Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

PHYSICS **9702/33**

Paper 3 Advanced Practical Skills 1 **February/March 2017**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given does not reach the candidates either directly or indirectly.

No access to the Question Paper is permitted in advance of the examination.

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If you have any queries regarding these Confidential Instructions, please contact Cambridge stating the Centre number, the nature of the query and the syllabus number quoted above.

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This document consists of **7** printed pages and **1** blank page.

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Preparing apparatus

These Confidential Instructions detail the apparatus required for the experiments in the Question Paper. It is essential that absolute confidentiality is maintained in advance of the examination: the contents of these Confidential Instructions must not be revealed either directly or indirectly to candidates.

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It is assumed that the ordinary apparatus of a physics laboratory will be available.

Number of sets of apparatus

The number of sets of apparatus provided for each experiment should be $\frac{1}{2}N$, where N is the number of candidates taking the examination. There should, in addition, be a few spare sets of apparatus available in case problems arise during the examination.

Organisation of the examination

Candidates should be allowed access to the apparatus for each experiment for one hour only. After spending one hour on one experiment, candidates should change over to the other experiment. The order in which a candidate attempts the two experiments is immaterial.

Assistance to candidates

Candidates should be informed that, if they find themselves in real difficulty, they may ask the Supervisor for practical assistance, but that the extent of this assistance will be reported to the Examiner, who may make a deduction of marks.

Assistance should only be given:
when it is asked for by a candidate,
or as directed in the Notes sections of these Confidential Instructions,
or where apparatus is seen to have developed a fault.

Assistance should be restricted to enabling candidates to make observations and measurements. Observations and measurements must not be made for candidates, and no help should be given with data analysis or evaluation.

All assistance given to candidates must be reported on the Supervisor's Report.

Faulty apparatus

In cases of faulty apparatus (not arising from a candidate's mishandling) that prevent the required measurements being taken, the Supervisor may allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present. The candidate should use a spare copy of the Question Paper when the fault has been rectified or when working with a second set of apparatus.

Supervisor's Report

The Supervisor should complete the Supervisor's Report on pages 7 and 8 and enclose it in the envelope containing the answers of the candidates. If more than one envelope is used, a copy of the Supervisor's Report must be enclosed in each envelope.

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Question 1

Apparatus requirements (per set of apparatus unless otherwise specified)

Wooden strip of length 50.0 cm, and approximate cross-section 2 cm by 1 cm. See Note 1.

Two expendable springs with approximate outside diameter 15 mm, approximate coiled length 20 mm and approximate spring constant 25 Nm^{-1} (e.g. Philip Harris product code B8G87194). See Note 1.

Cotton string (parcel string). See Note 1.

400 g mass with a hook (e.g. a 100 g mass hanger loaded with three 100 g masses).

Wire hook and approximately 100 g of M12 steel washers to hang on it (approximately 25 washers). See Note 2.

Stand, boss and clamp. The height of the stand should be at least 80 cm.

180° protractor with 1° divisions.

30 cm ruler with a millimetre scale.

Card showing the mass of the wire hook and the mass of one washer, both to the nearest 0.1 g. See Note 3.

Notes

1 Drill three holes centrally through the wooden strip at the positions shown in Fig. 1.1.

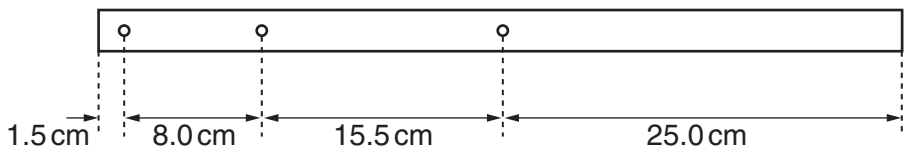

Fig. 1.1

Connect the springs and wooden strip together using five string loops, each of circumference 8 cm, as shown in Fig. 1.2.

