Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | | | |
| CENTRE NUMBER | | CANDIDATE NUMBER | |

*2329403777*

**PHYSICS** **0625/62**

Paper 6 Alternative to Practical **October/November 2017**

**1 hour**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **12** printed pages.

DC (ST/FC) 134120/4


CAMBRIDGE
International Examinations

**[Turn over**

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

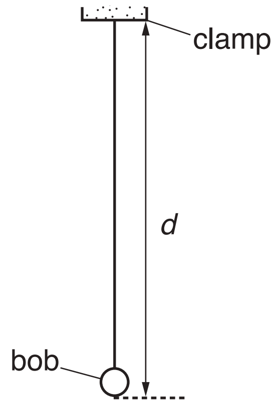


**Fig. 1.1**

**(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$^{th}$ 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.

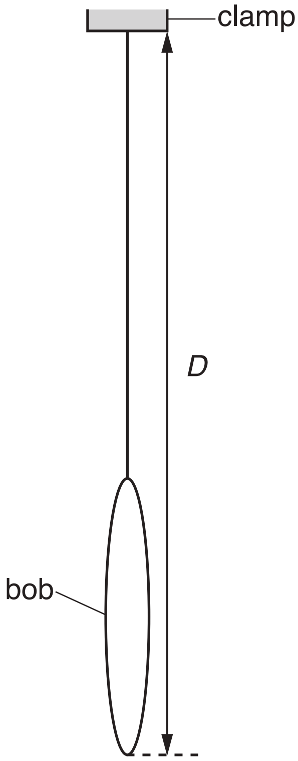


**Fig. 1.3**

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]

[Total: 11]

**2** A student is investigating the cooling of water.

**(a)** The thermometer in Fig. 2.1 shows room temperature $\theta_R$ at the beginning of the experiment. Record $\theta_R$.

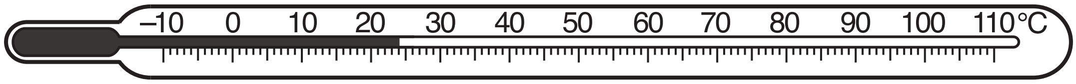


**Fig. 2.1**

$\theta_R$ = ................................................... °C [1]

**(b)** The student pours 50 $cm^3$ of hot water into a beaker.

He measures the temperature $\theta_H$ of the hot water.

$\theta_H$ = .............................86 °C.............................

He adds 50 $cm^3$ of cold water to the beaker. He stirs the water briefly.

He measures the new temperature $\theta_M$ of the water in the beaker.

$\theta_M$ = .............................52 °C.............................

Calculate the temperature fall $\theta_F$ using the equation $\theta_F = (\theta_H - \theta_M)$.

$\theta_F$ = ...........................................................
[1]

**(c)** He repeats the procedure in **(b)** using 100 $cm^3$ of hot water and 100 $cm^3$ of cold water.

$\theta_H$ = .............................84 °C.............................

$\theta_M$ = .............................54 °C.............................

Calculate the temperature fall $\theta_F$ using the equation $\theta_F = (\theta_H - \theta_M)$.

$\theta_F$ = ...........................................................[1]

**(d)** Suggest **one** reason for stirring the water before reading $\theta_M$.

.............................................................................................................................................

.............................................................................................................................................[1]

**(e)** A student states that the temperature fall $\theta_F$ should be the same each time because the proportions of hot and cold water are the same.

Suggest **one** reason why $\theta_F$ could be significantly different in **(b)** and **(c)**.

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**(f)** Suggest an improvement to the apparatus to make it more likely that $\theta_F$ would be the same each time.

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**(g)** Suggest a condition, not included in your answer to **(f)**, that you would control to make it more likely that $\theta_F$ would be the same each time.

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**(h)** The student uses a measuring cylinder to measure the volume of water he uses. Draw a measuring cylinder about half-full of water. Show clearly on your diagram the line-of-sight required for obtaining a correct reading for the volume of water.

[3]

[Total: 10]

**3** A student is determining the focal length $f$ of a lens.

Fig. 3.1 shows the apparatus used.

