



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

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**PHYSICS**

**9702/34**

Paper 3 Advanced Practical Skills 2

**May/June 2012**

**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 **8** printed 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 content 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 (e.g. two 1.5V cells).

Switch.

Three component holders with crocodile clips and terminals. One component holder should be labelled X and fitted with a  $330\ \Omega$  resistor, and a second component holder should be labelled Y and fitted with a  $680\ \Omega$  resistor.

D.C. ammeter with a range of at least 0–20 mA and reading to 0.1 mA or better. A multimeter set to this range is suitable, provided the range switch is fixed and any unused terminals are covered.

Resistors with values  $4.7\ \text{k}\Omega$ ,  $3.3\ \text{k}\Omega$ ,  $2.2\ \text{k}\Omega$ ,  $1.5\ \text{k}\Omega$ ,  $1.0\ \text{k}\Omega$ ,  $0.68\ \text{k}\Omega$ ,  $0.47\ \text{k}\Omega$ ,  $0.33\ \text{k}\Omega$  and  $0.22\ \text{k}\Omega$  each labelled with its value in  $\text{k}\Omega$  to 2 significant figures, e.g. '0.68 k $\Omega$ ' and '3.3 k $\Omega$ '.

Eight connecting leads.

**Notes**

- 1 All the resistors should be rated at 0.25W, with a maximum tolerance of 5%.
- 2 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)**

Two smooth, round-headed nails of length approximately 60 mm and diameter approximately 2.5 mm.

Piece of wood of length 300 mm and with cross-section  $(15 \text{ mm} \pm 2 \text{ mm}) \times (25 \text{ mm} \pm 5 \text{ mm})$ . See Note 1.

Thin wooden rod of diameter approximately 3 mm and length 130 mm.

Wooden block of dimensions 30 mm  $\times$  30 mm  $\times$  150 mm. See Note 2.

Stopwatch reading to 0.1 s or better.

A4 size image of a 180° protractor, mounted on thick card. See Note 3.

Five straight copper specimens of diameter approximately 0.70 mm (22 swg) and length 40 mm. They can be cut from either bare or enamelled copper wire and should be placed in a small tray (e.g. a plastic petri dish).

Five straight copper specimens of diameter approximately 0.90 mm (20 swg) and length 40 mm. They can be cut from either bare or enamelled copper wire and should be placed in a small tray (e.g. a plastic petri dish).

Retort stand (minimum height 60 cm and with a flat base) and two bosses.

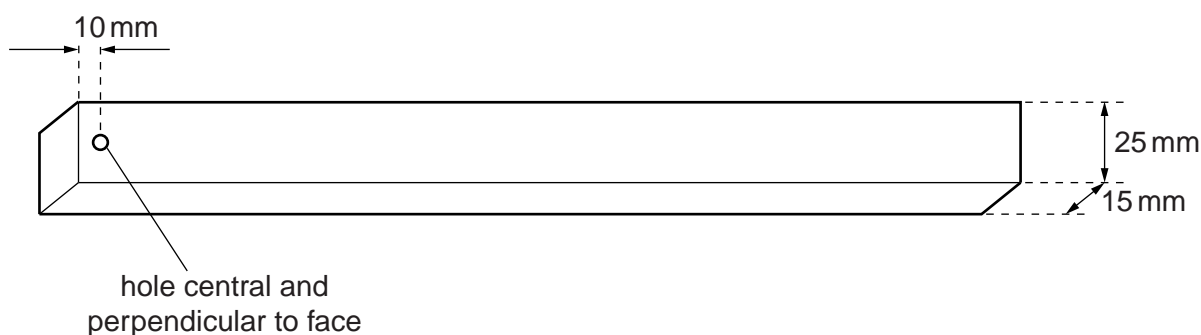
Small piece of Blu-Tack.

Access to a micrometer reading to 0.01 mm, shared between at most three candidates.

30 cm ruler with a millimetre scale.

