IGCSE Cambridge Topical Past Papers

PHYSICS

0625 Paper 6

2017 — 2023

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PHYSICS 0625

TOPICAL PAST PAPER WORKSHEETS

2017 - 2023 | Questions + Mark scheme

AVAILABLE PAPERS

P1	P2	P3	P4	P6
1413 Questions	1401 Questions	511 Questions	491 Questions	177 Questions

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TOPICS	P1	P2	P3	P4	P6
MEASUREMENT & UNITS	76	64	33	15	15
FORCES & MOTION	170	212	64	66	15
FORCES & PRESSURE	101	85	51	43	20
FORCES & ENERGY	88	101	41	40	5
THERMAL EFFECTS	210	181	53	66	35
WAVES & SOUNDS	80	76	39	34	2
RAYS & WAVES	134	129	53	51	37
ELECTRICITY	191	182	54	64	42
MAGNETS & CURRENTS	143	141	60	36	1
ELECTRICITY & ELECTRONICS	72	90	18	26	5
RADIOACTIVITY	130	119	39	41	0
SPACE PHYSICS	18	21	6	9	0

1 - (0625/63_Summer_2017_Q1) - *Measurements And Units*

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

Method 1

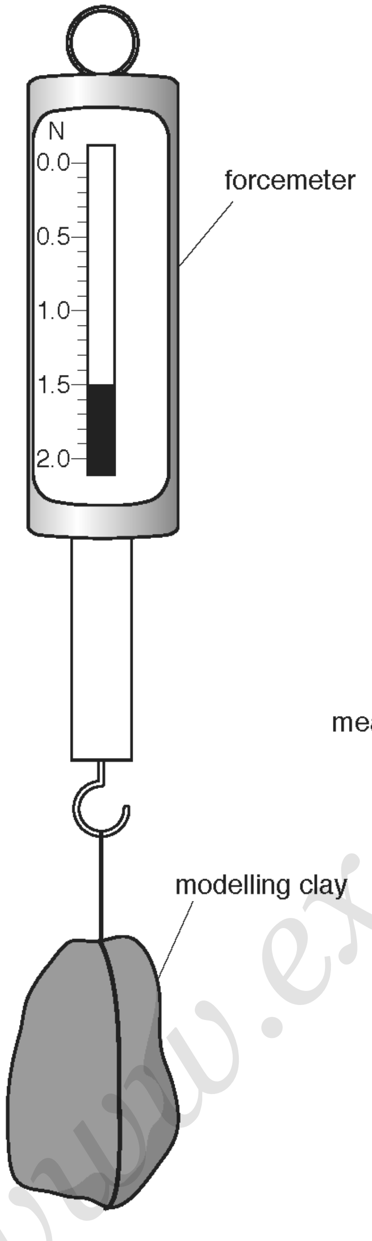

Fig. 1.1

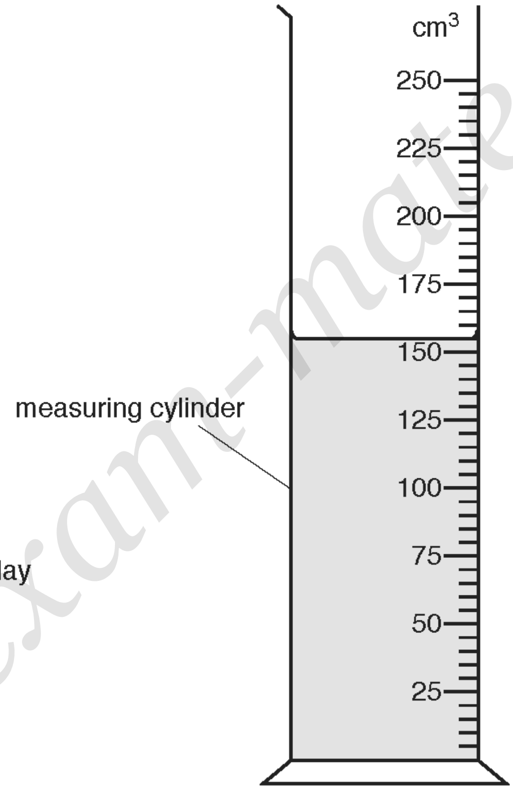

Fig. 1.2

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

W_1 = ... N [1]

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

V_1 = ... 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]

