Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	• Use of $T = 2\pi\sqrt{\frac{L}{g}}$ (1) • $L = 0.994\,\text{m}$ (1)	Example of calculation: $L = \frac{(2.00\,\text{s})^2 \times 9.81\,\text{m s}^{-2}}{4\pi^2} = 0.994\,\text{m}$	2

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	A description that makes reference to the following points: • Record nT (where n is at least 5) **and** divide by n (to find T) (1) • Time oscillations from equilibrium position of bob using a (fiducial) marker **Or** repeats timings for multiple oscillations and calculate mean (1)		2

Question Number	Acceptable Answer	Additional Guidance	Mark
(c)	• Using the stopwatch there would be reaction time (1) • The uncertainty in the measurement of the time is larger with the stopwatch than with the data logger. (1) • Timing multiple swings (with stopwatch) reduces %U (1) • Light gates are difficult to use with a pendulum bob. (1)	MP2 dependent on MP1	4

Q2.

Question Number	Acceptable answers		Additional guidance	Mark
(i)	• Use of $T = 2\pi\sqrt{\frac{\ell}{g}}$ • $T = 2.24$ (s) (at least 3 sf)	(1) (1)	Example of calculation: $T = 2\pi\sqrt{\frac{1.25\text{ m}}{9.81\text{ m s}^{-2}}} = 2.24\text{ s}$	2

Question Number	Acceptable answers		Additional guidance	Mark
(ii)	• Use of $\omega = \frac{2\pi}{T}$ • Use of $v = -A\omega\sin\omega t$ • $v = 0.21\text{ m s}^{-1}$ (ecf from (i))	(1) (1) (1)	Example of calculation: $\omega = \frac{2\pi}{2.24\text{ s}} = 2.80\text{ rad s}^{-1}$ $v = -7.5\times10^{-2}\text{m} \times 2.80\text{ s}^{-1} \times 1$ $= 0.210\text{ m s}^{-1}$	3

Q3.

Question Number	Acceptable Answers		Additional Guidance	Mark
(i)	• Pendulum A is $\pi/2$ ahead of pendulum B	(1)		1
(ii)	• $T = 1.2$ s from graph • Use of $T = 2\pi\sqrt{(l/g)}$ • $l = 0.36$ m	(1) (1) (1)	$T = 3.0$ s / 2.5 oscillations $1.2\text{ s} = 2\pi\sqrt{(l/9.81\text{ N kg}^{-1})}$ $l = 0.36$ m	3