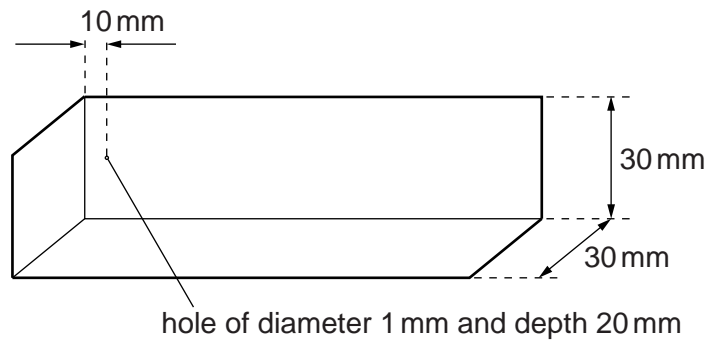
**Notes**

- The mass of the piece of wood should be between 60 g and 80 g (the 25 mm dimension may be reduced or increased to bring the mass into this range). A hole of suitable diameter should be drilled through the wood, as shown in Fig. 2.1. The hole should be just large enough for the piece of wood to swing freely on a nail through it.



**Fig. 2.1**

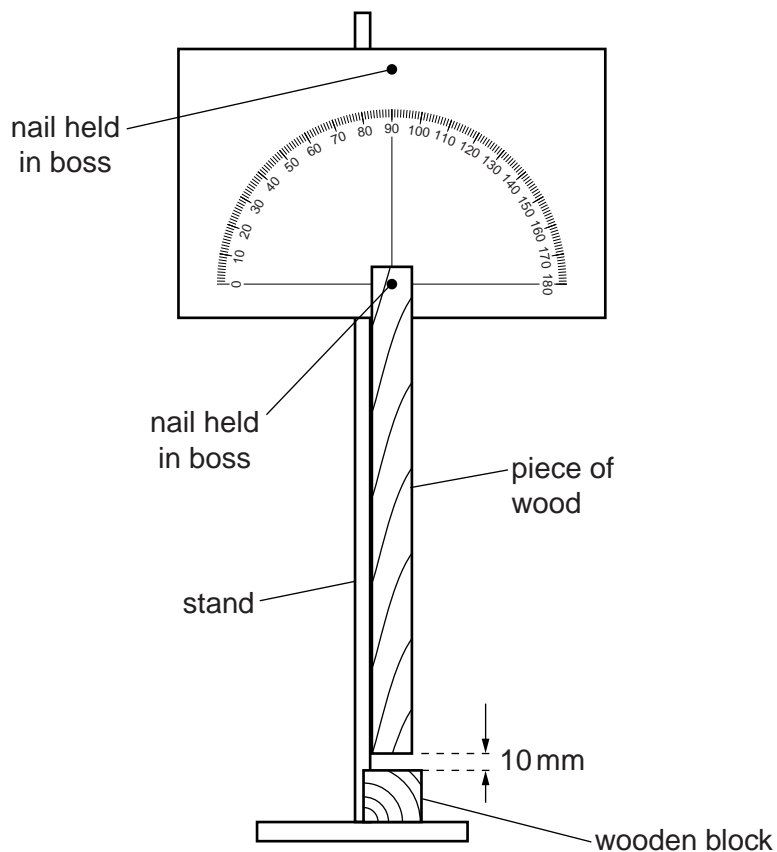
- 2 A hole of diameter 1 mm should be drilled to a depth of 20 mm in the wooden block, Fig. 2.2.



**Fig. 2.2**

- 3 A copy should be made of Fig. 2.4 (on page 6). This should be glued onto a piece of thick card.
- 4 The apparatus should be partially assembled as shown in Fig. 2.3. One nail passes through the protractor card above the 90° mark and the other passes through the piece of wood and the origin of the protractor. Ensure that the piece of wood swings freely. The thin rod and piece of Blu-Tack should be left on the bench with the copper specimens.

If the apparatus is to be used by another candidate, then it should be returned to this state, with new copper specimens provided.



