



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 2008**

CONFIDENTIAL INSTRUCTIONS

**2 hours**

**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 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 (9702/31).

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)**

1 m thin, strong string (e.g. nylon cord or cotton string). A small loop should be tied in the middle and at each end as shown in Fig. 1.1.

**Fig. 1.1**

Two stands at least 60 cm tall.

Two pulleys arranged so that they can be attached to the stands.

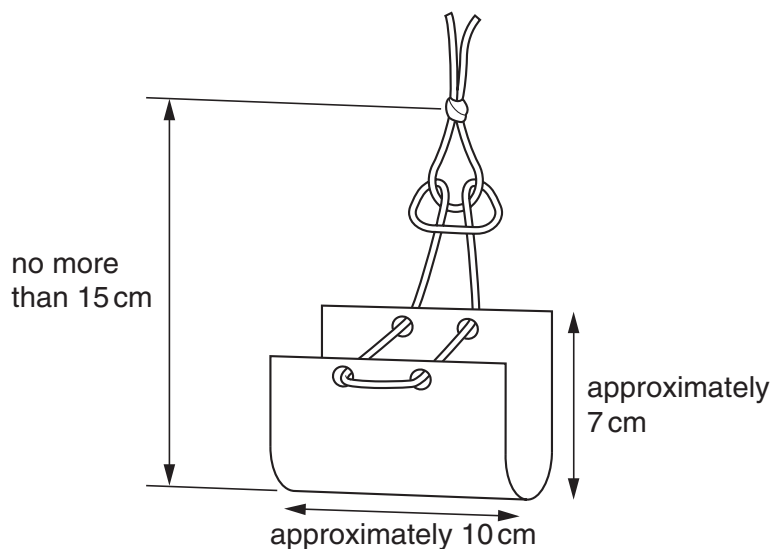
Two G-clamps to fix the stands to the bench. Heavy weights may be used if suitable G-clamps are not available.

Two 100 g mass holders.

Two 100 g masses.

Eleven nails. 15 cm (6") long mild steel, each of mass about 33 g. Alternatively, any object in the range of 20-34 g will be appropriate (e.g. washers, bolts, coins) as long as eleven identical objects are provided for each candidate.

Holder for the nails or chosen objects. For nails a card saddle (shown in Fig. 1.2) has been found to work well. This should be fixed with string to the middle loop. Label this 'object holder' on the front and back.

**Fig. 1.2**

180° protractor.

Stopwatch reading to 0.1 s or better.

Half-metre rule with a millimetre scale.

**Notes**

- 1 If the apparatus is to be used by a second candidate, the pulleys, string and nails should be dismantled and the equipment laid out on the bench ready for the next candidate to use.

**Information required by Examiners**

Mass of a single nail (or the chosen object).

## Question 2

### Apparatus requirements (per set of apparatus unless otherwise specified)

3.0V power supply ( $2 \times 1.5\text{V}$  dry cells would be suitable), with suitable terminals. The positive and negative terminals must be clearly labelled.

LED soldered in series to a  $47\ \Omega$  resistor (see Note 1).

LDR soldered in series to a  $10\ \text{k}\Omega$  resistor (see Note 2).

Six leads.

Voltmeter. The meter must be capable of measuring voltages in the range  $0 - 5\text{V}$  to a precision of  $0.01\text{V}$ . An analogue or digital meter is suitable.

Micrometer screw gauge. If there are insufficient micrometers for candidates to have one each, then Supervisors must ensure that each candidate has reasonable access.

One A4 sheet of tracing paper (one per candidate).

One piece of black paper  $4\text{cm} \times 8\text{cm}$  (one per candidate).

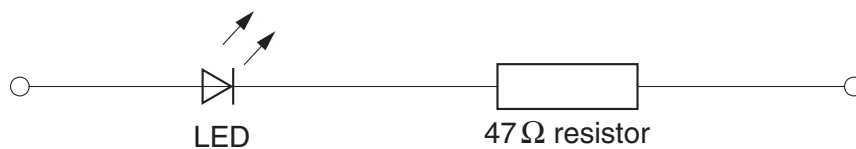
Scissors.

One small roll of Sellotape.

300 mm rule with a millimetre scale.

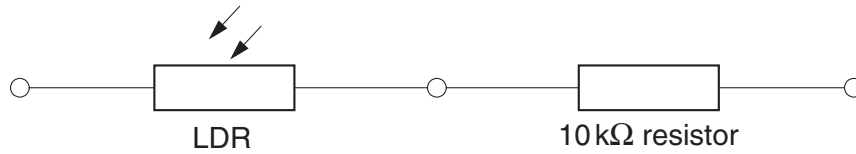
### Notes

- 1 The negative terminal of the LED should be soldered to the resistor as shown in Fig. 2.1. There should be one terminal at each end. The LED should be labelled.



**Fig. 2.1**

- 2 The LDR and the  $10\text{k}\Omega$  resistor should be soldered together so that there are three terminals as shown in Fig. 2.2. The LDR should be labelled. The experiment will work with any LDR (e.g. RS Components catalogue reference 651-507) but the diameter of the LDR should be less than 2 cm.



**Fig. 2.2**

- 3 If the apparatus is to be used by a second candidate, the circuit should be disconnected. The electrical equipment should be laid out on the bench ready for use by the next candidate. The black paper and the tracing paper should be removed. New black paper and tracing paper should be provided.

### Information required by Examiners

None.

This form should be completed and sent to the Examiner with the scripts.

### SUPERVISOR'S REPORT FORM

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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: Mass of a single nail (or the chosen object) = .....g

Question 2: none.

#### 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 .....