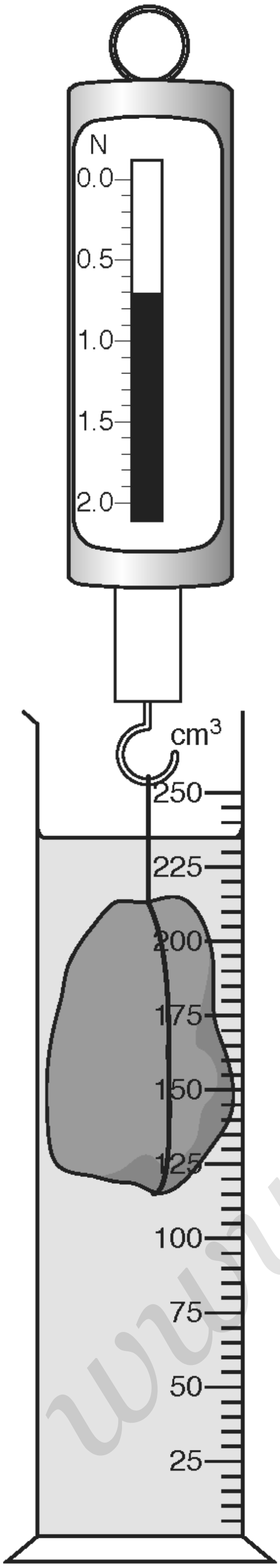

Fig. 1.3

(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 = ... N

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

V_2 = ... 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 g / N.

ρ_1 = ...[2]

Method 2

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

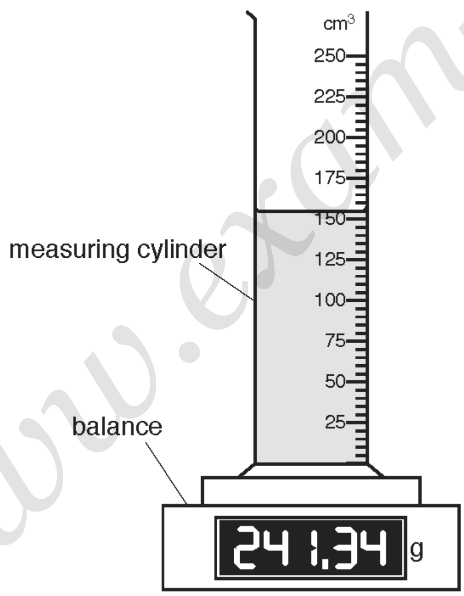

Fig. 1.4

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 = ...[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 = ...93.......... g

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

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

ρ_2 = ...

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

ρ_{AV} = ...

[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]

2 - (0625/61_Summer_2017_Q3) - *Measurements And Units, Thermal Effects*

The class is investigating the cooling of water.

Fig. 3.1 shows the apparatus.

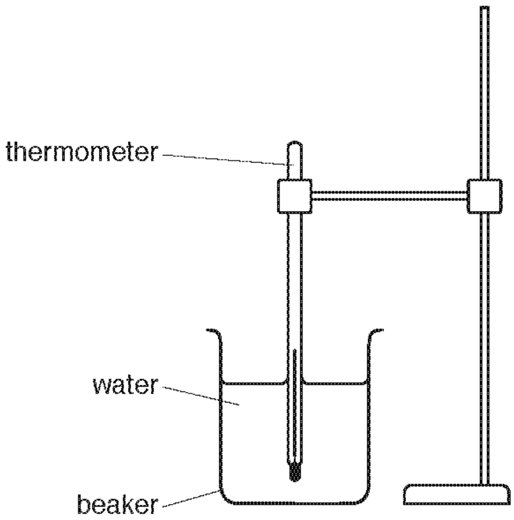

Fig. 3.1

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

Record θ_R.

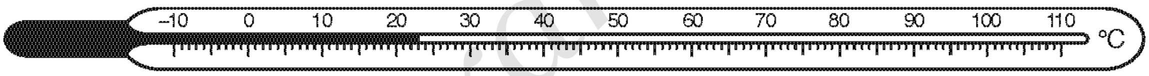

Fig. 3.2

θ_R = ...[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	θ/°C
0	85
180	74
360	66

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

$\Delta\theta_1$ = ...

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

$\Delta\theta_2$ = ... [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.

