

General Certificate of Education  
June 2008  
Advanced Subsidiary Examination



**PHYSICS (SPECIFICATION A)**

**PHA3/P/TN**

<b>Instructions to Supervisors</b>
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**CONFIDENTIAL**

**OPEN ON RECEIPT**

The examination will be held on Wednesday 14 May 2008 1.30 pm to 3.15 pm.

- It is the responsibility of the Examinations Officer to ensure that these instructions to Supervisors are given immediately to the Supervisor of the practical examination.
- These instructions are provided to enable centres to make appropriate arrangements for the examination.
- These instructions explain how to set up the equipment for Question 2.
- Relevant sections of Question 2 are printed on page 4 and page 5 of this Instruction Booklet.
- Centres are at liberty to make any reasonable minor modifications to the apparatus which may be required for the successful working of the experiment but a note of all such modifications must be forwarded to the Examiner with the scripts. However, any such modifications must permit the experiment to be carried out in the specified manner.

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## INSTRUCTIONS TO THE SUPERVISOR OF THE PRACTICAL EXERCISES

### Preparing for the Practical Examination

- 1 The Instructions and details of materials contained in this document are for the use of the Supervisor and **are strictly confidential**. In no circumstances should no information concerning the content of this document, apparatus or materials be given before the examination to a candidate or other unauthorised person. After use, these *Instructions* must be kept in safe custody by the Examinations Officer until after the issue of results (in March or August as appropriate).

Using information for any purpose beyond that permitted in this document is potentially malpractice. Guidance on malpractice is contained in the JCQ document *Suspected Malpractice in Examinations and Assessments: Policies and Procedures*.

- 2 The Supervisor has been granted access to some of the content of Question 2 to aid the practical set up as part of these Instructions. This is printed to enable the Supervisor to carry out the experimental parts of the Exercises in order to ensure that the apparatus and materials obtained are satisfactory and to seek advice from AQA if there are any problems. The Instructions must be returned to safe custody at the earliest possible moment after the Supervisor has ensured that all is in order.
- 3 A suitable laboratory, or laboratories, must be reserved for the examination and kept locked throughout the period of preparation. Unauthorised persons not involved in the preparation for the examination must not be allowed to enter. Candidates must not be admitted until the specified time for the commencement of the examinations.

### The Practical Examination

- 1 If a candidate is **unable to perform** any experiment, or is performing an experiment **incorrectly**, the Supervisor is expected to give the **minimum** help required to enable the candidate to proceed. In this instance, a note bearing the candidate's name and number must be attached to the candidate's script reporting to the Examiner the extent of the help given. Any failure in the apparatus should also be reported to the Examiner. No help should be given with the analysis of the experimental data.

The Supervisor should not intervene in situations where the candidate is performing some aspect of the work badly or in a manner likely to obtain less than full credit.

It is not the wish of the Examiner that a candidate should waste time because of, for example, an incorrect electrical connection. The Examiner wishes to test the candidate's ability to perform an experiment and carry out the subsequent analysis.

- 2 Details should be given to the Examiner if the apparatus or materials provided differ from that detailed in this document. Where specific information or data about apparatus or materials is requested in these Instructions, it is important that it is given accurately. In some cases it may represent the only means available to the Examiner of assessing the accuracy of a candidate's work.

In case of difficulty the Supervisor should telephone the Assistant Subject Officer for A Level Physics, Philip Bridgehouse, at AQA (Manchester Office), telephone number 0161 953 1180, or email [physics-gce@aqa.org.uk](mailto:physics-gce@aqa.org.uk).

Candidates will investigate the equilibrium conditions for a pivoted metre ruler.

