

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
TOTAL	



General Certificate of Education
Advanced Subsidiary Examination
June 2009

Physics

(Specifications A and B)

PHA3/B3/X

Unit 3 Investigative and Practical Skills in AS Physics Route X Externally Marked Practical Assignment (EMPA)

Section A Task 2

For this paper you must have:

- a calculator
- a pencil
- a ruler.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Show all your working.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for Section A Task 2 is 16.



J U N 0 9 P H A 3 B 3 X 0 1

SECTION A TASK 2

Follow the instructions given below.

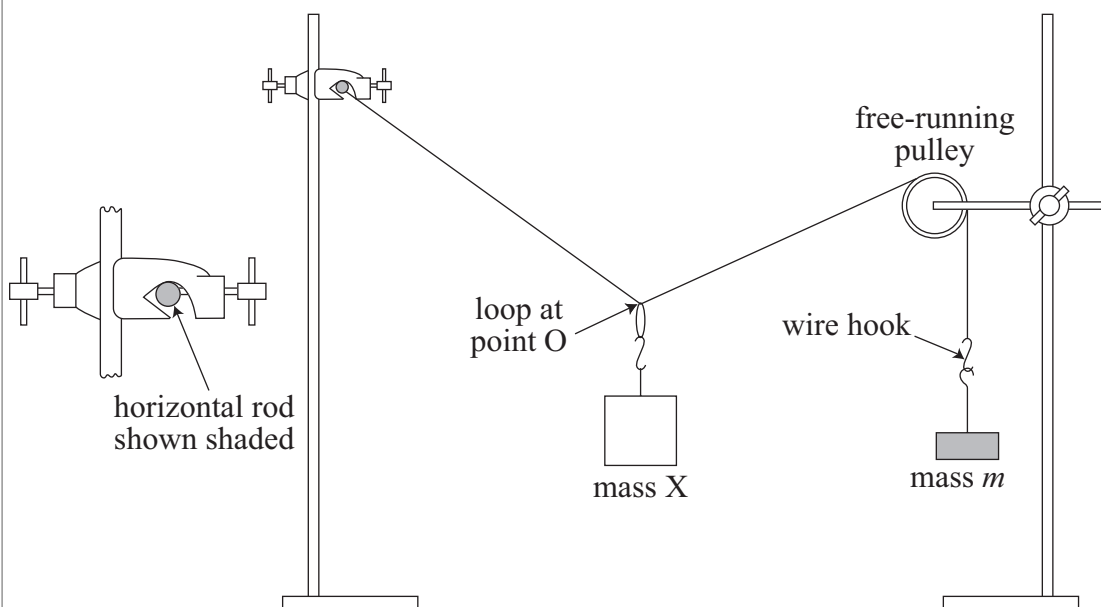
Provide the information required in the spaces provided.

No description of the experiment is required.

In this experiment you will investigate the equilibrium conditions for a number of coplanar forces.

- 1 (a) Position the clampstands about 70 cm apart.
 A length of string has been tied to the horizontal rod clamped in the retort stand.
 A small loop has been tied near the middle of this string at a point, O.
 Pass the free end of the string over the pulley clamped to the other stand.
 Tie one of the wire hooks that are provided to the free end of the string and hang a mass, m , of total mass 100 g, from the hook.
 Using the additional hook, suspend mass X from the loop at point, O, and allow the system to regain equilibrium under the forces now acting.
 The apparatus should now appear as in **Figure 5**.

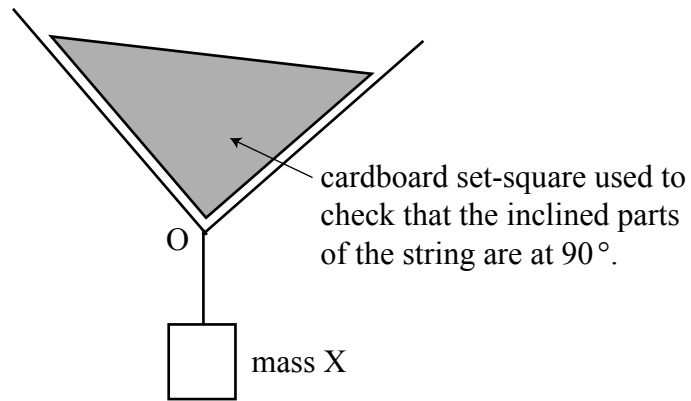
Figure 5



Adjust the apparatus so that the system is in equilibrium and the inclined parts of the string are at 90° to each other.

You should do this by adjusting the height of the pulley and/or the distance between the stands. The alignment of the parts of the string can be checked using the large set-square, as shown in **Figure 6**.

