

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**Joint Examination for the School Certificate**  
**and General Certificate of Education Ordinary Level**

**PHYSICS**

**5054/3**

PAPER 3 Practical Test

INSTRUCTIONS

**OCTOBER/NOVEMBER SESSION 2002**

2 hours

**Great care should be taken that any confidential information given does not reach the candidates either directly or indirectly.**

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**These instructions consist of 8 printed pages.**



## **Instructions for preparing apparatus**

These instructions detail the apparatus required for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, to allow the Physics teacher to test the apparatus appropriately. 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.

Extra graph paper should be available. It is assumed that candidates will supply their own 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 of 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 printed Answer Booklet. 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.

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

Uniform wooden metre rule of rectangular cross section

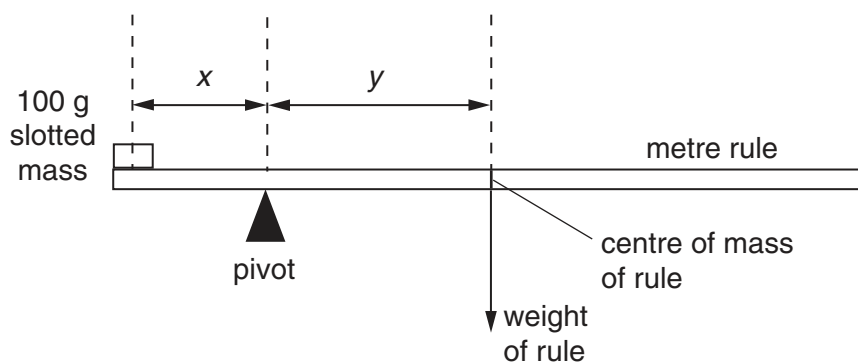
Pivot, e.g. glass prism or triangular wooden block

100 g slotted mass

15 cm rule with mm graduations

**Notes**

- (i) If a wooden metre rule is not available, a plastic rule would be suitable, provided it has a thickness of approximately 5 mm and is of rectangular cross section.
- (ii) The candidate will set up the apparatus as shown in Fig. 1.1.
- (iii) At the changeover, Supervisors should dismantle the apparatus.



**Fig. 1.1**

**Procedure to be followed by candidates**

Candidates will be required to determine the centre of mass of the rule. They will measure  $x$  and  $y$  in order to determine the mass of the rule. The dimensions of the rule will also be measured.

**Information required by examiners**

Mass of the rule.

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

A polystyrene or plastic cup of approximate volume 120 – 150 cm<sup>3</sup>

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

–10 °C to 110 °C thermometer with graduations which will enable candidates to interpolate between the 1 °C temperature intervals

Stand, boss and clamp to hold the thermometer

A supply of ice cubes each of volume between 10 cm<sup>3</sup> and 20 cm<sup>3</sup>, i.e. about 10 g to 20 g

250 cm<sup>3</sup> beaker containing approximately 200 cm<sup>3</sup> of water

Plastic stirrer, e.g. teaspoon

Paper towels to dry the ice cubes

**Notes**

- (i) The temperature of the water in the beaker should be such that an ice cube completely melts in 80 cm<sup>3</sup> of the water in a maximum time of three minutes, when the water is stirred.
- (ii) Supervisors should check that the size of the ice cube is sufficient to produce a temperature drop of at least 5 °C in 80 cm<sup>3</sup> of the water.
- (iii) The thermometer should be clamped in such a way that it can be inserted into the cup by moving the stand.
- (iv) At the changeover, Supervisors should empty the cup and the measuring cylinder and replenish the beaker of water.

**Procedure to be followed by the candidates**

Candidates will be required to place 80 cm<sup>3</sup> of water into the cup. They will record the initial temperature of the water and add an ice cube. When all the ice has melted they will record the final temperature and final volume of the water.

**Information required by examiners**

None.

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

5 V power supply or 4.5 V battery

1 k $\Omega$  resistor

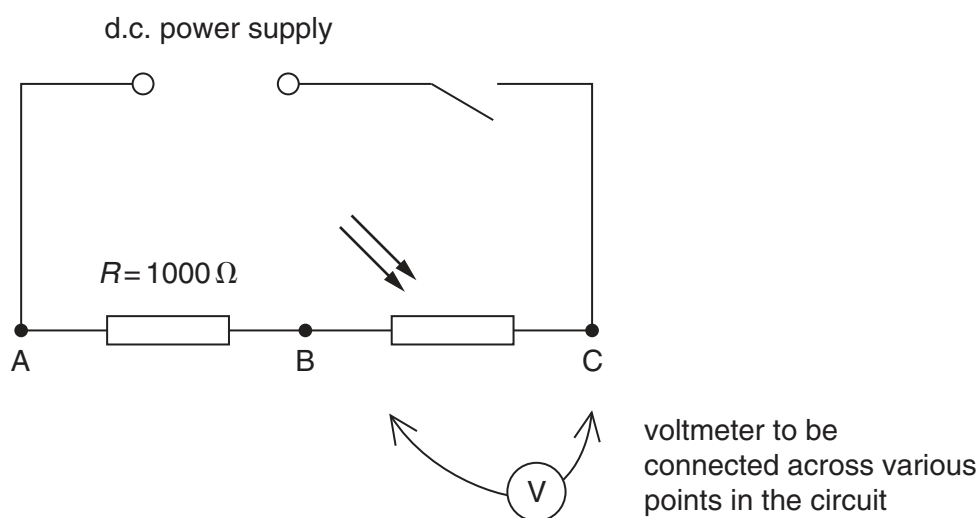
NORP 12 or equivalent light-dependent resistor

Switch or plug key

d.c. voltmeter of full-scale deflection 5 V

Leads to enable the Supervisor to set up the circuit shown in Fig. 3.1

A disc which will cover the LDR, e.g. a coin of diameter greater than the detecting face of the LDR



**Fig. 3.1**

#### Notes

- (i) The components should have suitable terminations to enable them to be connected into the remainder of the circuit.
- (ii) The points A, B and C in the circuit should be labelled.
- (iii) At the changeover, the Supervisor should remove the disc from the LDR, disconnect the voltmeter from the circuit and check that the circuit is still set up as described above.

#### Procedure to be followed by the candidates

The candidate is to ensure that the LDR is uncovered and then to measure the potential difference between the pairs of points AB, BC and AC. This process will be repeated with the LDR covered.

#### Information required by examiners

Sample set of results.

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

Polystyrene or other soft board of approximately A4 size

Rectangular glass or perspex block of the type used in refraction experiments

Protractor

Four optics pins

**Procedure to be followed by the candidates**

The candidates will place the block in the middle of a page of the answer booklet. The soft board will be used beneath the page so that the pins may be inserted through the page. The candidates will construct incident rays entering the block at a point along one of the longer edges and emergent rays leaving the block from the opposite edge.

**Information required by examiners**

None.

**This form must be completed and returned with the Answer Booklets.**

### REPORT ON PRACTICAL PHYSICS

The Supervisor is asked to give the following details, using the space provided on page 8.

- (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 index 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 index numbers of the places occupied by the candidates for each session. The plan should be enclosed with the Answer Booklets, together with the Information required by Examiners.

#### Declaration to be signed by the Principal

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

Signed .....

Name (in block capitals) .....

Centre Number .....

Centre Name .....



**Information required**

1. Mass of the rule.
3. Sample set of results.

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

