



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**PHYSICS**

**5054/31**

Paper 3 Practical Test

**October/November 2010**

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 CIE  
by e-mail: 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.

This document consists of **9** printed pages and **3** blank pages.



## Instructions for preparing apparatus

These instructions detail the apparatus required for each experiment in this paper. No access is permitted to the Question Paper in advance of the examination session.

## Number of sets of apparatus

In addition to a few spare sets, the minimum number of sets of apparatus to be provided should be sufficient to enable candidates to spend 20 minutes with the apparatus for each of Questions 1, 2 and 3, and one hour with the apparatus for Question 4. The order in which candidates answer the questions will be determined by the Supervisor. Candidates may spend one hour circulating around Questions 1, 2 and 3, followed by an hour on Question 4, or vice versa.

It is assumed that candidates will supply their own calculator and geometrical instruments, such as a set square,  $0^\circ$  to  $180^\circ$  protractor, pair of compasses and 30 cm rule. Candidates should be advised in advance that they may, if they wish, use quartz wristwatches with stopwatch facilities, providing that such wristwatches afford the required precision.

## Instructions for the supervision of the examination

The Supervisor, who may be a Physics teacher, is responsible for the administration of the examination according to the procedures detailed in the Handbook for Centres. In all instances, a Physics teacher should be present. Preferably, this teacher should have been responsible for the preparation of the apparatus. Two invigilators must be present at all times: it is not acceptable for a teacher who has been responsible for preparing the candidates for this paper to be the sole Supervisor or Invigilator.

Supervisors may make the following announcement at the start of the examination.

'The Examiners do not want you to waste time when you are unable to do any experiment. Any candidate who is unable to get results with an experiment may ask for help. The extent of this help will be reported to the Examiners, who may make a deduction of marks.'

Supervisors should note that a candidate may only be given enough assistance to allow some raw readings or observations to be made. On no account should any assistance be given with the treatment or analysis of these readings and observations.

Supervisors may draw to the attention of the candidates any significant deviation between the apparatus provided and that detailed in the Question Paper, particularly where diagrams are given in the paper.

Candidates should be reminded that all their work should be written on the Question Paper. Rough paper must not be used.

The Supervisor must complete the Report at the back of these Instructions. Details should be given of any significant deviation between the apparatus used and that specified in these Instructions. A sample set of results can often help Examiners. A copy of this Report must be included in **each** packet of scripts.

**Question 1****Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)**

100 cm<sup>3</sup> heat resistant glass beaker.

Bunsen burner (see Note 1).

Supply of water at room temperature (see Note 2).

100 cm<sup>3</sup> measuring cylinder.

Thermometer, with a range of –10 °C to 110 °C.

Stand, boss and clamp to hold the thermometer.

Stirrer.

10 g mass made of metal, e.g. slotted mass (see Note 3).

Tongs.

Paper towels.

Safety glasses.

**Notes**

1. At the start of the experiment, the Bunsen burner should be lit and adjusted to give a yellow flame. It should be placed well away from the supply of water at room temperature.
2. Each candidate will require at least 50 cm<sup>3</sup> of water at room temperature. There should therefore be sufficient water for all candidates to use. This should have been placed in a container overnight so that it is in thermal equilibrium with its surroundings.
3. The candidates will heat the metal mass in a roaring blue Bunsen flame. The Supervisor should check that the mass used does not melt in the Bunsen flame. If the mass starts to melt, it should be replaced with one that has a higher melting point (e.g. a mass made of brass).
4. At the changeover, Supervisors should empty the beaker and place the mass on the bench. The beaker should be dried or replaced. The Supervisor should ensure that the supply of water at room temperature is sufficient for the next candidate. Wet paper towels should be removed and replaced by dry ones.

**Information required by Examiners**

Sample set of numerical results, clearly labelled “Supervisor’s Results”, obtained out of sight of the candidates.

**Question 2****Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)**

Mirror in holder (see Note 1).

Three optics pins.

Soft board (or polystyrene tile) at least 30 cm × 20 cm (see Note 2).

30 cm rule with a millimetre scale.

Protractor.

**Notes**

1. The mirror should have a minimum length of approximately 8 cm. The holder is to be used to secure the mirror such that the longest edge of the mirror can be placed on a page of the question paper with the mirror perpendicular to the page.
2. The board should be soft enough to allow pins to be easily pushed in.
3. At the changeover, the Supervisor should check that all the apparatus is still present.

**Information required by Examiners**

Length of mirror.

**Question 3****Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)**

3V d.c. power supply (e.g. two 1.5V dry cells in a suitable holder).

Digital voltmeter capable of measuring a voltage of up to 4V to a precision of 0.01V (see Note 1).

