \text{ (g/cm}^3\text{)}$	1
(g)	appropriate cause of inaccuracy: e.g: <ul style="list-style-type: none"> • some water still in empty measuring cylinder • water spilled, splashed when putty put in water • water drops on putty when removed • air bubbles on putty 	1
	suitable improvement: e.g: <ul style="list-style-type: none"> • measure m_2 at start (when cylinder dry) • measure new volume in Method OR refill to correct value • shake putty to remove air / smooth surface to minimise bubbles 	1
Total:		11

3 - (0625/61_Winter_2017_Q3)



MP1	Stopwatch (or equivalent) AND (metre) rule / ruler	1
MP2	Measure time for 5 (+) oscillations	1
MP3	Divide by number of oscillations to find period (T)	1
MP4	Repeat for each bob	1
MP5	Variable; one from: Initial amplitude / starting position Length of pendulum / thread Number of oscillations	1
MP6	Table with column headings for t , or period (T), or both AND d , with correct units	1
MP7	Conclusion: Plot graph(s) of d against period (T) or t (or vice versa) OR compare period (T) or t values for different diameters	1

4 - (0625/62_Winter_2017_Q1)



(a)(i)	$d = 5.0$ (cm)	1
(a)(ii)	$D = 50$ cm	1
(a)(iii)	clear correct use of set-square AND vertical ruler	1
(b)(i)	28.12	1
(b)(ii)	1.406 / 1.41 / 1.4	1
	unit s / secs / seconds seen in 1(b)(i) or 1(b)(ii) at least once	1
(c)	statement to match readings justification to include the idea of within (or beyond e.c.f.)	1
	the limits of experimental accuracy e.g. (very) close / almost equal	1
(d)	final box ticked	1
(e)	V, V, V, V, P, P all correct = 2 marks 4 or 5 correct = 1 mark Fewer than 4 correct = 0 marks	2