UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/31**

Paper 3 Practical Test **October/November 2013**

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 Cambridge
by e-mail: info@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 **11** printed pages and **1** blank page.

DC (SJF/CGW) 64527/4

UNIVERSITY of CAMBRIDGE
International Examinations

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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° to 180° 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).

Tapered rubber stopper (bung) of approximate diameter 30 mm (see Note 1).

30 cm ruler with a millimetre scale.

Access to a top-pan balance (see Note 2).

Notes

1. The stopper must be tapered because the candidates are expected to measure the largest and smallest diameters.

2. The top-pan balance must be capable of measuring to a precision of 0.1 g. There should be sufficient top-pan balances to ensure that candidates do not face undue delay when measuring the mass of the rubber stopper.

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).

100 cm^3 Pyrex beaker.

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

Supply of water at room temperature (see Note 1).

Container for water at room temperature (see Note 1).

100 cm^3 measuring cylinder (see Note 2).

Candle with base to ensure that it will stand upright, e.g. tea light.

Means of lighting the candle, e.g. box of matches.

Stand with clamp and two bosses (see Note 3).

Second clamp (see Note 4).

Plastic stirrer.

Stopwatch or stop-clock.

Paper towels or cloths to mop up spillages.

Notes

1. The supply of water at room temperature should have been left in a large container in the laboratory overnight so that it is in thermal equilibrium with its surroundings. Each candidate will need a maximum of 100 cm^3 of water. The supply should be placed in a smaller container at room temperature, labelled 'Water at room temperature'.

2. If the measuring cylinder is marked in ml, candidates should be advised that 1 ml = 1 cm^3.

3. The bosses should be attached to the stand, and the clamp should be held in the lower of the two bosses. The jaws of this clamp must open sufficiently wide so that the clamp can hold the 100 cm^3 beaker.

4. The thermometer should be held in the second clamp so that the scale from 0 °C to 60 °C is not obscured. A label should be attached to the clamp stating 'do not adjust'.

5. If the examination room has ceiling fans or is draughty, draught shields should be provided so that the candle can burn with a steady flame.

6. At the changeover, the Supervisor should dismantle the apparatus set up by the candidate. The 100 cm^3 beaker should be emptied and its base wiped clean. The supply of water at room temperature should be replenished, if necessary.

Information required by Examiners

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

Question 3

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

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

Switch or plug key.

A resistor of nominal value 18 Ω, labelled X, e.g. RS Components product code 707-8596 (see Note 1).

A resistor of nominal value 33 Ω, labelled Y, e.g. RS Components product code 707-8603 (see Note 1).

Voltmeter capable of measuring a potential difference of up to 5 V to a precision of 0.05 V or better. An analogue or digital meter is suitable.

Ammeter capable of measuring a current of up to 200 mA to a precision of 1 mA or better. An analogue or digital meter is suitable.

Six connecting leads (see Note 2).

Two further connecting leads (see Note 3).

Notes

1. The value of resistors X and Y should be concealed from the candidates, e.g. by winding masking tape around the two resistors. Both resistors should have a power rating of 1 W or higher. The resistors should have suitable terminals to enable them to be connected into the remainder of the circuit.

2. The Supervisor should set up the apparatus as shown in Fig. 3.1. The terminals A, B, C and D should be clearly labelled.

