Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/32**

Paper 3 Practical Test **October/November 2015**

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 **10** printed pages and **2** blank pages.

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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)

250 cm^3 beaker (see Note 1).

Five 100 g slotted masses (see Note 2).

A plastic bottle containing at least 200 cm^3 of water.

100 cm^3 measuring cylinder.

Tweezers or tongs (see Note 3).

Paper towels or cloths to mop up spillages.

Notes

1. The beaker must be made of glass or plastic so that candidates can see the level of the water in the beaker. The 250 cm^3 graduation must be clearly visible.

2. It must be possible to place all the masses in the beaker so that all the masses are below the 250 cm^3 mark on the beaker. All the slotted masses at a particular station should be made from the same material.

3. The tweezers or tongs will be used by the candidate to lift the slotted masses.

4. During the experiment, candidates will need to discard water. Ideally the experiment should be set up close to the sink to facilitate this. Alternatively buckets could be placed at various points around the laboratory.

5. At the changeover, the Supervisor should
- empty the beaker and the measuring cylinder,
- ensure that the plastic bottle contains at least 200 cm^3 of water.

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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Question 2

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

Plane mirror in a holder (see Note 1).

Ray box with slit (see Note 2).

Protractor.

Notes

1. The mirror should have a length of at least 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. If a ray box with slit is not available, then a slit may be constructed as described below and a source of light may be placed behind the slit. The slit should be formed using a 20 cm square piece of card or board. A vertical slit should be made in the card, from the centre of the base of the card. The height of the slit should be slightly greater than the height of the plane mirror and its width should be approximately 1 mm. A piece of tracing paper should be taped across the back of the slit. The slit should be supported so that it can stand perpendicular to the bench. This should be done by attaching wooden blocks to the base of the slit. The slit should not be obscured so two blocks should be used, one each side of the slit. This is shown in Fig. 2.1.

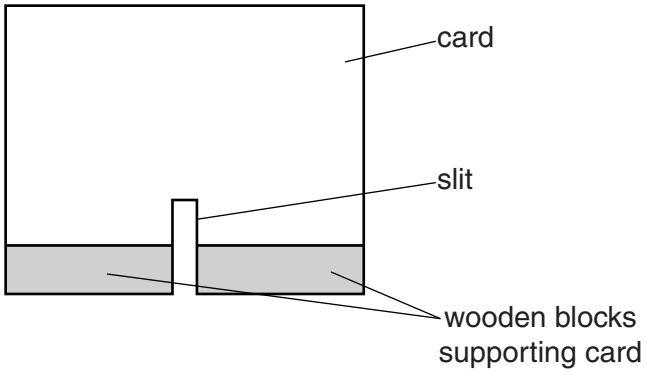

Fig. 2.1

3. This experiment should be set up in a dimly lit area of the laboratory.

4. At the changeover, the Supervisor should check that all the apparatus is still present, particularly the protractor.

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)

Half-metre rule with a millimetre scale (see Note 1).

Small hook with a screw thread (see Note 2).

Rod of approximate length 10 cm and approximate diameter 2 mm, e.g. optics pin (see Note 3).

Stand and boss to support the rod at a height of about 55 cm above the bench (see Note 4).

Pulley wheel, supported at a height of about 30 cm above the bench.

10 g mass hanger with nine 10 g slotted masses.

Card on which is written the mass of the half-metre rule to the nearest gram, written in the form "*M* = ……..... g".

Thin string of approximate length 70 cm (see Note 5).

Metre rule with a millimetre scale.

Set square.

Protractor.

Notes

1. The half-metre rule should be stiff and preferably made of wood.

2. The Supervisor should screw the hook into the 50.0 cm end of the half-metre rule.

3. A hole should be drilled in the half-metre rule at the 1.0 cm mark. The diameter of the hole should be slightly greater than the diameter of the rod, so that the half-metre rule can be suspended freely from the rod.

4. Candidates will need to adjust the height of the rod.

5. The Supervisor should tie a small fixed loop at each end of the string. The Supervisor should set up the apparatus as shown in Fig. 3.1, with only the 10 g mass hanger on the second loop.

