

General Certificate of Education
June 2006
Advanced Level Examination



PHYSICS (SPECIFICATION A)

PHAP/TN

Instructions to Supervisors for the Unit 5-9 Practical Examination

CONFIDENTIAL

OPEN ON RECEIPT

The examination will be held on Wednesday 24 May 2006 Morning Session

- These *Instructions* are provided to enable centres to make appropriate arrangements for the examination. Copies of the *Instructions* are to be kept at the centre under lock and key when not in use; they are not to be removed from the centre. The question paper packets must not be opened prior to the examination.
- These instructions explain how to set up the equipment for Question 2.
- Question 2 is printed on pages 3, 4 and 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.

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. 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).
- 2 The Supervisor has been granted access to some of the questions to aid the practical set up as part of these instructions. The relevant questions are 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.

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.

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.

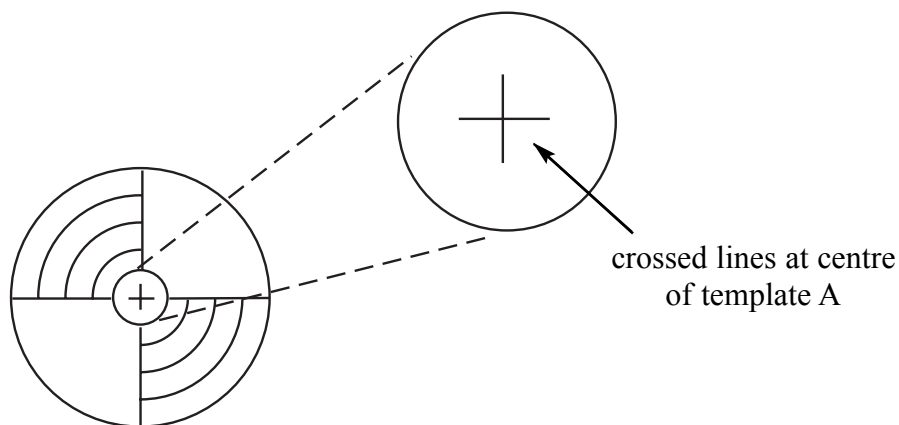
In case of difficulty the Supervisor should telephone the Senior Subject Officer for A Level Physics, David Baker, at AQA (Manchester Office), telephone number 0161 9531180, or email dbaker@aqa.org.uk

Candidates will investigate the rotational oscillations of a mass supported by a vertical wire as the length of the wire is varied.

Apparatus required by each candidate:

- copies of templates A and B, **to be found on page 7** of these instructions
- stopwatch or electronic stopclock, capable of reading to 0.1 s or better
- boss, clamp and retort stand, rod of retort stand to be of length at least 600 mm
- one G clamp (optional)
- either a metre ruler and a half-metre ruler or a steel tape measure: the longest distance to be measured will exceed 1.00 m but will not exceed 1.30 m
- about 1.5 m 26 s.w.g. copper wire
- two rectangular pieces of thin wood or m.d.f. between which the upper end of the wire can be clamped
- mass hanger for slotted masses, mass either 50 g or 100 g and two additional 100 g slotted masses to produce total mass of 250 g or 300 g
- micrometer screw gauge; this can be shared among several candidates but the hand-over must be controlled by the supervisor, the instrument being reset before transfer to the next candidate.

Make enough photocopies of the templates, A and B, so that there are sufficient for each candidate. It is suggested that the copies be made using thin A4 card. Using a sharp knife cut through the crossed lines at the centre of template A.



Place template A, printed side uppermost, over the stem of the mass hanger, and then add the slotted masses onto the hanger to trap the template in place.

Tie one end of the wire to the hook of the hanger, and then arrange the apparatus, as shown in **Figure 4**, page 4, so that the mass is suspended freely over the edge of the bench. Centres may wish to use a G-clamp to stabilise this arrangement.