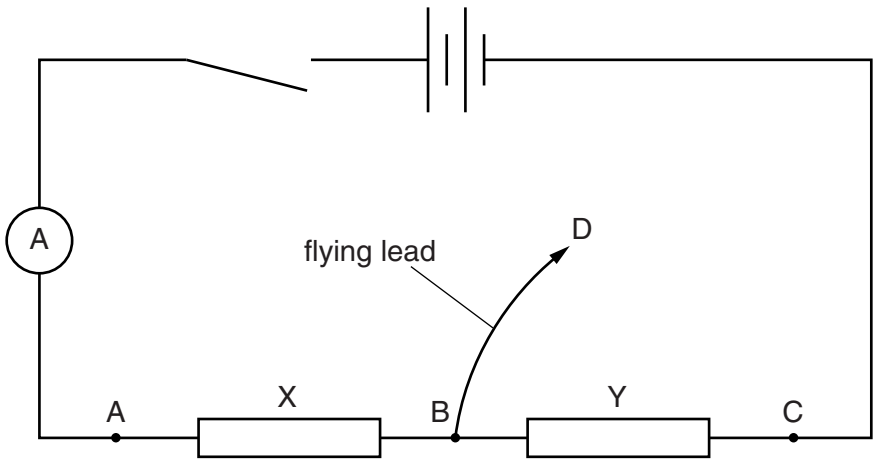

Fig. 3.1

3. The two further connecting leads should be connected to the voltmeter so that the **candidate** can connect it across points A and C in the circuit.

4. At the changeover, the apparatus should be restored to its original state as in Fig. 3.1, disconnecting end D of the flying lead from the circuit. If cells are used, they should be checked, and replaced if necessary.

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 block of approximate mass 200 g (see Note 1).

Small hook (see Note 2).

Thin string of approximate length 1 m (see Note 3).

Pulley (see Note 4).

10 g mass hanger with nine 10 g slotted masses.

Eight 100 g slotted masses.

Notes

1. The block must be cuboid in shape. Possible dimensions are 7 cm × 5 cm × 10 cm for wood of average density. However, Centres may use any blocks that they have available, provided the mass is approximately 200 g. One of the largest faces of the block should be labelled A.

2. The small hook should be screwed into the centre of one of the end faces of the wooden block as shown in Fig. 4.1. The hook should be vertical with the gap upwards when face A is upwards.

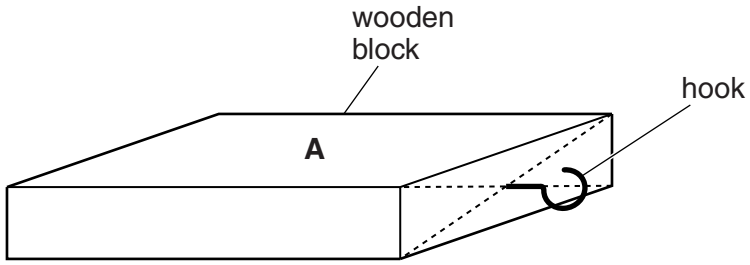

Fig. 4.1

3. Small loops that do not slip should be made at each end of the thin string. The **candidate** will place one of these loops over the small hook on the wooden block and the other over the hook on the 10 g mass hanger.

4. The pulley should be set up at the edge of the bench so that the **candidate** can set up the apparatus as shown in Fig. 4.2.

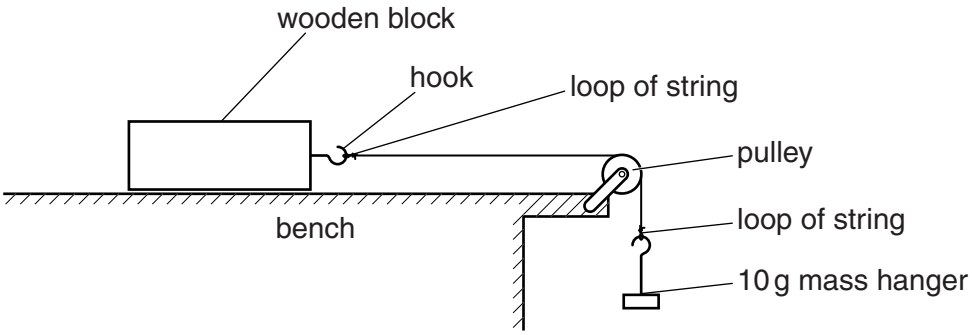

Fig. 4.2

5. At the changeover, the apparatus should be returned to its initial state.

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 Cambridge 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 candidates' 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

For questions 1, 2, 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