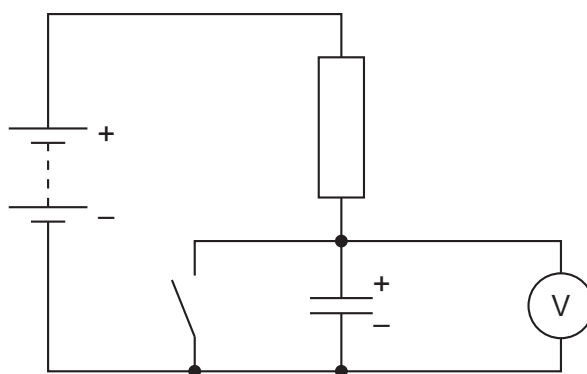
Resistor of nominal value 470k $\Omega$ .

Electrolytic capacitor of nominal value 100 $\mu$ F.

Switch or plug key.

Stopwatch, reading to 0.1 s or better.

Connecting leads to enable the Supervisor to set up the circuit shown in Fig. 3.1 (see Note 2).



**Fig. 3.1**

**Notes**

1. A **digital voltmeter** must be used so that it has the required high resistance. A digital multimeter fixed on an appropriate voltage range would be suitable.
2. The Supervisor should take care to connect the negative terminal of the electrolytic capacitor to the negative terminal of the power supply.
3. At the changeover, the Supervisor should check that the apparatus is still set up as in Fig. 3.1.

**Information required by Examiners**

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

**Question 4****Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)**

Wooden metre rule.

Small hook (see Note 1).

Small block of wood approximately 5 cm × 5 cm × 1 cm.

G-clamp (see Note 2).

100 g slotted mass hanger with four 100 g slotted masses.

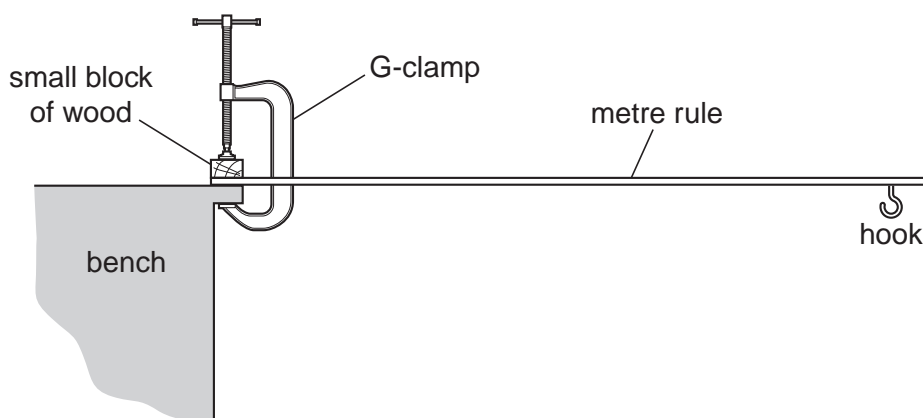
Additional metre rule with a millimetre scale.

Stand, boss and clamp for the candidate to support the additional metre rule vertically.

Set square.

**Notes**

1. The small hook should be screwed through the wooden metre rule at the 95.0 cm mark. The hook should be of sufficient size to provide a point of suspension for the 100 g mass hanger. If the screw thread protrudes through the top of the rule, the thread should be covered by a small piece of Blu-tack.
2. The Supervisor should clamp the wooden metre rule at the edge of the bench, as shown in Fig. 4.1. The rule should be clamped at the 5.0 cm mark so that 95.0 cm of the rule overhangs the bench. The edge of the block of wood should be at the 5.0 cm mark above the rule and the edge of the bench should be at the same point below the rule so that a well defined edge is produced. The block of wood should be held in place by the G-clamp.



**Fig. 4.1**

3. The **candidate** will clamp the additional metre rule vertically close to the end of the horizontal rule.
4. At the changeover, the Supervisor should remove all masses, including the mass hanger, that are suspended from the horizontal rule and ensure that the rule is still clamped at the 5.0 cm mark. The vertical rule arrangement should be dismantled.

### **Information required by Examiners**

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







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**This form must be completed and returned with the candidates' scripts.**

### REPORT ON PRACTICAL PHYSICS

The Supervisor is asked to give the following details, using the space provided on page 12.

- (a) Information required at the end of the test, as indicated in the Instructions.
- (b) Any help given to a candidate.
- (c) Any general difficulties encountered in preparing the apparatus.
- (d) Any difficulties experienced by particular candidates. These should include reference to difficulties due to faulty apparatus or materials and accidental damage to apparatus or materials. Candidates should be identified by name and candidate number.

Other cases of hardship, such as disability or illness, should be reported to the Syndicate in the normal way.

The Supervisor is asked to provide a plan of the work benches, giving details by candidate numbers of the places occupied by the candidates for each session. The plan and report should be enclosed in the envelope containing the candidate's scripts. If more than one envelope is used, a copy of the report must be enclosed in each envelope.

#### Declaration to be signed by the Principal

The preparation of this practical examination has been carried out so as to maintain fully the security of the examination.

Signed .....

Name (in block capitals) .....

Centre number .....

Centre name .....



**Information required**

1. Length of mirror used for Question 2: ..... cm
2. For questions 1, 3 and 4, please enclose a sample set of numerical results, obtained out of sight of the candidates and clearly labelled "Supervisor's Results".

**Details of difficulties and any help given to candidates**