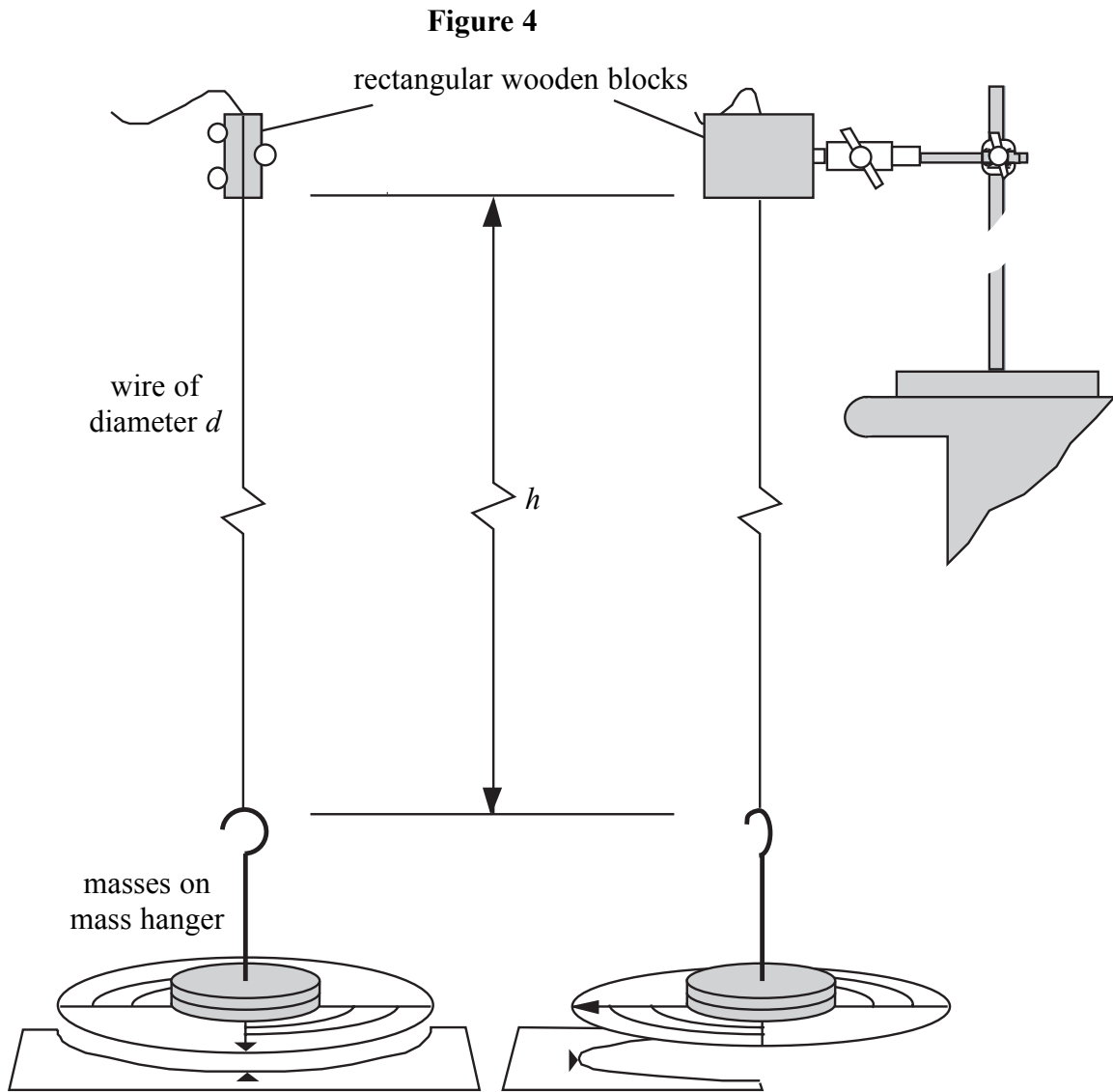
Adjust the length of wire, h , between the clamped pieces of wood and the top of the mass hanger, to be between 1.20 m and 1.30 m and then adjust the height of the clamp until the lower surface of the mass hanger is just above the floor.

Rotate template A until the view of the apparatus, from directly above, is as shown in **Figure 5**, page 5, then position template B so that the marks on both templates are aligned with each other.

