

---

**PHYSICS**

**9702/34**

Paper 3 Advanced Practical Skills 2

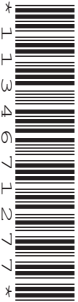
**October/November 2014**

**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.**

---



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 **9** printed pages and **3** 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 (9702/34).

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 11 and 12 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)**

Board of minimum dimensions 22 cm × 31 cm. See Note 1.

Three pins of approximate length 3 cm, e.g. optical pins.

Small tray for the pins.

Semicircular perspex or glass block of approximate diameter 9 cm (e.g. Philip Harris product code B8A45470). See Note 2.

180° protractor with 1° divisions.

30 cm ruler with a millimetre scale.

Small set square.

**Notes**

- 1 The board should be made from a material into which it is possible to stick pins securely, e.g. cork or the material used for a noticeboard.

A photocopy of Fig. 1.1 should be pasted on to the board.

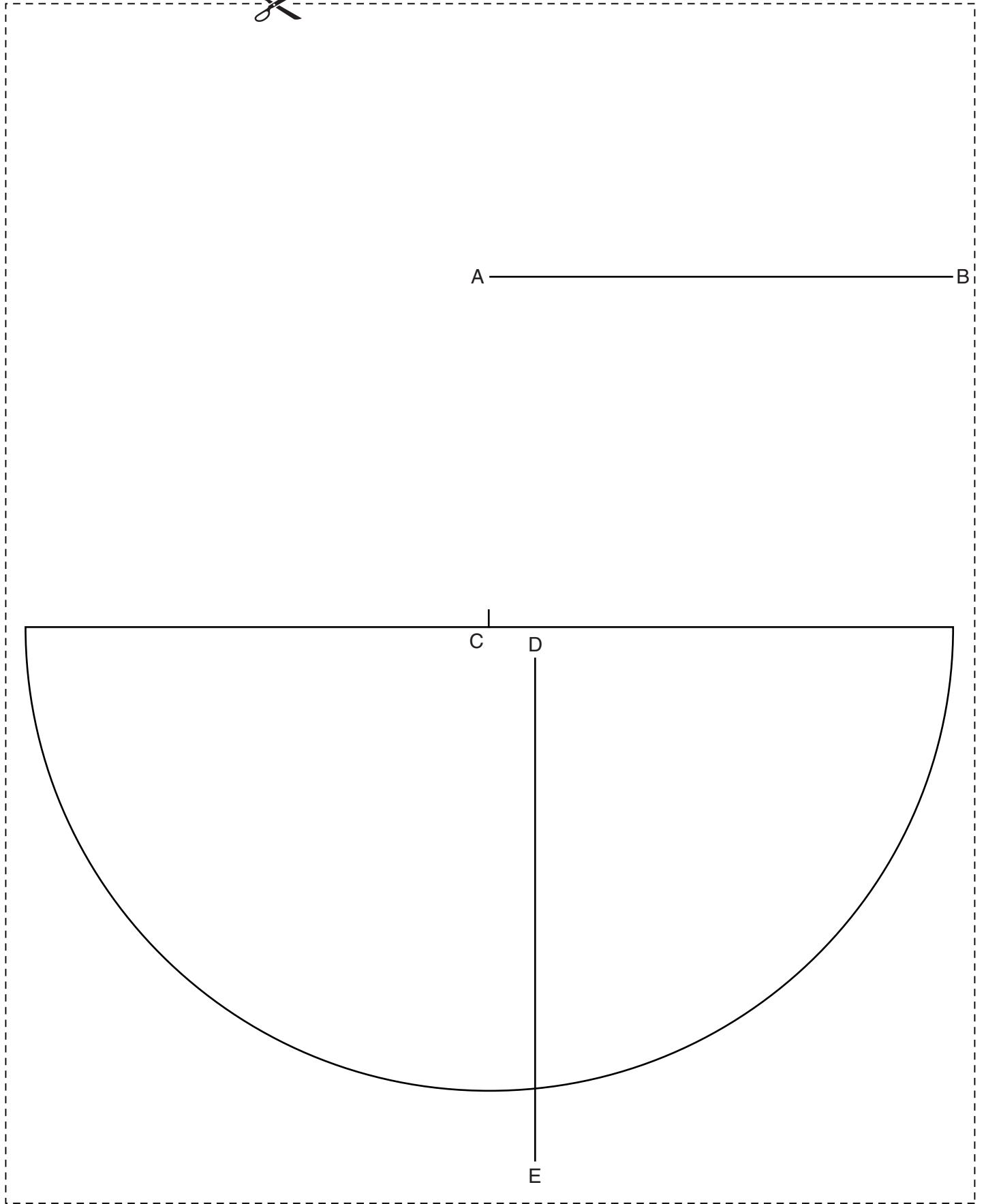
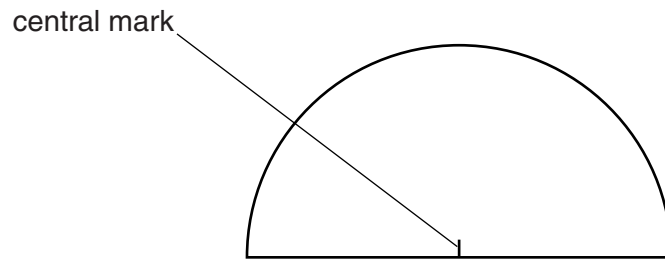


Fig. 1.1



- 2 Use a fine permanent marker pen to make a small mark on one of the flat faces of the block at the centre of the semicircle, as shown in Fig. 1.2.