**Fig. 2.3**

### Information required by Examiners

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

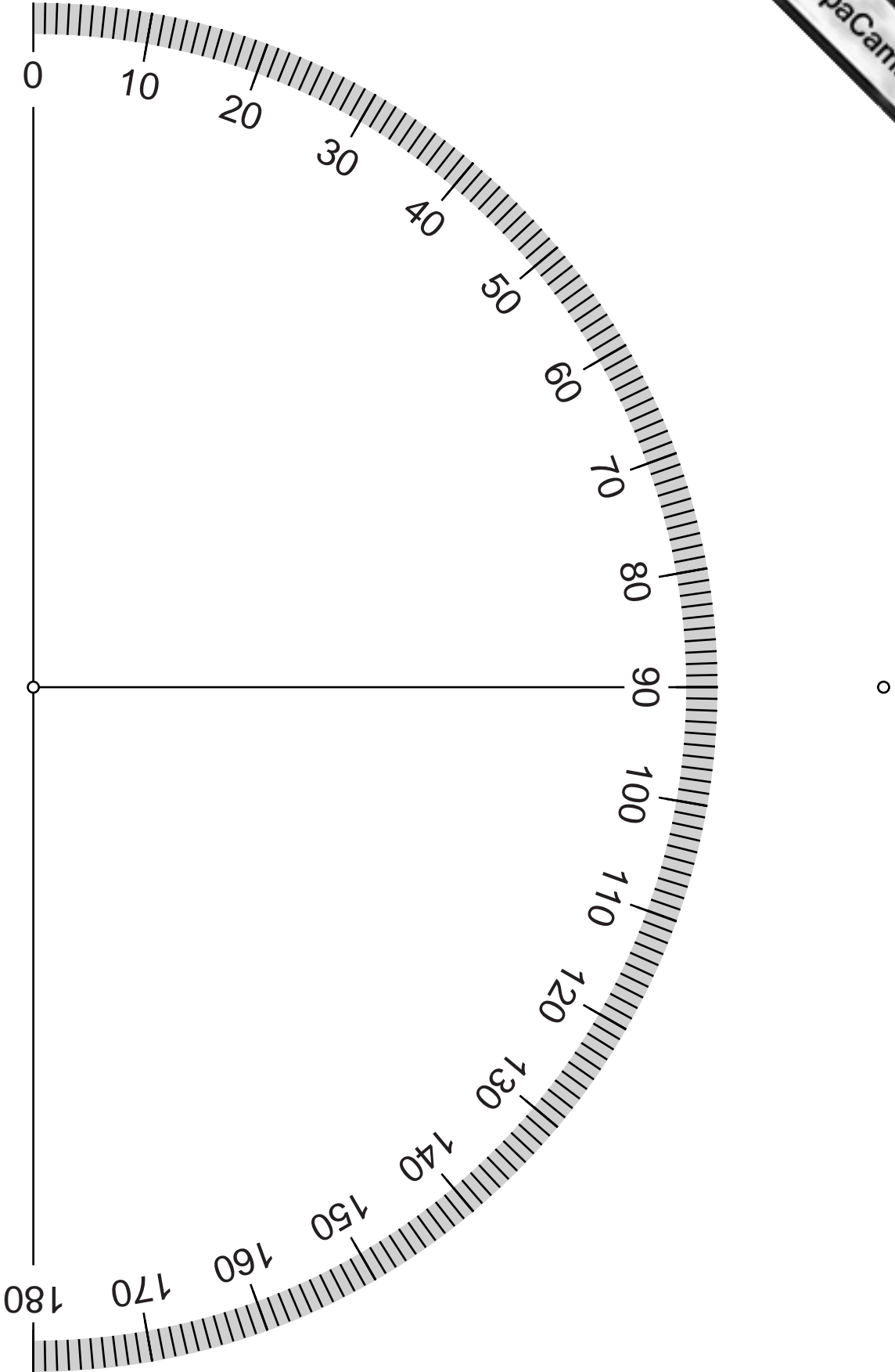


Fig. 2.4

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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**

**May/June Session 2012**

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 .....

