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**PHYSICS**

**9702/31**

Paper 3 Advanced Practical Skills 1

**May/June 2014**

**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 problems or queries regarding these Instructions, please contact Cambridge  
by e-mail: [info@cie.org.uk](mailto:info@cie.org.uk),  
by phone: +44 1223 553554,  
by fax: +44 1223 553558,  
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.

## Preparing apparatus

These 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 Instructions must not be revealed either directly or indirectly to candidates.

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

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by e-mail: info@cie.org.uk,  
or by telephone: +44 1223 553554,  
or by fax: +44 1223 553558,

stating the nature of the query and quoting the syllabus and paper numbers (9702/31).

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 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 Form.

## 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 Form 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 report must be enclosed in each envelope.

**Question 1****Apparatus requirements (per set of apparatus unless otherwise specified)**

30 cm ruler with a millimetre scale.

Two lengths of thin string. See Note 1.

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

Two stands of height at least 60 cm. See Note 2.

Large mass (e.g. brick) suitable for stabilising the base of one of the stands.

Two clamps and two bosses. See Note 2.

Free-running pulley. See Note 2.

300 g mass with a hook. The mass should be labelled X and its value should be hidden. See Note 3.

100 g mass hanger with its value of mass clearly labelled.

Two 50 g slotted masses and five 10 g slotted masses. It must be possible to fit the slotted masses onto the 100 g mass hanger.

Small set square.

**Notes**

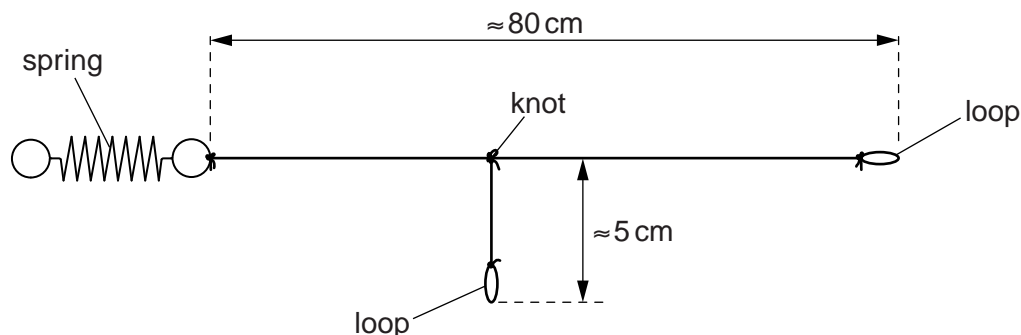
- 1 One length of string should be of approximate length 10 cm and the other of approximate length 90 cm.

The longer string should be attached to one of the springs as shown in Fig. 1.1.

The shorter string should be attached to the longer string with a knot as shown in Fig. 1.1.

It must be possible for the knot to slide along the longer string.

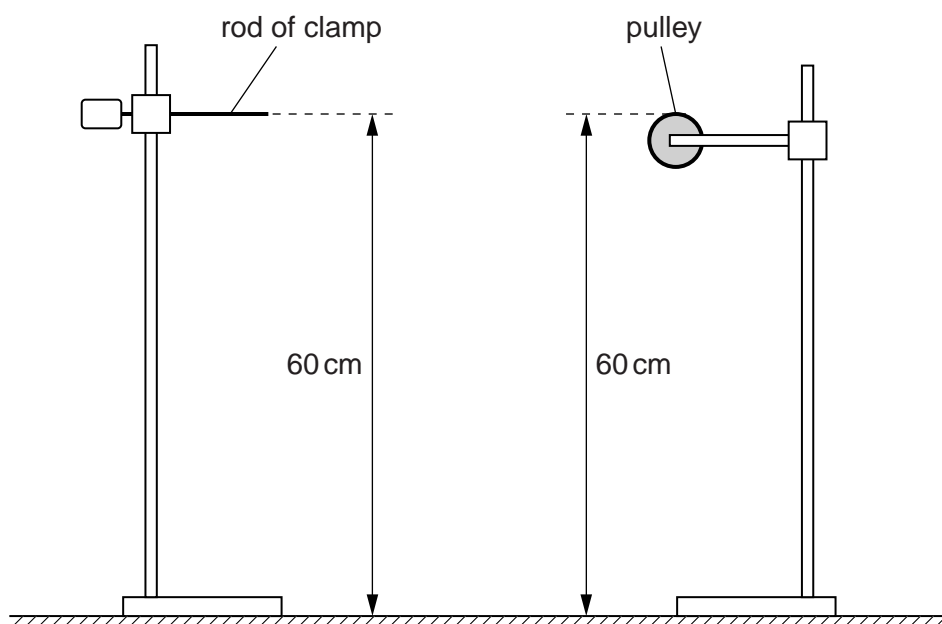
The string loops should be big enough to accommodate the hook of a mass hanger.



**Fig. 1.1**

- 2 The stands, bosses, clamps and pulley should be set up as shown in Fig. 1.2.

Dependent on pulley design it may not be necessary to use the second clamp.



**Fig. 1.2**

- 3 The 300 g mass could be made up from a 100 g or 50 g mass hanger and slotted masses. The mass should be taped to prevent it being changed by the candidate.
- 4 With the stands, bosses, clamps and pulley set up as in Fig. 1.2, the rest of the apparatus should be laid out on the bench. If it 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.

**Question 2****Apparatus requirements (per set of apparatus unless otherwise specified)**

G-clamp with maximum opening at least 100 mm.

Hacksaw blade of approximate length 30 cm. See Note 1.

180° protractor with 1° divisions.

Stopwatch reading to 0.1 s or better.

Metre rule with a millimetre scale.

Two 10 g slotted masses.

0.5 g of Blu-Tack.

**Notes**

- 1 Candidates should be advised to avoid touching the teeth on the blade.
- 2 The apparatus is to be laid out on the bench. If it is to be used by another candidate, then it should be restored to its original state with the Blu-Tack removed from the hacksaw blade and the masses.

**Information required by Examiners**

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates.

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

### **SUPERVISOR'S REPORT FORM**

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 direct 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 .....

