Cambridge Assessment International Education

Interactive

Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 1

Cambridge IGCSE™
Physics 0625

Version 2.0

Cambridge Pathway

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1 In this experiment, you will use a pendulum to determine a value for the acceleration of free fall g.

Carry out the following instructions, referring to Figs. 1.1 and 1.2.

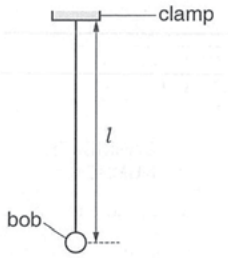

Fig. 1.1

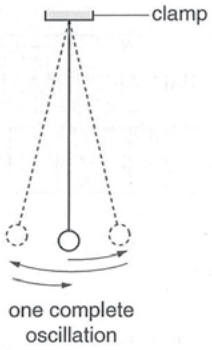

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length $l = 50.0$ cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

Place the meter rule vertically along the pendelum and horizontally level eye with the 50 cm mark and 0cm mark when measuring length of L. [1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

$t =$ 28.3 s [1]

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

$\frac{28.3}{20} = 1.415$
$= 1.42$ s

$T =$ 1.42 s [2]

Select page

HIGH | MIDDLE | LOW

	Your Mark
1(a)	
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1(b)(iii)	
1(c)(i)	
1(c)(ii)	
1(d)(i)	
1(d)(ii)	

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	$t = 27.8 - 29.0$ (s)
(b)(ii)	T correct Unit s
(b)(iii)	More likely to miscount/pendulum may stop swinging
(c)(i)	Correct calculation and unit s^2
(c)(ii)	g between 9 and 11 from correct T and working 2 or 3 significant figures
(d)(i)	Explanation of cause of inaccuracy in measurement of t or l. e.g. student did not react quickly enough when starting/stopping stopwatch OR difficulty in measuring accurately to centre of bob
(d)(ii)	Any two from: Use different length(s) Repeat timing Use of a fiducial mark Increased number of oscillations Plot a graph using length and time or time^2

EXAMINER COMMENTS | MARK SCHEME

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

The number of oscillation may be too large and the speed may change after a while thus the result may not be accurate for T. [1]

(c) (i) Calculate T^2.

$T^2 =$ 2.0164 s^2 [1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$\frac{4\pi^2 \times 50}{2.0164} = 978.93...$

$= 979$ cm/s^2

$= 9.79$ m/s^2

$g =$ 9.79 m/s^2 [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s^2.

(i) Suggest a practical reason why the result obtained from the experiment may be different.

Because we cannot exactly start and stop the timer during the oscillation period because of humans have a reaction rate of 0.04s. [1]

(ii) Suggest two improvements to the experiment.

1. .....

.....

2. .....

.....

[2]

[Total: 11]

Select page

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	Your Mark
1(a)	
1(b)(i)	
1(b)(ii)	
1(b)(iii)	
1(c)(i)	
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EXAMINER COMMENTS

MARK SCHEME

Select page

HIGH | MIDDLE | LOW

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Carry out the following instructions, referring to Figs. 1.1 and 1.2.

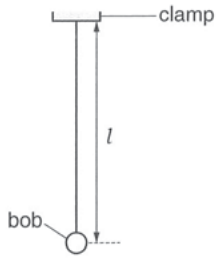

Fig. 1.1

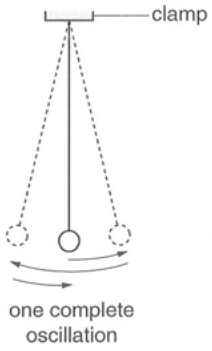

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length $l = 50.0$ cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

View the ruler at right angles

.....[1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

$t =$ 28 ~~15~~ seconds [1]

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

$\frac{28}{20} = 1.4$

$T =$ 1.4 ~~1.33~~ seconds [2]

	Your Mark
1(a)	
1(b)(i)	
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EXAMINER COMMENTS

MARK SCHEME

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

It will take too long ~~and~~ to measure the time for 200 oscillations [1]

(c) (i) Calculate T^2.

1.777...

T^2 = ~~1.78 seconds~~ 1.96 [1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$\frac{4 \times \pi^2 \times 0.5}{1.78^2}$ = ~~H0.455~~ ~~11.10386~~ ~~H08.944515~~

= 10.07

g = ~~1109 11.1~~ 10.1 m/s² [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s².

(i) Suggest a practical reason why the result obtained from the experiment may be different.

There was no air resistance accounted for in my results

[1]

(ii) Suggest two improvements to the experiment.

1. Repeat the experiment to get the average

2. Measure the length from centre of bob

[2]

[Total: 11]

Select page

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1(a)	
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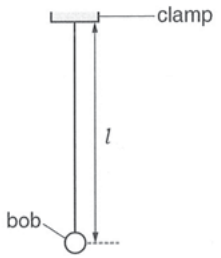

Fig. 1.1

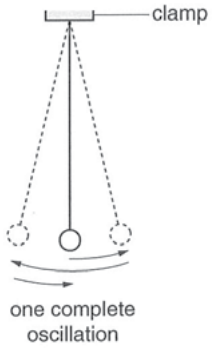

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length $l = 50.0\,\text{cm}$. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

I used a ruler to align the middle of the bob to the rule of measurement as this would avoid error. [1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

$t =$ 37.0 seconds. [1]

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

$\frac{37.0}{20}$ s

$T =$ 1.85 [2]

Select page

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1(a)	
1(b)(i)	
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(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

It would be more accurate as a persons time delay needs to be countered for and it is difficult to count for [1] oscillations

(c) (i) Calculate T^2.

$(1.85)^2 = 3.4225$ (3 S.F)

$T^2 =$ 3.4225 [1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$g = \frac{4\pi^2 \times 50.0}{3.4225} = 1831.584$

3 (S.F)

$= 184$

$g =$ 184 m/s² [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s².

(i) Suggest a practical reason why the result obtained from the experiment may be different.

Because the value of accelaration of freefall may differ slightly from place to place. [1]

(ii) Suggest two improvements to the experiment.

1. To get accurate results we could have made use of a sensor which starts and end time on pendulum crossing it.
2. Run More number of oscillations should be taken.

[2]

[Total: 11]

	Your Mark
1(a)	
1(b)(i)	
1(b)(ii)	
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