



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

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**PHYSICS**

**9702/32**

Paper 32 Advanced Practical Skills 2

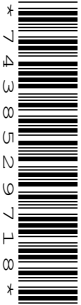
**May/June 2009**

**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 (9702/32).

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)**

Retort stand, clamp and boss. The retort stand should have a height of at least 60 cm. The boss and clamp should be left on the table.

70 cm length of wool (knitting yarn). The type of wool is not important.

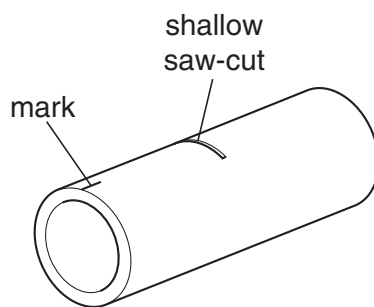
Two 100 g masses.

Copper tube, diameter about 1.5 cm, length about 8 cm. See Note 1.

Stopwatch reading to 0.1 s or better.

Half-metre rule with a millimetre scale.

Two wooden blocks, each with approximate dimensions 4 cm × 4 cm × 2 cm.

**Notes****Fig. 1.1**

- 1 A shallow saw-cut should be made in the pipe half-way along with a hacksaw blade, as shown in Fig. 1.1. It is not necessary for the cut to go through the wall of the pipe. A mark should be made at the top of one end of the pipe, as shown in Fig. 1.1.
- 2 If the apparatus is to be used by a second candidate, it should be dismantled.

**Information required by Examiners**

Sample set of numerical results, clearly labelled "Supervisor's Results".

**Question 2****Apparatus requirements (per set of apparatus unless otherwise specified)**

90 cm length of 34 swg constantan wire. See Note 1.

Four wooden blocks, each with approximate dimensions 4 cm × 4 cm × 2 cm.

Two 4 cm lengths of wooden dowelling rod. These can be of any diameter, up to 1.5 cm.

30 cm clear rule with a millimetre scale.

Half-metre rule with a millimetre scale.

Two retort stands, clamps and bosses.

Two G-clamps to hold the two retort stands firmly onto the bench.

100 g mass holder.

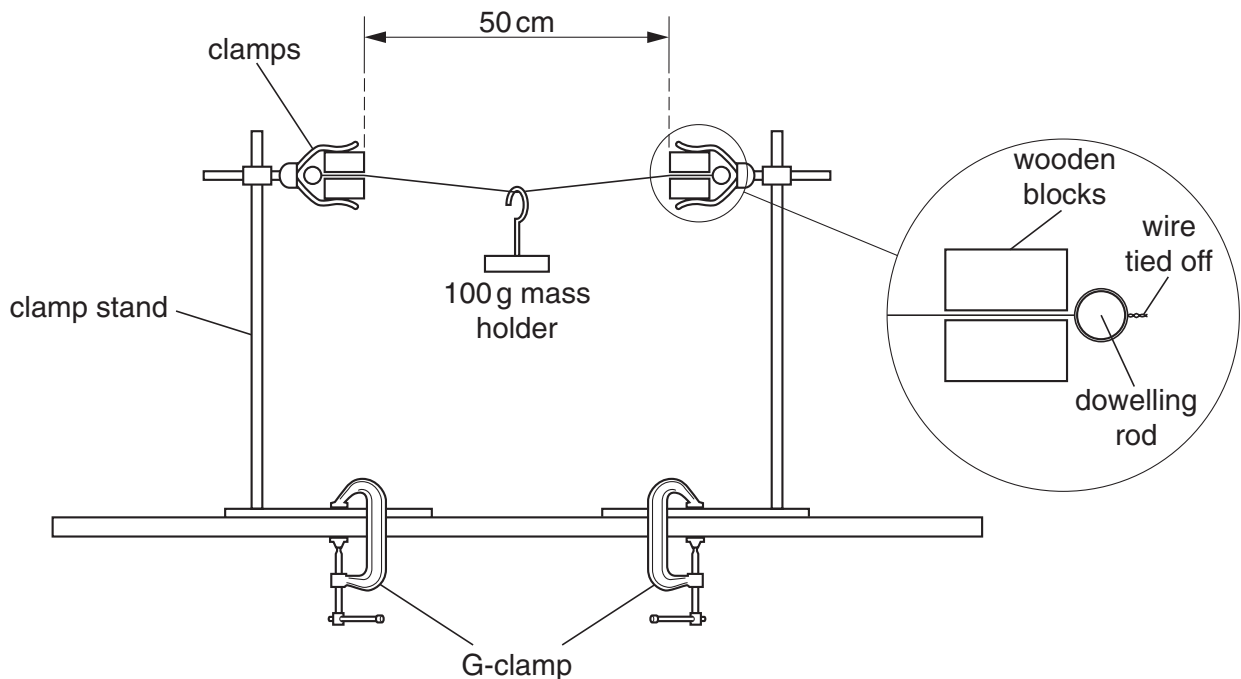
Ammeter with a range to allow readings between 0.5 A and 2 A. This should have a precision of at least 0.1 A.

12 V d.c. variable power supply.

Eight connecting wires. Two of these wires should have a crocodile clip at one end.

Switch.

Safety goggles. See Note 2.



**Fig. 2.1**

**Notes**

- 1 Wrap each end of the constantan wire around a wooden dowelling rod several times and secure it. Place each end of the constantan wire between two wooden blocks and hold firmly in the clamps, as shown in Fig. 2.1. The length of wire between the two pairs of wooden blocks should be approximately 50 cm, and the wire should be positioned about 40 cm above the table. The retort stands should be clamped firmly to the table. The 100 g mass holder should be placed so that it hangs down from the middle of the wire. Check that each boss, clamp and G-clamp is secure before the experiment starts and check that the wire will not move between the wooden blocks.
- 2 Safety goggles must be worn for this experiment.
- 3 If the apparatus is to be used by a second candidate, dismantle the electric circuit **only** and check that the rest of the apparatus is still as in Fig. 2.1 and that the bosses, clamps and G-clamps are secure.

**Information required by Examiners**

Sample set of numerical results, clearly marked "Supervisor's Results".

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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 2009

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

Question 1: Sample set of numerical results, clearly marked "Supervisor's Results".

Question 2: Sample set of numerical results, clearly marked "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 .....