For the apparatus as described (h between 1.20 m and 1.30 m) the period of small amplitude torsional oscillations will be between 5.5 s and 6.5 s. If the period falls outside this range make suitable adjustments to the mass supported by the hanger.

Examiners require no information for this question.

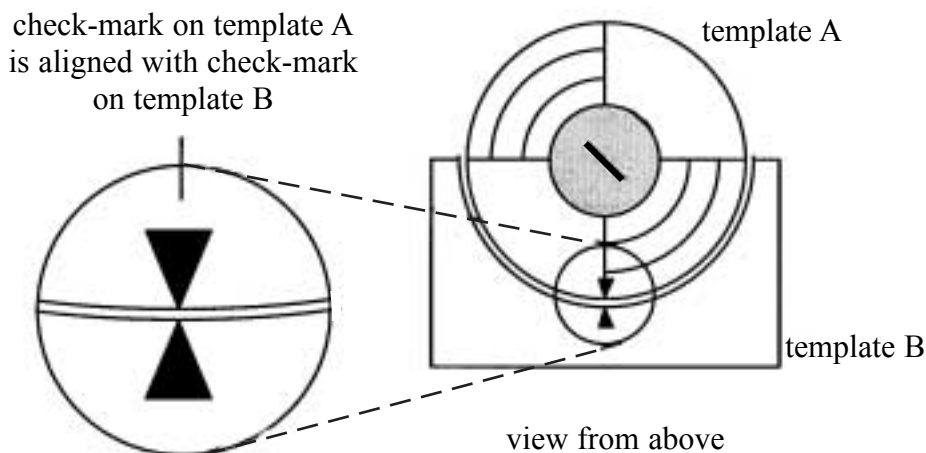
- 2 You are to investigate the rotational oscillations of a mass suspended from a wire, as the length, h , of the wire is varied.
The arrangement of the apparatus is shown in front and side view in **Figure 4**.



- (a) Use the micrometer screw gauge to determine the mean diameter, d , of the wire.
(1 mark)

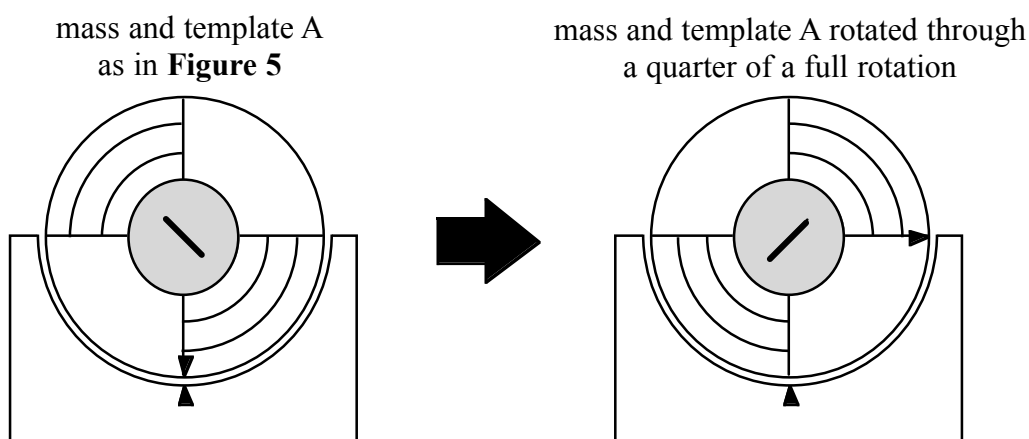
- (b) Template A is a piece of card that is trapped between the mass hanger and slotted masses. Template B is another piece of card that can be placed on the floor below the suspended mass. Printed on both templates are check marks that you should use when measuring the period of rotational oscillations of the suspended mass. Rotate template A on its own until the check-mark is pointing away from the edge of the bench. Position template B so that it is directly below the suspended mass and the check-mark is aligned with that on template A, as shown in **Figure 5**.

Figure 5



Keeping the wire vertical, rotate the stem of the mass hanger so that the suspended mass turns through approximately a quarter of a full rotation, i.e. 90° , as shown in **Figure 6**.