**Apparatus required for each candidate:**

*the following should be assembled before the examination, to be arranged as illustrated in **Figure 4** of the question*

- metre ruler in good condition with small holes drilled through the median line at the 10 mm and 100 mm and 990 mm graduations
- one 100 g slotted mass to be attached, using a suitable nut and bolt, to the metre ruler through the hole at the 10 mm graduation
- retort stand with rod of height 600 mm, boss attached about 150 mm from the base of the rod, and another boss (with clamp fitted) attached **at the top** of the rod; centres should provide a suitable counterweight or G-clamp to stabilise the base of this stand
- small screwdriver or similar, to act as a horizontal pivot for the ruler, inserted through the hole at the 100 mm graduation of the ruler; centres should ensure that any sharp end of the pivot to be used should be the end to be fixed into the lower of the two bosses
- a cork to be held in the jaws of the clamp, as shown in **Figure 5** of the question; a hole should be bored through the cork of sufficient diameter to enable the thread or thin string to be threaded through it.
- strong wire hook suitable for attaching springs to the pivoted ruler; large paper clip formed into “S” shape is suitable; this should be connected to the pivoted ruler through the hole at the 990 mm graduation

*the following additional apparatus is also required*

- about 900 mm strong thread or thin string
- three expendable steel springs, coupled together in series, Philip Harris B6A41397 (pack of 100)
- additional metre ruler and set square
- 100 g slotted mass and holder (50 g or 100 g)
- slotted mass and holder to total 250 g, labelled “W”; the masses should be taped together to prevent their disassembly and to conceal their value from the candidate

The assembled apparatus should be presented to the candidates as shown in **Figure 4** of the question, with the pivoted end of the metre ruler **to the left hand side**. The other apparatus should be placed on the bench alongside.

**Examiners require no information for this question.**

Turn over ►

**No description of the experiment is required.**

You are provided with a metre ruler, pivoted off-centre, with a mass bolted to one end. You are also provided with three springs, connected in series.

**Do not disconnect the three springs from each other during the experiment.**

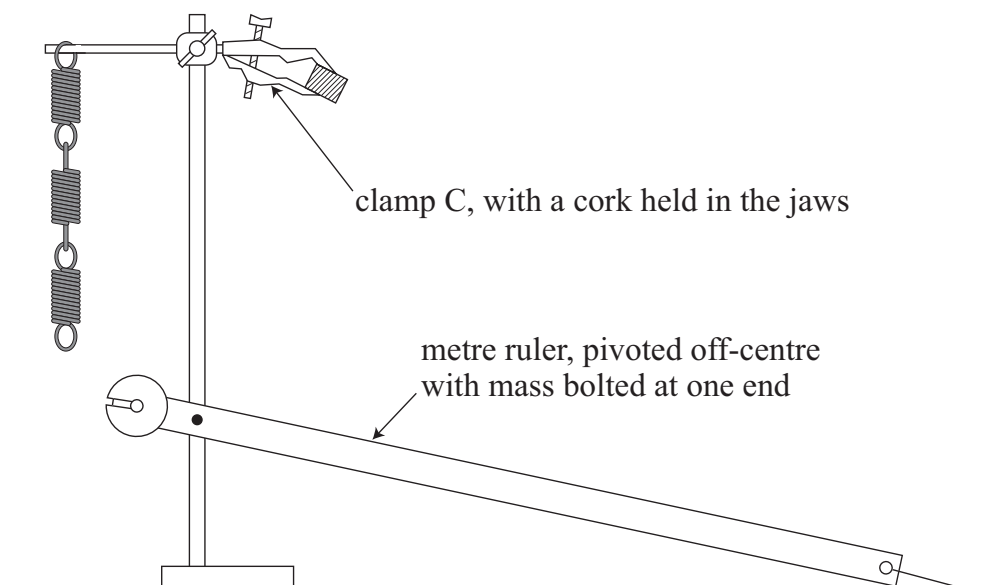
The pivot holding the ruler is attached to a retort stand.

A cork is held in the jaws of a clamp, C, which is attached to the top of this stand.

**Do not remove the cork from the jaws of the clamp during the experiment.**

Three springs are suspended above the bench from the stem of clamp C, as shown in **Figure 4**.

**Figure 4**



- 2 (a) Suspend the mass hanger from the lower end of the springs.
- 2 (a) (i) Measure and record the vertical distance  $h_0$  from the lower surface of the mass hanger to the bench.
- 2 (a) (ii) Place a single slotted mass on the hanger so that the total mass supported by the springs is now increased by 100 g. Measure and record the new vertical distance,  $h_1$ , from the lower surface of the mass hanger to the bench.