Figure 6



- 1 (a) (i) Measure and record the horizontal distance, d , between O and the point at which the string is tied to the rod.

$$d = \dots\dots\dots$$

- 1 (a) (ii) Measure and record the length, L , between O and the point at which the string is tied to the rod.

$$L = \dots\dots\dots$$

- 1 (a) (iii) Estimate the uncertainty, in mm, ΔL , in your value of L .

$$\Delta L = \dots\dots\dots$$

(2 marks)

Turn over ►



- 1 (b) Investigate how d varies with m for **five** larger values of m , each time adjusting the system to keep the inclined parts of the string at 90° to each other.

Record below all your measurements and observations.

Note that the independent variable should be recorded in the **left-hand** column of your table.

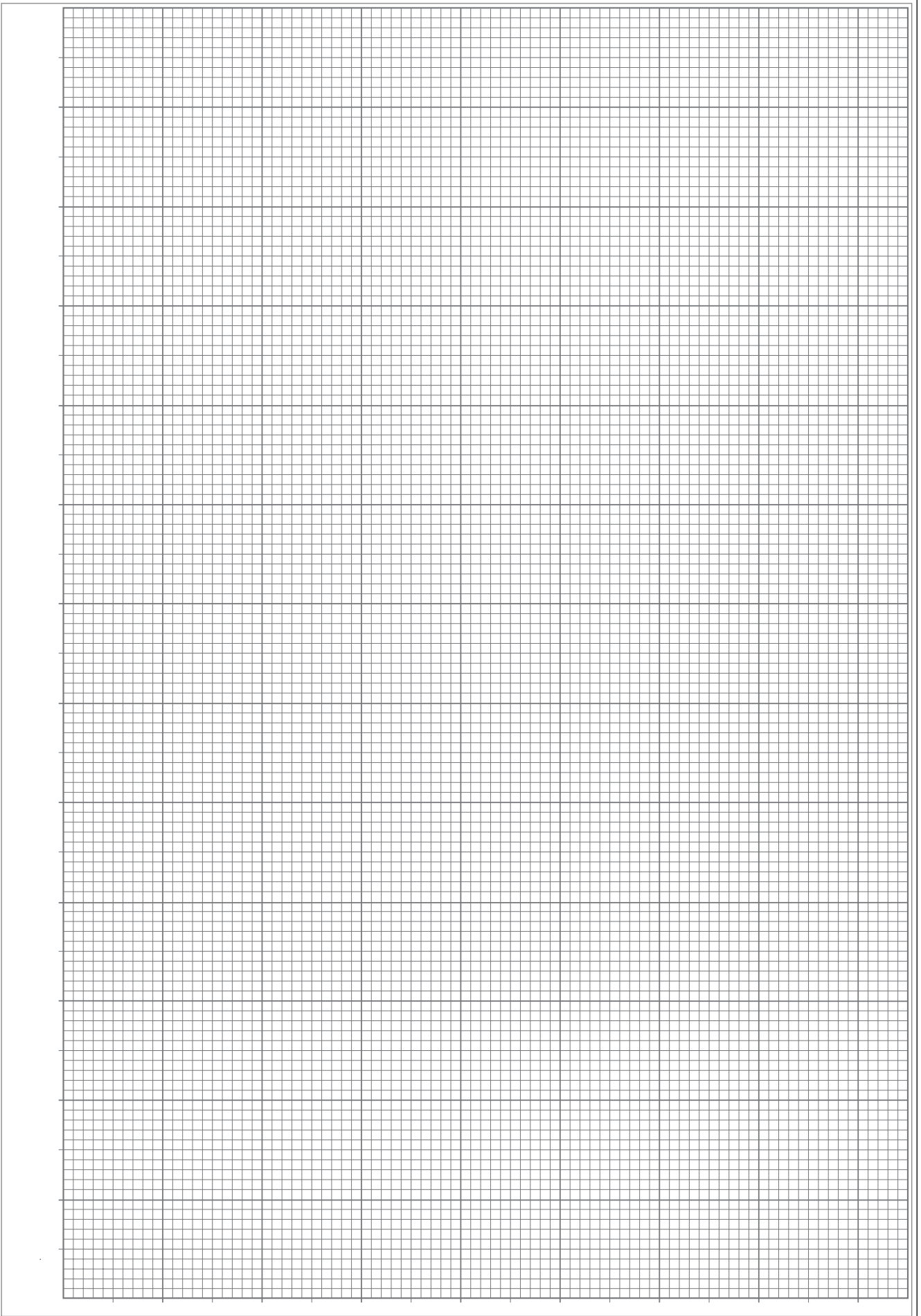
(6 marks)

- 1 (c) Plot, on the grid opposite, a graph of your readings for part (a) and part (b) with d on the vertical axis and m on the horizontal axis.

(8 marks)

END OF QUESTIONS





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ANSWER IN THE SPACES PROVIDED**



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