Figure 6



Release the stem of the mass hanger so that the suspended mass performs rotational oscillations.

Make suitable measurements to determine the period, T , of the rotational oscillations and the length of wire, h , as defined in **Figure 4**.

Repeat the procedure to find values of T for four smaller values of h .

Record all the measurements you make.

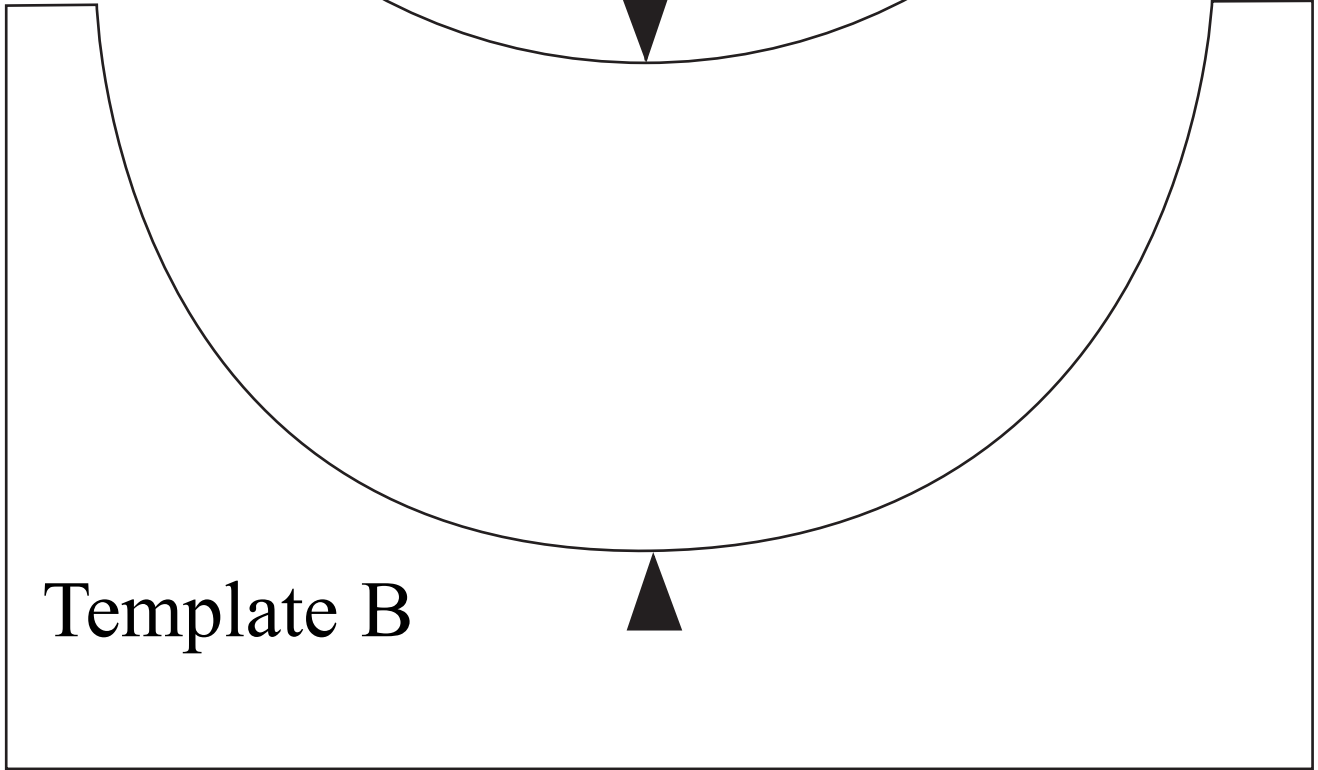
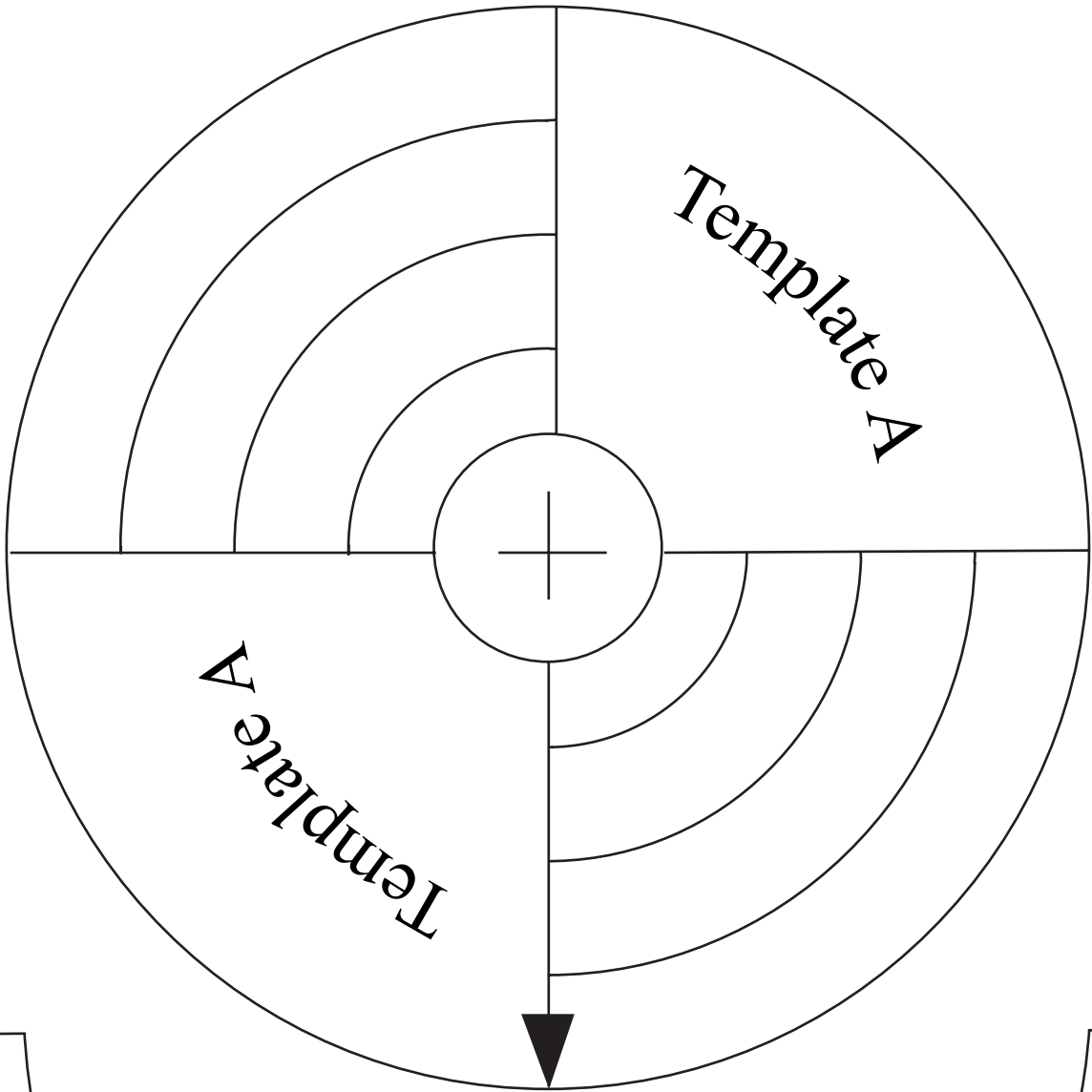
(4 marks)

- (c) Plot a graph with $\log_{10} (h/m)$ on the vertical axis and $\log_{10} (T/s)$ on the horizontal axis. Tabulate the data you will plot on your graph. *(8 marks)*
- (d) Measure and record the gradient, G , of your graph. *(3 marks)*

The remaining questions for this examination are not provided. It is not necessary for the supervisor to be aware of these questions as they do not have a bearing on the setting up of the experiment.

However, centres are advised that in this experiment, the graph produced should be a straight line of positive gradient.

END OF QUESTIONS



There are no instructions printed on this page