

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**PHYSICS**

**5054/03**

Paper 3 Practical Test

October/November 2005

**CONFIDENTIAL INSTRUCTIONS**

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

This document consists 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 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 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)**

Expendable steel spring of approximate length 3 cm and approximate diameter 1.5 cm e.g. Griffin & George XBV-590-010H

30 cm rule

Two set squares

Access to a balance reading to at least 0.1 g

**Procedure to be followed by candidates**

Candidates will make measurements on the spring when the turns are touching.

**Information required by examiners**

Dimensions of the spring: unstretched length and diameter.

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

Expendable steel spring of approximate length 3 cm and approximate diameter 1.5 cm e.g. Griffin & George XBV-590-010H

Metre rule

Set square

Stand, boss and clamp from which the spring may be suspended

Second boss and clamp to hold the metre rule

A 500 g mass or five 100 g masses tied together

S hook, which may be constructed from a stiff piece of wire or by opening up a paper clip

Beaker containing water

Paper towels to mop up spillage

**Notes**

- (i) The S hook should be attached to the 500 g mass by a length of thread so that the candidates can suspend the mass from the spring. The length of thread should be such that the 500 g mass can be completely immersed in the water in the beaker.
- (ii) The beaker should be of sufficient diameter to ensure that the mass can easily fit into the beaker. There should be sufficient water in the beaker to ensure that the mass can be fully immersed without touching the sides or base of the beaker.
- (iii) At the changeover, Supervisors should dismantle the apparatus. The mass should be placed on a paper towel. Supervisors may also need to replenish the supply of water if the candidate has spilled any.

**Information required by examiners**

None.

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

6 V d.c. power supply e.g. four 1.5 V cells in a cell pack

Switch or plug key (the question paper will refer to a switch)

Ammeter capable of reading up to 0.5 A to a precision of at least 0.01 A e.g. a 1.0 A full-scale deflection analogue meter or a 2.0 A digital meter

Voltmeter capable of reading up to 6 V to a precision of at least 0.1 V e.g. a 10 V full-scale deflection analogue meter or a 20 V digital meter

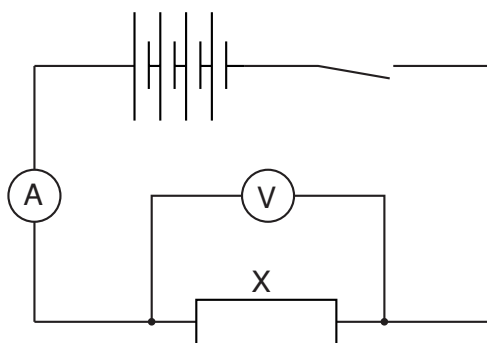
Nominal  $47\ \Omega$  resistor labelled X

Nominal  $22\ \Omega$  resistor labelled Y

8 connecting leads

**Notes**

- (i) The resistors should have suitable terminations to enable them to be easily connected into the remainder of the circuit. The values of the resistors should be obscured from the candidates.
- (ii) The Supervisor should set up the circuit as shown in the Fig. 3.1 with the resistor X in the circuit. The switch should be open i.e. the circuit should not be complete.
- (iii) At the changeover, Supervisors should remove the resistor Y from the circuit and ensure that it is set up as shown in Fig. 3.1. Supervisors should check that any cells used in the circuit have not run flat and that the switch is open.



**Fig. 3.1**

**Information required by examiners**

None.

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

250 cm<sup>3</sup> Pyrex beaker

Supply of boiling water

–10 °C to 110 °C thermometer

Stand, boss and clamp to hold the thermometer

Plastic stirrer

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

Stopwatch

Paper towels to mop up spillages

**Notes**

- (i) The supply of boiling water should be close to the apparatus being used by the candidates so that candidates do not have to carry boiling water across the laboratory, e.g. an electric kettle could be placed between two workstations. Candidates will have to transfer very hot water to the beaker and Supervisors must ensure that this can be done safely.
- (ii) The thermometer should be of sufficient length to enable candidates to interpolate between 1 °C divisions, i.e. the thermometer should be between 20 cm and 30 cm long.
- (iii) Supervisors should clamp the thermometer vertically with the bulb of the thermometer in the beaker. The bulb of the thermometer should be just above the base of the beaker. Supervisors should ensure that the clamp does not obscure the scale of the thermometer in the region of 90 °C to 50 °C. The beaker should not be placed on the base of the stand, because candidates will need to be able to lift the thermometer out of the beaker without adjusting the clamp.
- (iv) At the changeover, Supervisors should empty the beaker and the measuring cylinder, and replace the thermometer in the beaker.

**Procedure to be followed by candidates**

Candidates will pour water from the supply into the beaker so that the bulb of the thermometer is just covered.

**Information required by examiners**

None.

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**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 candidate number.

Other cases of hardship, such as disability or illness, should be reported to CIE 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 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**

Dimensions of the spring used in question 1:

unstretched length = .....

diameter = .....

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