



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

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**PHYSICS**

**9702/34**

Advanced Practical Skills 2

**October/November 2011**

**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 CIE  
by e-mail: [international@cie.org.uk](mailto:international@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.

If you have problems or queries regarding these instructions, please contact CIE:

by e-mail: international@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 (9702/34).

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)**

3V d.c. power supply.

Digital voltmeter or digital multimeter reading to the nearest 0.01V or better and fixed to a range of 0 to 5V or more. The positive terminal should be labelled '+' and any unused terminals should be taped over.

Three 1 k $\Omega$  resistors each with its value concealed and each labelled 'X'. See Note 1.

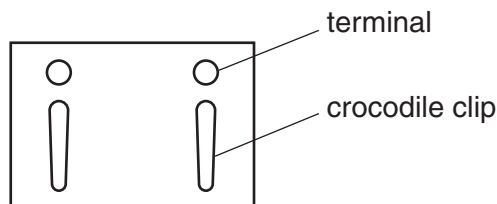
Resistors with values 0.22 k $\Omega$ , 0.33 k $\Omega$ , 0.47 k $\Omega$ , 0.68 k $\Omega$ , 1.0 k $\Omega$ , 2.2 k $\Omega$ , 3.3 k $\Omega$ , 4.7 k $\Omega$  and 6.8 k $\Omega$ . Each of the nine resistors should be labelled with its value in k $\Omega$  to 2 sig. fig., e.g. '0.22 k $\Omega$ ', '1.0 k $\Omega$ ', '6.8 k $\Omega$ ' etc. See Note 1.

Diode labelled 'D'. See Note 2.

Switch.

Thirteen connecting leads.

Four component holders with terminals and crocodile clips, similar to Fig. 1.1.



**Fig. 1.1**

**Notes**

- 1 All resistors should have a tolerance of  $\pm 5\%$  and a power rating of 0.25W.
- 2 A signal diode such as 1N4001.
- 3 The apparatus should be laid out on the bench. If it is to be used by another candidate, 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)

8 strips of polythene, each 2.5 cm wide and 10.0 cm long. They should be cut from sheets of polythene of maximum thickness 0.02 mm (e.g. polythene bag). See Note 1 and Note 4.

8 squares of white paper of dimensions 2.5 cm × 2.5 cm (photocopier paper is suitable). See Note 2.

Roll of adhesive tape approximately 25 mm wide (e.g. Sellotape). See Note 3.

Scissors.

Mass hanger with 100 g masses to a total mass of 300 g, with a diameter of at least 2.5 cm.

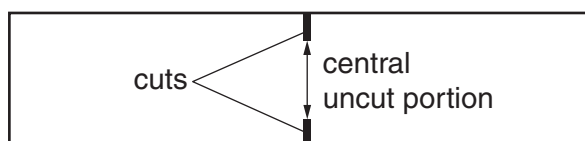
Newton–meter with range 0–10 N and reading to 0.2 N or better.

30 cm ruler with a millimetre scale.

Access to a micrometer (may be shared between at most three candidates).

### Notes

- Half-way along each strip there should be two cuts as shown in Fig. 2.1.

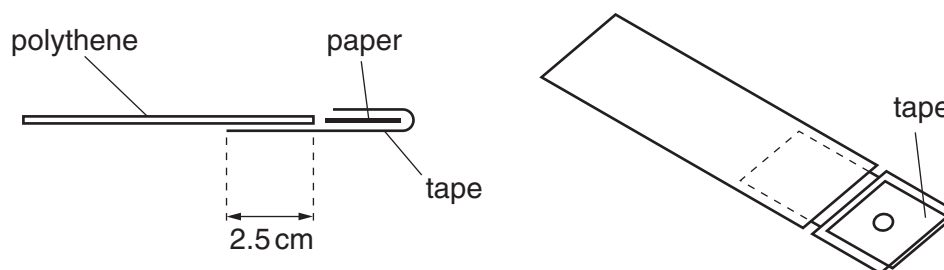


**Fig. 2.1**

The cuts should be made accurately using a sharp craft knife.

Four strips should have a central uncut portion 1.0 cm wide and the other four strips should have a central uncut portion 2.0 cm wide.

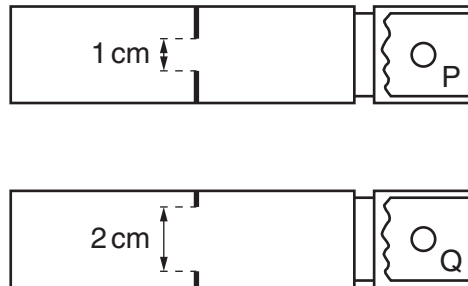
- A paper square should be attached using adhesive tape to one end of each polythene strip as shown in Fig. 2.2.



**Fig. 2.2**

After attaching the paper square, a hole should be made in the middle of the paper square using a hole punch.

The four strips with the 1.0cm central uncut portion should be labelled P and the four strips with the 2.0cm central uncut portion should be labelled Q, as shown in Fig. 2.3.



**Fig. 2.3**

- 3 It should be possible to stick the adhesive tape firmly to the bench. If this is not possible then an alternative work surface (of at least 40 cm × 30 cm) should be clamped to the bench. An upturned plastic tray or laminate sheet would be suitable. The candidates should be advised to use this surface.
- 4 The strips should break when a 1 kg mass, attached with a hook through the punched hole, is lifted from the bench surface. The Supervisor should carry out this test on one strip labelled Q before constructing the remaining strips for the candidates. If the strip does not break, thinner polythene must be used.
- 5 If the apparatus is to be used by another candidate, then the used polythene strips should be removed and new polythene strips provided.

### Information required by examiners

Sample set of numerical results clearly labelled “Supervisor’s Results”, 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**

**General Certificate of Education Advanced Subsidiary Level and Advanced Level**

**October/November Session 2011**

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 CIE 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 .....

