



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

---

**PHYSICS**

**9702/33**

Paper 3 Advanced Practical Skills 1

**May/June 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.**

---



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.

---

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 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 (9702/33).

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)**

Low voltage power supply fixed at 1 V d.c. or 1.5 V cell with terminals.

Switch.

Digital voltmeter fixed to the range 0–2 V reading to the nearest 0.001 V.

Digital ammeter fixed to the range 0–200 mA reading to the nearest 1 mA or better.

Metre rule with a millimetre scale.

110 cm length of 34 swg constantan wire. See Notes 1 and 2.

20 cm length of 34 swg constantan wire taped to a card and labelled 'sample of wire'. See Note 2.

Rheostat. The exact range of the rheostat is not important provided it has a maximum resistance between  $8\ \Omega$  and  $20\ \Omega$ . Tape over any unused terminals.

Seven connecting leads. See Note 3.

Access to a micrometer screw gauge (shared between at most three candidates).

**Notes**

- 1 The 110 cm length of wire should be attached to the metre rule with 5 cm protruding at each end. It should be possible to attach a crocodile clip to each end of the wire. The wire should be attached to the rule firmly enough (e.g. using adhesive tape at the ends of the rule) to minimise any looseness or kinks.
- 2 If 34 swg constantan wire is unavailable, then 32 swg constantan wire may be used. Alternatively, 28 swg nichrome wire or 30 swg nichrome wire may be used.
- 3 Two of the leads should have a crocodile clip at one end. One of these leads should have approximate length 100 cm and its crocodile clip should be labelled 'Q'. The other crocodile clip attached to a shorter lead should be labelled 'P'.
- 4 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. If the sample of wire has been removed from the card, it should be re-attached.

**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)**

Two stands.

Two bosses.

Two clamps.

Glass ball (e.g. a marble) of approximate diameter 15 mm.

Small container for the glass ball.

Stopwatch reading to 0.1 s or better.

Two rigid runways. Suitable materials are thick card, plastic or wood. See Note 1.

Metre rule with a millimetre scale.

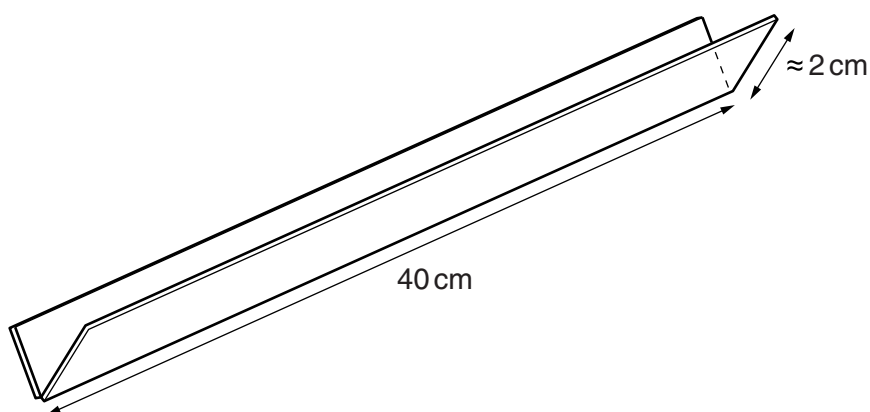
Two thin wooden rods. See Note 2.

Two wooden blocks. See Note 2.

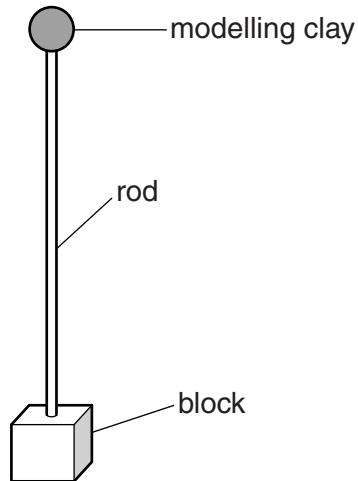
Modelling clay. See Note 2.

**Notes**

- 1 The runways should be of approximate length 40 cm with a V-shaped groove. It should be possible for the glass ball to roll easily along the groove. The length of the edges of each runway should be approximately 2 cm as shown in Fig. 2.1.

**Fig. 2.1**

- 2 Each rod should be supported by a wooden block as shown in Fig. 2.2.



**Fig. 2.2**

The rods should have approximate length 20cm and approximate diameter 3mm.

The blocks should have approximate dimensions 2 cm × 2 cm × 2 cm.

The purpose of the modelling clay is to cover the ends of the rods for safety reasons.

- 3 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.

**BLANK PAGE**

---

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

**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**

**May/June 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 .....