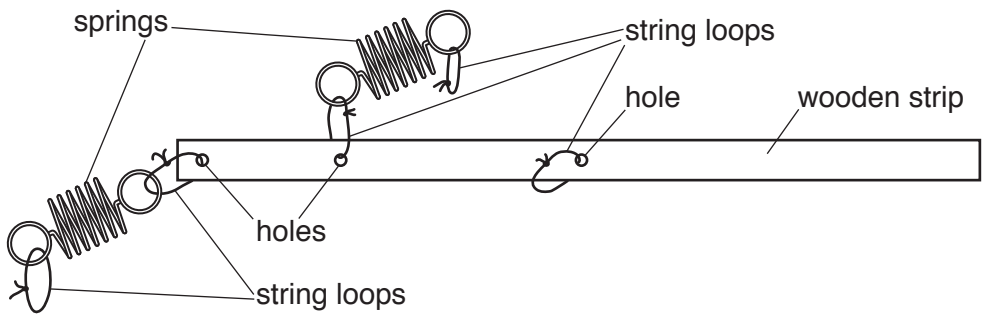

Fig. 1.2

2 The wire hook should be made from steel wire of approximate diameter 1.5 mm. It should have the approximate dimensions shown in Fig. 1.3.

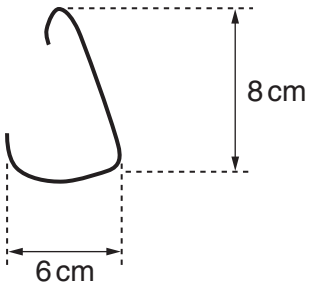

Fig. 1.3

3 An example of the information card is shown in Fig. 1.4.

Mass of hook = 2.1 g
Mass of one metal ring = 4.0 g

Fig. 1.4

4 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then it should be restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates by the Supervisor, who should be a teacher of physics or other competent physicist.

Question 2

Apparatus requirements (per set of apparatus unless otherwise specified)

Rigid plastic pipe of length 15.0 cm and external diameter approximately 15 mm (e.g. 15 mm plastic water pipe). The ends of the pipe should be cut square.

Rigid plastic pipe of length 15.0 cm and external diameter approximately 40 mm (e.g. 38 mm plastic water pipe). The ends of the pipe should be cut square.

Cotton string (parcel string). See Note 1.

Newton-meter with range 0–10 N reading to 0.1 N. See Note 1 and Note 2.

Card showing the mass of the newton-meter in kg, to the nearest 0.001 kg. See Note 3.

Stopwatch reading to 0.1 s or better.

300 g mass labelled M. The mass should have a flat base and a hook on top.

Stand, boss and clamp.

30 cm ruler with a millimetre scale.

Metre rule with millimetre scale.

Notes

1 Tie string to the loop at the top of the newton-meter. The other end of the string should have a loop of circumference 2 cm. The overall length of the string should be 50 cm, as shown in Fig. 2.1.

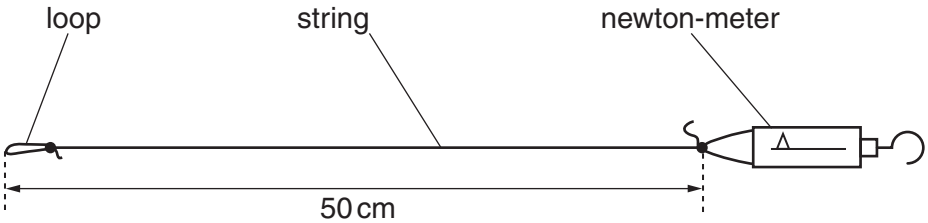

Fig. 2.1

2 If a spring balance marked in grams is used, the candidate should be provided with a conversion to newtons.

3 An example of the information card is given in Fig. 2.2.

Mass of newton-meter = 0.087 kg

Fig. 2.2

4 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then it should be restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled ‘Supervisor’s Results’ and obtained out of sight of the candidates by the Supervisor, who should be a teacher of physics or other competent physicist.

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This form should be completed and sent to the Examiner with the scripts.

SUPERVISOR'S REPORT

The Supervisor's Report should give full details of:

(a) any help given to a candidate (including the nature of the help given and the name and candidate number of the candidate);

(b) any cases of faulty apparatus (including the nature of the problem, the action taken to rectify it, any additional time allowed, and the name and candidate number of the candidate);

(c) any accidents that occurred during the examination;

(d) any other difficulties experienced by candidates, or any other information that is likely to assist the Examiner, especially if this information cannot be discovered in the scripts.

Cases of individual hardship, such as illness, bereavement or disability, should be reported directly to Cambridge on the normal Special Consideration Form.

Information required by Examiners

For each question, please enclose a sample set of numerical results, obtained out of sight of the candidates and clearly labelled "Supervisor's Results".

Supervisor's Report

Supervisor's Report (continued)

Declaration
(to be signed by the Supervisor)

The preparation of this practical examination has been carried out so as to maintain fully the security of the examination.

Signed .....

Name .....

Centre number .....

Name of Centre .....

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