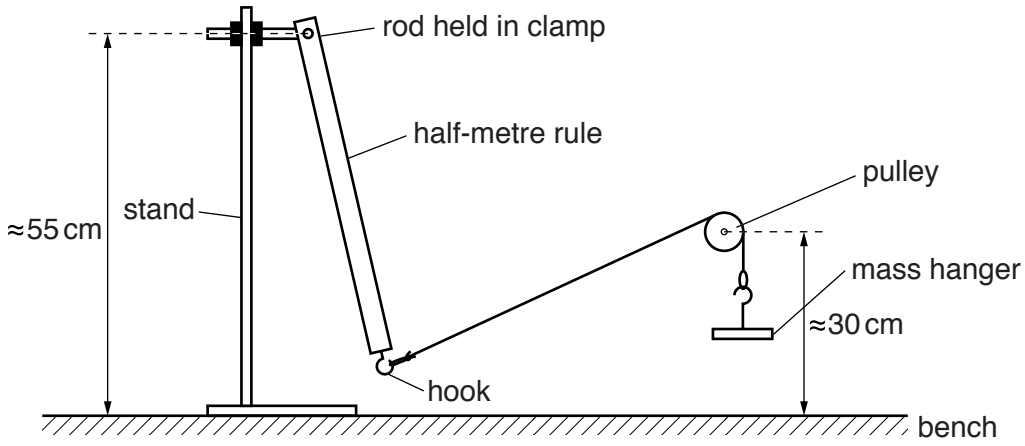

Fig. 3.1

6. At the changeover the Supervisor should:

- remove any slotted masses from the mass hanger,
- ensure that the heights of the rod and pulley are as shown in Fig. 3.1,
- return the apparatus to the state shown in Fig. 3.1.

Information required by Examiners

Sample set of numerical results, clearly marked “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)

4.5 V to 5.0 V d.c. power supply (see Note 1).

Switch or plug key.

Resistor of resistance 1 kΩ ±5% (e.g. RS Components product code 707-7666) (see Note 2).

Sufficient connecting leads to enable the **Supervisor** to set up the incomplete circuit shown in Fig. 4.1 (see Note 3).

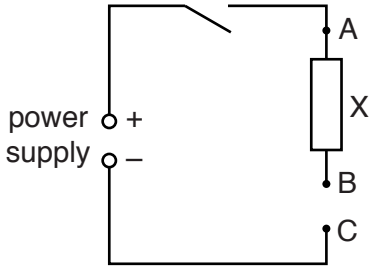

Fig. 4.1

Voltmeter capable of measuring a potential difference of up to 5.0 V to a precision of 0.1 V or better. An analogue or digital meter is suitable (see Note 4).

Two further resistors, each of resistance 1.0 kΩ ±5% (RS Components product code as above) (see Note 5).

Resistor of resistance 2.7 kΩ ±5% (e.g. RS Components product code 707-7704) (see Note 5).

Six connecting leads to enable the **candidate** to connect the voltmeter and the resistors into the circuit.

Notes

1. Any suitable d.c. power supply may be used. The maximum current in the circuit will only be of the order of 5 mA. Low power resistors can therefore be used in the circuit. If cells are used as the power supply, they should be in a suitable holder.

2. The value of the resistance should be obscured from the candidates and the resistor should be labelled X. The resistor should have suitable terminals to enable it to be connected into the circuit.

3. The points A, B and C in the circuit should be labelled.

4. Supervisors should check that the e.m.f. of the power supply can be measured by the voltmeter. If the voltmeter is off-scale, the power supply voltage should be reduced.

5. The resistors should have suitable terminals to enable them to be connected into the circuit. Each resistor should be labelled with its nominal value in kΩ, e.g. 1.0 kΩ.

6. At the changeover, the Supervisor should
- disconnect the voltmeter and the resistors (apart from X) from the circuit,
- ensure that the circuit is set up as in Fig. 4.1 with the switch open.

Information required by Examiners

Sample set of numerical results, clearly marked “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 .....

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Information required

For each question, 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