AQA

General Certificate of Education
Advanced Subsidiary Examination
June 2010

Physics   PHA3/B3/X
(Specifications A and B)

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. Do not write outside the box around each page or on blank pages.
- 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 15.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

Section A   Task 2

Follow the instructions given below.

Answer **all** the questions in the spaces provided.

No description of the experiment is required.

In this experiment you will investigate the bending of a plastic metre ruler under its own weight.

1 (a) You are provided with a wooden metre ruler to be used as a vertical scale.
Make the ruler vertical with the zero graduation of the ruler in contact with the floor.
Use the stand and clamp provided to secure the ruler in this position.

Use the G-clamp and blocks of wood to clamp the plastic metre ruler to the top of the bench so that x, the length of the ruler between the vertical edge of the blocks and the free end of the ruler is 90.0 cm, as shown in **Figure 5**.

Figure 5

plastic ruler clamped between two wooden blocks

vertical edge of wooden blocks

h_0
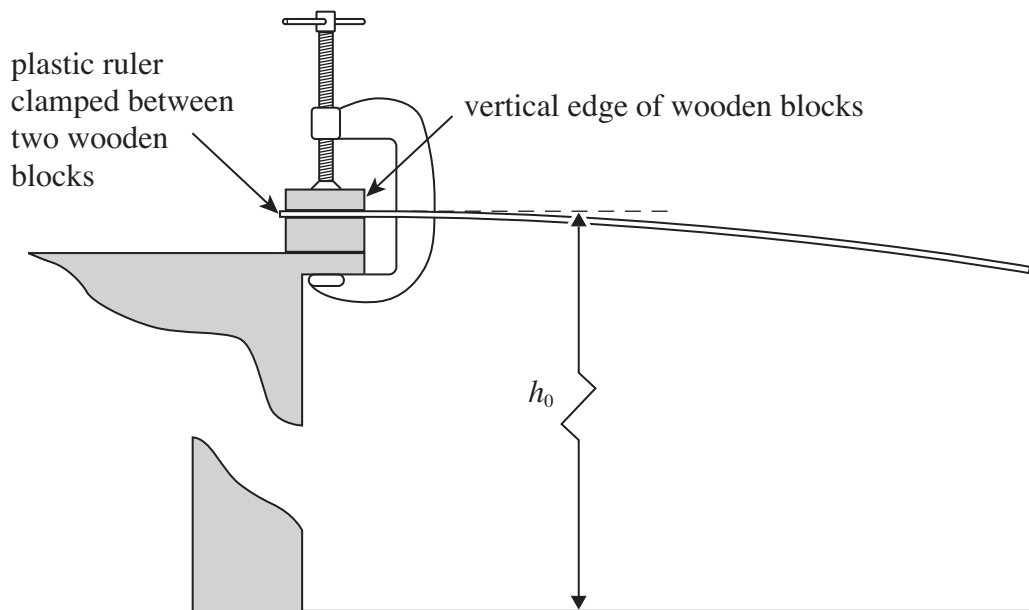
Measure and record h_0, the vertical height between the top of the plastic ruler and the floor, at the end where the ruler is clamped between the wooden blocks.

h_0 = ...

(1 mark)

Turn over ▶

1 **(b)** Attach the pin to the free end of the plastic ruler, so that the tip of the pin projects horizontally at right angles to the top surface of the ruler at the free end, as shown in **Figure 6**.

Figure 6

tip of pin

pin attached to top surface☐
at free end of the ruler
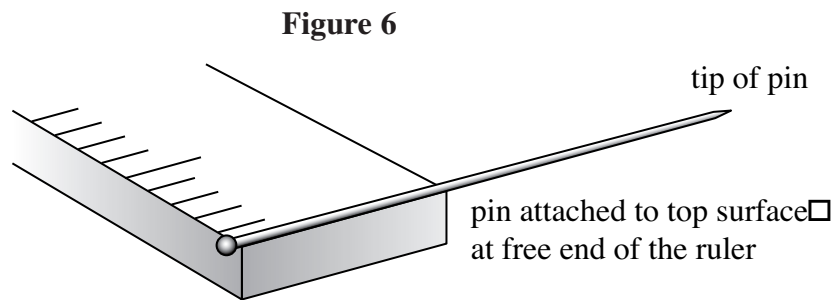
Measure and record h, the vertical height between the tip of the pin and the floor.
You should use the mirror that is provided to assist you in measuring h.

