



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

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**PHYSICS**

**9702/36**

Paper 3 Advanced Practical Skills 2

**October/November 2013**

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 **6** printed pages and **2** blank pages.



## 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 Cambridge:

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 (9702/36).

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 with switch. See Note 1.

Two 104 cm lengths of bare resistance wire. See Note 2.

Two metre rules. See Note 3 and Note 4.

10  $\Omega$  resistor rated at 0.5W (e.g. RS Components product code 707–8063). The resistor should have terminals for the connection of leads.

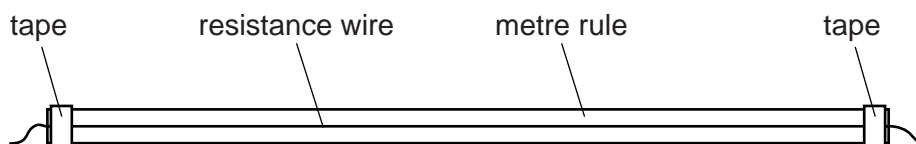
Eight connecting leads. See Note 5.

Digital voltmeter with range 0–20V d.c. reading to 0.01V or better. If a digital multimeter is used, it should be fixed on this range, with any unused terminals covered.

Four crocodile clips suitable for attaching to the leads.

**Notes**

- 1 The power supply should be taped so that the candidate cannot adjust the voltage. Any unused terminals should be covered.
- 2 The resistance wire should have a resistance of approximately  $10\ \Omega\ \text{m}^{-1}$  (e.g. 32 swg or 34 swg constantan, or 28 swg nichrome).
- 3 The metre rules should each have a single scale with millimetre divisions. If there is a reverse scale it should be covered.
- 4 Attach a length of resistance wire to each metre rule using adhesive tape, as shown in Fig. 1.1, leaving approximately 2 cm of wire at each end.



**Fig. 1.1**

- 5 Two of the leads should each have length at least 50 cm and one end suitable for use as a movable contact on the resistance wire.
- 6 Lay the apparatus out on the bench. If it is to be used by a second 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)

100 cm length of plastic track, e.g. open (not tubular) curtain track. See Notes 1 and 2.

Flat board of length 100 cm, width 20 cm and approximate thickness 10 mm (MDF or plywood is suitable). See Note 2 and Note 3.

Two hard spheres of approximate diameter 20 mm (e.g. glass marbles). See Note 4.

Hard sphere of approximate diameter 15 mm (e.g. glass marble). See Note 4.

Stopwatch reading to 0.1 s or better.

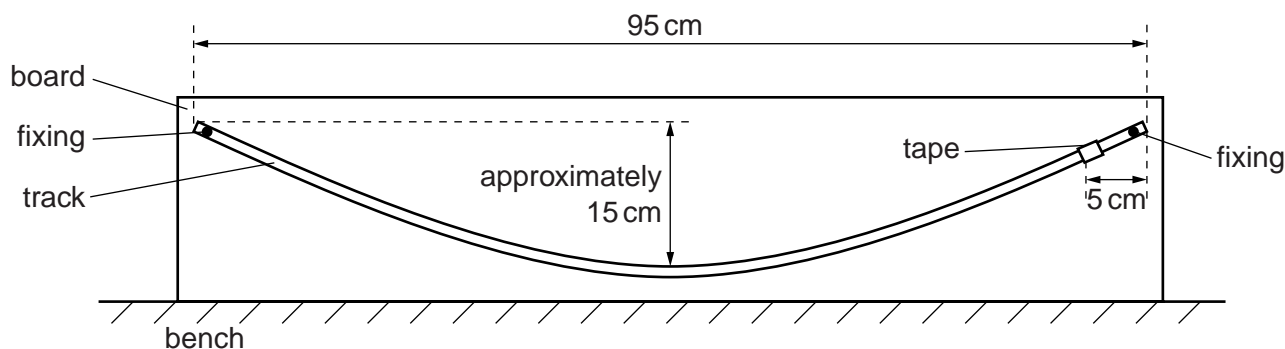
A small tray to store the spheres (e.g. a plastic petri dish). See Note 5.

Access to a top pan balance reading to 1 g or better.

Metre rule with a millimetre scale.

### Notes

- 1 A band of adhesive tape should be wrapped around the track 5 cm from one end.
- 2 The plastic track should be attached to the board at each end so that it forms a curve, as shown in Fig. 2.1. Spacers should be used if necessary so that the spheres can roll along the track without touching the board.



**Fig. 2.1**

- 3 The board should be securely mounted vertically on the bench as shown in Fig. 2.1, e.g. using two retort stands.
- 4 Using a permanent marker, one large sphere should be labelled A and the other labelled B. The small sphere should also be labelled B.
- 5 The spheres should be placed in the tray. If the apparatus is to be used by a second 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.



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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 2013**

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 .....