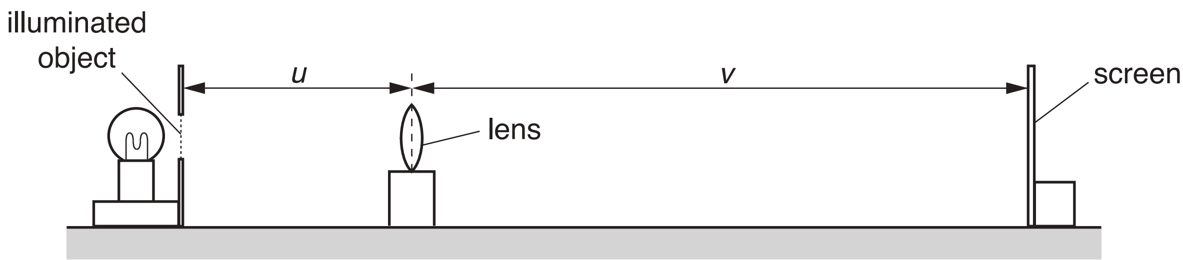


**Fig. 3.1**

**(a)**
- The student places the screen about 100 cm from the illuminated object.
- She places the lens between the object and the screen so that the centre of the lens is at a distance $u$ = 20.0 cm from the object.
- She adjusts the position of the screen until a clearly focused image is formed on the screen.
- She measures the distance $v$ between the centre of the lens and the screen.
- She repeats the procedure using values for $u$ of 22.0 cm, 25.0 cm, 30.0 cm and 35.0 cm.
- The readings are shown in Table 3.1.

**Table 3.1**

| $u$/cm | $v$/cm |
|---|---|
| 20.0 | 60.0 |
| 22.0 | 47.1 |
| 25.0 | 37.5 |
| 30.0 | 29.8 |
| 35.0 | 26.3 |

Plot a graph of $v$/cm ($y$-axis) against $u$/cm ($x$-axis). You do not need to start your axes at the origin (0, 0). Draw the best-fit curve.

[4]

**(b) (i)** • Mark, with a cross, the point on the graph grid where $u$ = 25.0 cm and $v$ = 25.0 cm.

• Mark with a cross, the point on the graph grid where $u$ = 35.0 cm and $v$ = 35.0 cm.

• Join these two points with a straight line. [1]

**(ii)** • Record $u_1$, the value of $u$ at the point where the straight line crosses your graph line.

$u_1$ = ........................................................ cm

• Record $v_1$, the value of $v$ at the point where the straight line crosses your graph line.

$v_1$ = ........................................................ cm

[1]

**(iii)** Calculate the focal length $f$ of the lens using the equation $f = \frac{(u_1 + v_1)}{4}$.

$f$ = ........................................................ cm

[2]

**(c)** Suggest **two** differences that you would expect to see between the appearance of the illuminated object and the image on the screen.

1. ...........................................................................................................................................

2. ...........................................................................................................................................
[2]

**(d)** Suggest **two** precautions that you would take in order to obtain reliable readings in this experiment.

1. ...........................................................................................................................................

2. ...........................................................................................................................................
[2]

[Total: 12]

4 A student has a selection of rubber bands of different widths. He is investigating the extension produced by adding loads. Fig. 4.1 shows the set-up used.

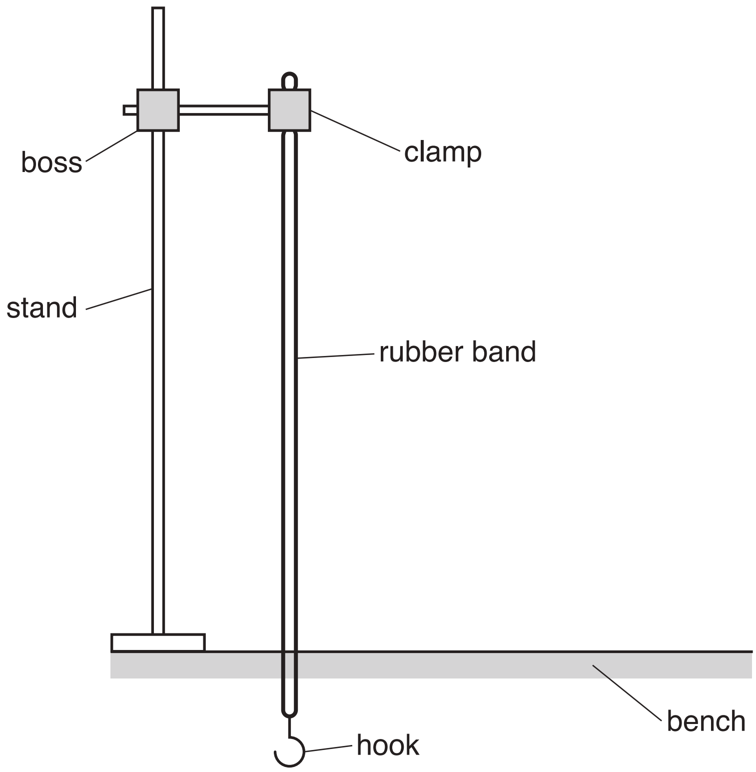


**Fig. 4.1**

In addition to the apparatus shown in Fig. 4.1, the following apparatus is available to the student:

A metre rule
A selection of different rubber bands
A selection of loads.

Plan an experiment to investigate how strips of rubber of different widths stretch when loaded.

You should

- explain briefly how you would carry out the investigation
- state the key variables that you would control
- draw a table, or tables, 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.

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[Total: 7]