Answer

FORM 4
CHAPTER 1

Paper 1

1 C	**2** B	**3** A	**4** A	**5** D
6 B	**7** C	**8** A	**9** A	**10** C

Paper 2

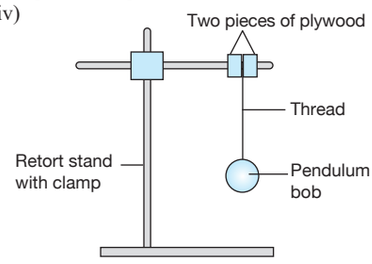
Structured Question

1 (a) (i) Derived quantity
(ii) Base quantity
(b) (i) kg m s^{-2}
(ii) m
(c) Newton (N)
(d) N m^{-1}

2 (a) (i) 3.72 s
(ii) Extrapolation
(iii) Continuous graph pattern
(b) ℓ is directly proportional to T
(c) 22 s^2 m^{-1}

Essay Questions

3 (a) The period of oscillation depends on the length of the pendulum.
(b) The longer the pendulum, the longer the swing period.
(c) (i) To determine whether the period of swing of a pendulum depends on the length of the pendulum.
(ii) Variables:
Manipulated: Pendulum length, ℓ
Responding: Oscillation period, T
Constant: Pendulum mass, m and amplitude of oscillation
(iii) Thread, two pieces of plywood, retort stand and clamps, protractor, pendulum bob, meter rule and stopwatch.
(iv)

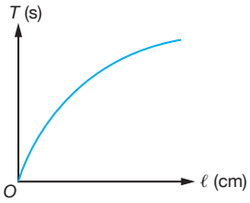


(v) 1. The apparatus is prepared as in the figure above.
2. The length of the pendulum, ℓ is adjusted so that the length from the centre of the pendulum to the hanging point is ℓ = 20.0 cm.
3. The sling is displaced laterally at an angle of less than 10° and released to swing.
4. The time, t_1 of 20 complete oscillations is measured and recorded.
5. Time, t_2 for another 20 complete swings is measured and recorded.
6. Steps 2 to 5 are repeated for ℓ = 30.0 cm, 40.0 cm, 50.0 cm, 60.0 cm and 70.0 cm.
7. Data is recorded in a table.
8. A graph of period of oscillation, t against length, ℓ and a graph of period of oscillation squared, T^2 against length, ℓ plotted against the data.

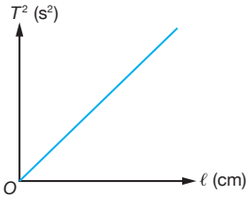
(vi) Data tabulation:

ℓ (cm)	Time for 20 oscillations, t (s)			$T = \frac{t}{20}$ (s)	T^2 (s^2)
	t_1	t_2	Average, t		
20.0					
30.0					
40.0					
50.0					
60.0					
70.0					

(vii) Data analysis



Based on the graph of T against ℓ, the period of oscillation, T increases as the length of the pendulum, ℓ increases. Based on the graph of T^2 against ℓ, T^2 is directly proportional to ℓ because it is a graph of a straight line through the origin.



Conclusion:
The period of oscillation of the pendulum increases as the length of the pendulum increases.