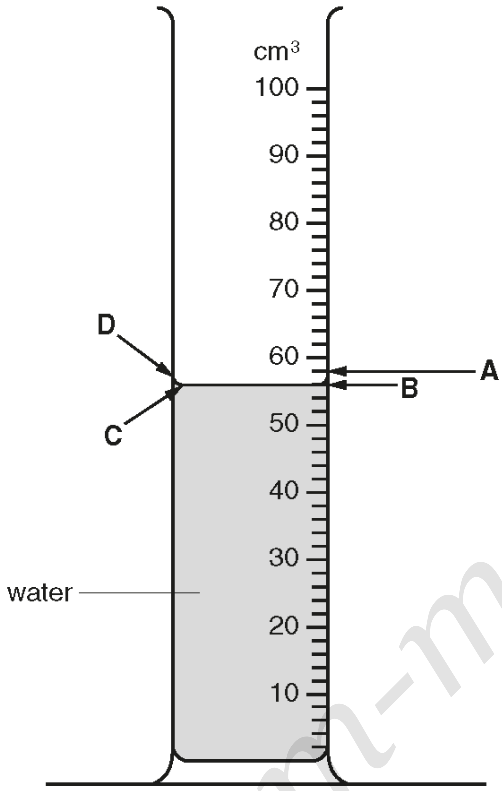

Fig. 3.3

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

1. ....

....

2. ....

.... [2]

3 - (0625/62_Winter_2017_Q1) - *Measurements And Units*

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

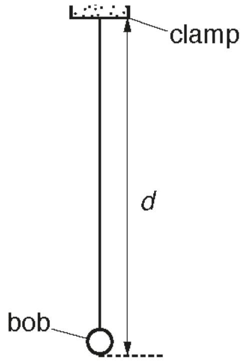

Fig. 1.1

(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 1/10th actual size. Calculate the actual distance *D* from the bottom of the clamp to the bottom of the bob.

D = ... 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 = ...[1]

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

T_1 = ...[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.

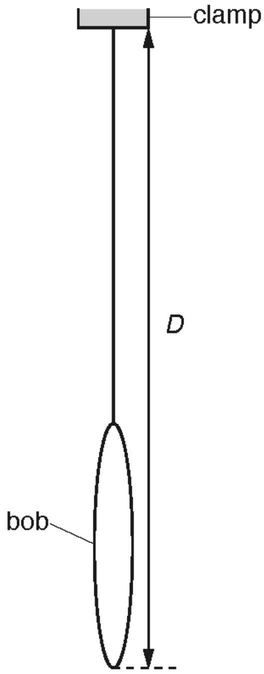

Fig. 1.3

She determines the period T_2 of this pendulum.

T_2 = ...1.37 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]

ANSWERS

1 - (0625/63_Summer_2017_Q1) - *Measurements And Units*

(a)	W_1 = 1.5 (N)	1
(b)(i)	V_1 = 155 (cm^3)	1
(b)(ii)	line of sight perpendicular	1
	to bottom of meniscus	1
(c)	W_2 = 0.7 (N) <u>and</u> V_2 = 235 (cm^3)	1
(d)	ρ_1 = 1.0 or ecf	1
	unit g/cm^3	1
(e)	m_1 = 241 (g)	1
(f)	ρ_{AV} 0.978 / 0.977(g/cm^3)	1
(g)	appropriate cause of inaccuracy: e.g: • 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: • 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

2 - (0625/61_Summer_2017_Q3) - *Measurements And Units, Thermal Effects*

(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

3 - (0625/62_Winter_2017_Q1) - *Measurements And Units*

(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**

4 - (0625/61_Winter_2017_Q3) - *Measurements And Units*

	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**

5 - (0625/61_Summer_2018_Q1) - *Measurements And Units, Forces And Motion*

(a)	*d* = 5(.0) (cm)	**1**
(b)(i)	*D* = 50 (cm)	**1**
(b)(ii)	*t* = 14.06	**1**
(b)(iii)	*T* = 1.406 (allow ecf from 1(b)(ii): *t*/10 (s))	**1**
(b)(iv)	T^2 = 1.98 or 1.99 (allow ecf from 1(b)(iii))	**1**
(b)(v)	*g* = 10.1 (allow ecf from 1(b)(iv))	**1**
(c)(i)	Unit s^2	**1**
(c)(ii)	*g* given to 2 or 3 significant figures	**1**
(d)	Use of additional *d* values **OR** use a larger *d* value	**1**
	Count more swings	**1**
(e)	Any one from: Perpendicular viewing of rule Counting beginning with zero (owtte) Use of fiducial mark (owtte) Use of set-square or horizontal rule to aid measurement of *d* Use rule close to/touching the bob Time taken from centre of swing, (not extremities) Measure length to top and bottom of bob and average Measure string length and add radius of bob measured with callipers or micrometer	**1**