Remove the mass hanger and the springs from the stem of the clamp. Attach one end of the springs to the hook passing through the right-hand end of the pivoted metre ruler.

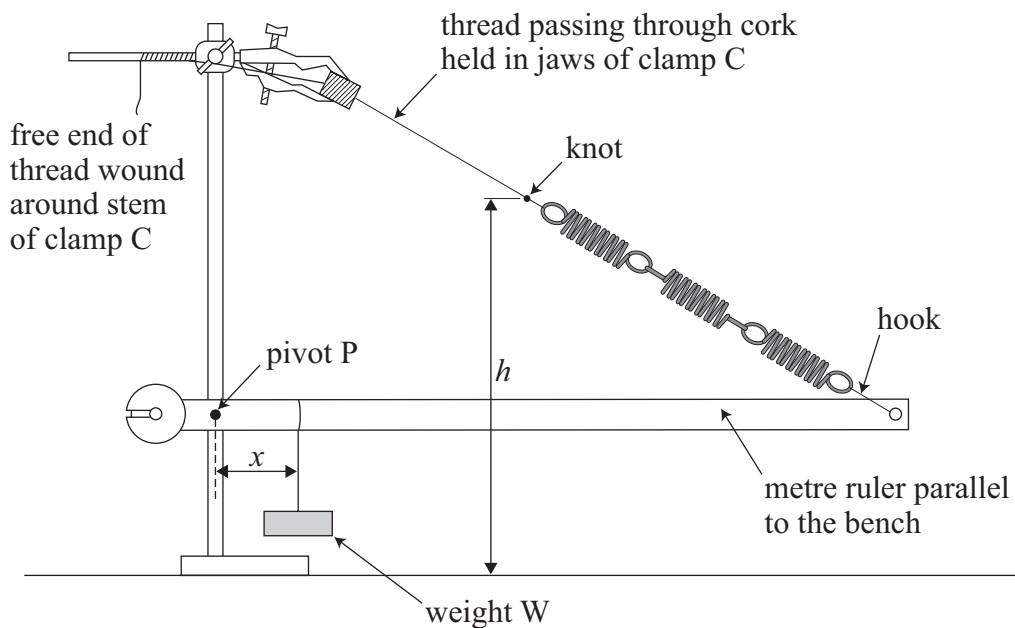
You are provided with a piece of thread; tie one end of the thread to the free end of the springs.

Tie a knot in the thread about 30 mm from the point at which it is attached to the springs. Pass the thread through the hole in the cork clamped in the jaws of clamp C.

- (b) Suspend the weight  $W$  from the metre ruler at a horizontal distance,  $x$ , about 100 mm to the right of the pivot,  $P$ .  
 Pull gently on the free end of the thread so the springs go into tension then adjust the tension until the ruler is supported by the springs and is approximately parallel to the bench.  
 Wind the free end of the thread around the stem of clamp  $C$  so that the thread is prevented from slipping back through the hole in the cork.  
 Make fine adjustments to the position of weight  $W$  until the ruler is parallel to the surface of the bench.

The apparatus should now appear as in **Figure 5**.

**Figure 5**



Measure  $x$ , the horizontal distance between pivot  $P$  and the point of attachment of weight  $W$  to the ruler.

Measure  $h$ , the vertical height of the knot above the surface of the bench.

- 2 (c) Find additional values of  $h$  corresponding to **five** larger values of  $x$ .  
 You should use the method employed in part (b), (i.e. set an approximate value for  $x$ , then adjust the tension in the thread until the ruler is roughly parallel to the bench; then make fine adjustments to the position of weight  $W$  until the ruler is parallel to the surface of the bench).
- 2 (d) (i) Plot a graph with  $h$  on the vertical axis and  $x$  on the horizontal axis.

### END OF QUESTIONS

Centres are advised that the graph is a straight line of positive gradient.

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