**Fig. 1.2**

- 3 The remaining 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 with a new board and paper.

**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 sharpened, hexagonal pencils with equal lengths. The length should be approximately 16 cm. The exteriors of the pencils should be a plain light colour. See Note 1.

Measuring cylinder (glass or plastic) of approximate diameter 3 cm and approximate height 25 cm. See Note 2.

Enough uncooked rice to fill the measuring cylinder. See Note 2.

Round, flat-headed nail with approximate length 6 cm and approximate diameter 3 mm.

Wooden strip with an approximate length 30 cm and approximate cross-section 1.5 cm × 1.5 cm. See Note 3.

Stand and boss.

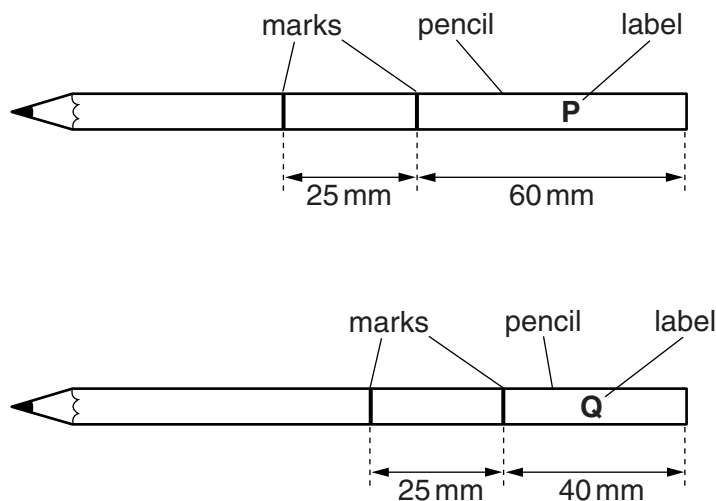
30 cm ruler with a millimetre scale.

Stopwatch reading to 0.1 s or 0.01 s.

Access to vernier calipers, shared between at most three candidates.

### Notes

- 1 Use a fine permanent marker pen to make marks around each pencil and to label them as shown in Fig. 2.1.

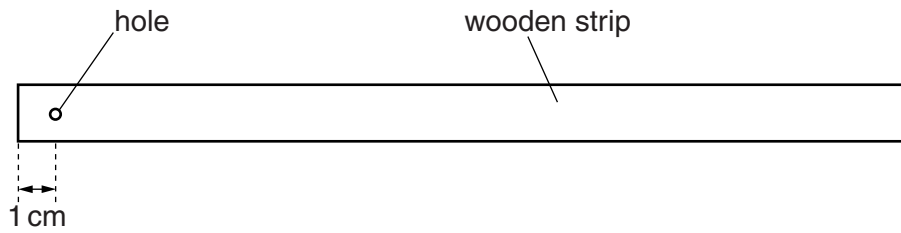


**Fig. 2.1**

- 2 Fill the measuring cylinder to the top with rice.

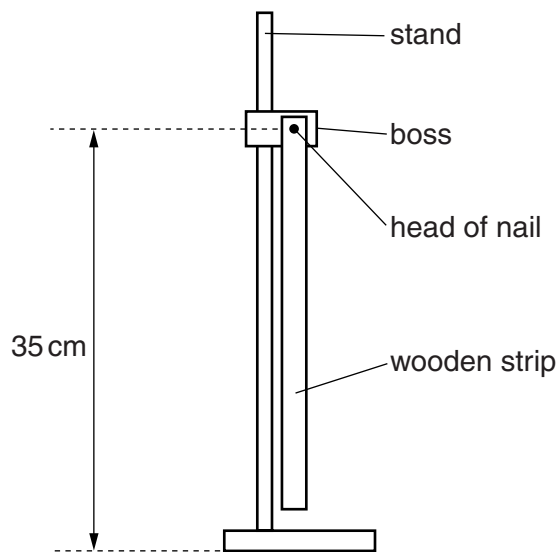


- 3 Drill a hole through the wooden strip approximately 1 cm from one end, as shown in Fig. 2.2. The diameter of the hole should be slightly larger than the diameter of the nail.



**Fig. 2.2**

- 4 Assemble the stand, boss, nail and wooden strip as shown in Fig. 2.3, and ensure that the wooden strip swings freely.



**Fig. 2.3**

- 5 The pencils 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, ensuring that the measuring cylinder is filled to the top with rice.

### Information required by Examiners

Sample set of numerical results, clearly labelled "Supervisor's Results", and obtained out of sight of the candidates.

---

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.

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**

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 .....