Investigate how h varies with x for **five** smaller values of x.

Record all your measurements and observations below.
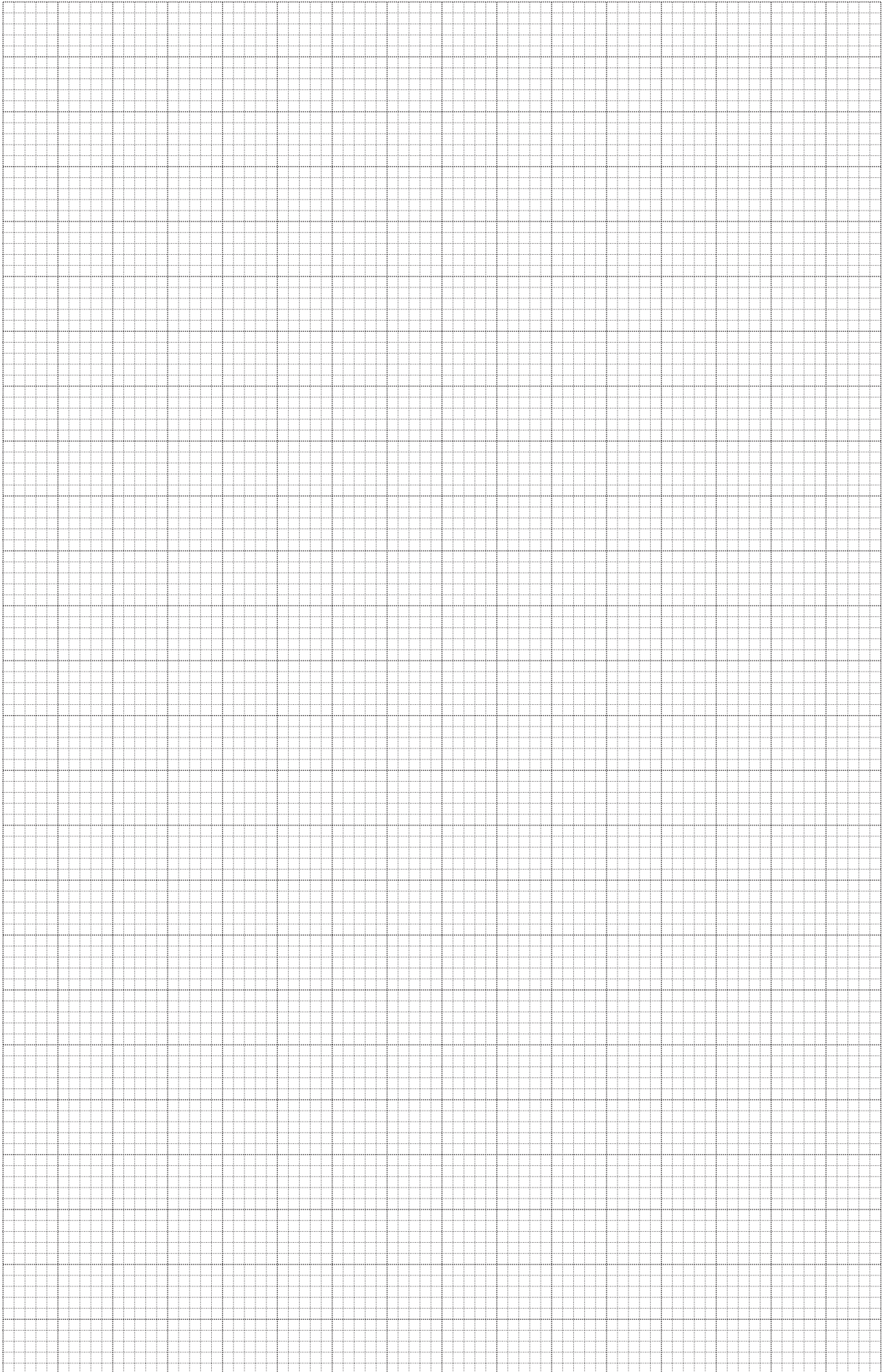Note that the independent variable should be recorded in the **left-hand** column of your table.
Leave space in your table for an extra column for the data you will be required to plot on your graph (see part (c) below).

(6 marks)

1 **(c)** Plot, on the grid opposite, a graph of $(h_0 - h)$ on the vertical axis and x on the horizontal axis.

(8 marks)

END OF QUESTIONS

15

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