



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

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**PHYSICS**

**9702/31**

Paper 31 Advanced Practical Skills 1

**May/June 2009**

CONFIDENTIAL INSTRUCTIONS

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**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 **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 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 (9702/31).

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 battery, (2 AA or C 1.5V cells are appropriate). See Note 1.

4 × 47 Ω resistors. See Note 2.

1 × 100 Ω resistor. See Note 2.

0.5m length of constantan wire, in the range 30–36 swg. This should be labelled ‘constantan wire’.

13 connecting wires.

8 crocodile clips.

100mA fsd ammeter with a precision of at least 0.1 mA. A digital multi-meter set to this range is acceptable.

Switch.

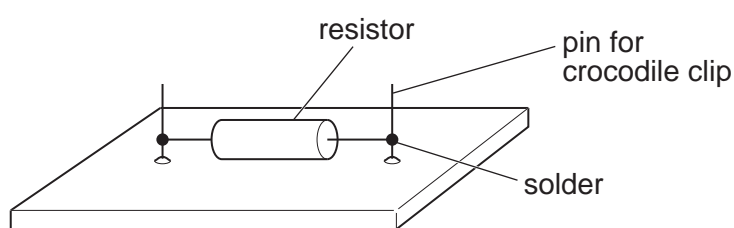
Access to a micrometer.

**Notes**

1 The battery should have terminals suitable for the connecting wires.

2 Mount each resistor individually so that it has suitable terminals for the connecting wires. Cover up the 100 Ω resistor and label it ‘X’. A suitable mount is shown below in Fig. 1.1.

You should have, in total, five mounted resistors for each candidate: four with resistance 47 Ω and one with resistance 100 Ω.



**Fig. 1.1**

Should 47 Ω resistors be difficult to obtain, construct boards of resistors, each with total resistance 47 Ω. In this case, the terminals to be used should be made clear to the candidate.

3 If the apparatus is to be used by a second candidate, the circuit should be dismantled and the components laid on the table. Supervisors should replace the batteries if necessary.

**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).**

Clear plastic bottle and lid. See Note 1.

Container holding more than enough water to fill the plastic bottle.

100 ml beaker.

Plastic teat pipette.

100 ml measuring cylinder.

180° protractor. See Note 2.

Half-metre rule with a millimetre scale.

Stopwatch reading to 0.1 s or better.

Paper towels.

**Notes**

- 1 The plastic bottle should be roughly cylindrical and free of any markings. The bottle should be provided with a securely-fitting screw top lid. A common drinks bottle would be suitable.
- 2 A large scale protractor with 0.5° divisions or a small scale protractor with 1° divisions are suitable.
- 3 If the apparatus is to be used by a second candidate, the water should be **emptied** from the plastic bottle and the water container should be refilled.

**Information required by Examiners**

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





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 labelled 'Supervisor's Results'.

Question 2: Sample set of numerical results, 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 .....

