UNIVERS	General Ce	GE INTERNATIONAL EXAMINATIONS rtificate of Education ry Level and Advanced Level
PHYSICS		9702/03
Paper 3 Prac	ctical Test	October/November 2004
		1 hour 15 minutes
	wer on the Question Pa rials: As specified in th	per. ne Confidential Instructions
Write in dark blue or bla You may use a soft pen Do not use staples, pap Answer the <b>one</b> question You are expected to reac the records so that it is handed in. Marks are mainly give accuracy, and for the us	per, candidate number an lick pen in the spaces pro- licil for any diagrams, gra per clips, highlighters, glu on. cord all your observations is not necessary to make n for a clear record of	
You are reminded of the	r and graph paper shoul	d be submitted only if it becomes necessary to do so. and clear presentation in your answers. ork securely together.
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(a) (i) Tie the end of the thread to a hole in the end of the hacksaw blade so that the length l of the pendulum is about 0.5 m. Record the value of l.

*l* = ..... m

- (ii) Place the blade between the two blocks of wood and tighten the wing nuts so that the blade is held firmly.
- (iii) Clamp the wooden blocks to the bench so that the blade protrudes horizontally from the wooden blocks as shown in Fig. 1.1. The length *d* from the blocks to the thread should be 0.24 m.

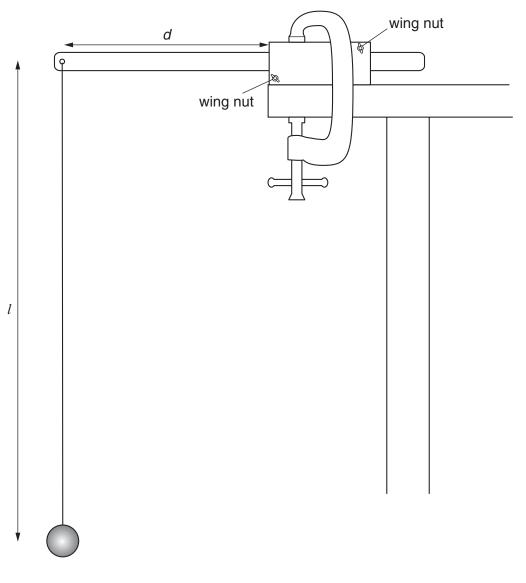


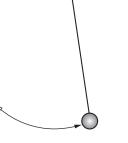
Fig. 1.1

- (b) (i) Measure and record the value of *d*.
  - (ii) Determine the percentage uncertainty in this value of *d*.

% uncertainty in d = .....

*d* = .....

(c) (i) Gently displace the pendulum so that it performs small oscillations in a vertical plane perpendicular to the blade, as shown in Fig. 1.2.





(ii) Make and record measurements to determine the period T of these oscillations.

*T* = .....

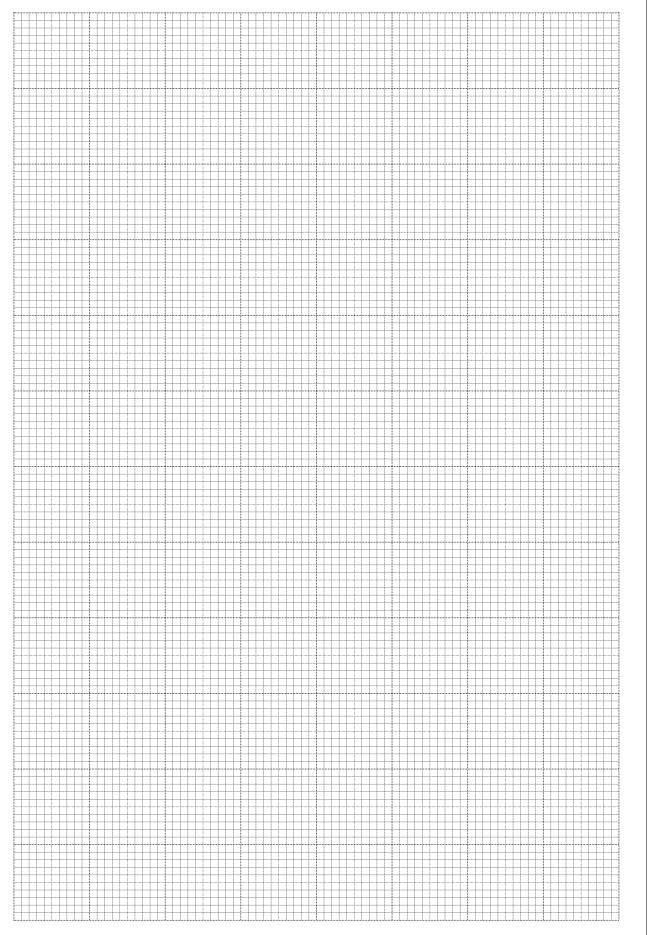
(d) Adjust the position of the blade to give a new value of *d* and repeat (b)(i) and (c) until you have a total of six sets of readings for *d* and *T*, where 7.0 cm  $\leq d \leq$  24.0 cm. Include the values of  $T^2$  and  $d^3$  in your table of results below.



- (e) (i) Plot a graph of  $T^2$  (*y*-axis) against  $d^3$  (*x*-axis).
  - (ii) Draw the line of best fit.
  - (iii) Determine the gradient and *y*-intercept of this line.

gradient = .....

*y*-intercept = .....



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(f) Theory suggests that T and d are related by the equation

$$T^2 = kd^3 + \frac{4\pi^2 l}{g},$$

where g is the acceleration of free fall and k is a constant.

Use your answers from (e)(iii) and the value of l to find values for k and g. Include appropriate units in each case.

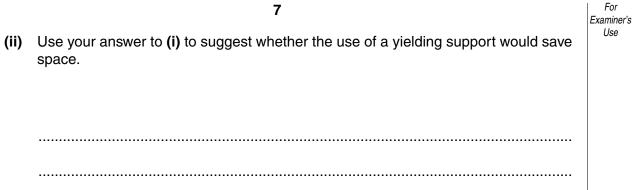


*k* = .....



- (g) A clockmaker wishes to make a pendulum clock whose pendulum has a period of two seconds. Calculation shows that the length of a pendulum of this period with a fixed support would be about one metre. The clockmaker wants to make a small case, and therefore considers using a pendulum with a yielding support.
  - (i) Use the results of your experiment to calculate a value for *d* that would give a period of two seconds for the pendulum you have used.

*d* = .....



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