

Instructions for preparing apparatus

The Supervisor is **not** allowed to consult the Question Paper before the examination. This teacher should, as part of the preparation of the examination requirements, test the apparatus in order to ensure that it is satisfactory.

The Supervisor is asked to give (and attach to the Report form printed on pages 11 and 12) a *brief* description of the apparatus supplied, mentioning any points that are likely to be of importance to the Examiner in marking the answers. The Supervisor should also report any assistance given to candidates. All reports should be signed by the Supervisor and by the person responsible for preparing the apparatus.

In addition to the usual equipment of a physics laboratory, each candidate will require the apparatus specified in these Instructions. If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Report.

Number of sets of apparatus

As a *minimum*, the number of sets of apparatus provided should be $N/4$, where N is the number of candidates (per session). A few spare sets should, preferably, be available to avoid any candidate being delayed when moving to another question.

Centres may find it more convenient and easier to administer if $N/3$ sets (plus one or two 'spares') of apparatus are provided.

The order in which a given candidate attempts the four questions is immaterial.

Assistance to Candidates

The purpose of the Practical Physics test is to find out whether the candidates can carry out simple practical work themselves. The Examiners are aware that candidates may sometimes be unable to show their practical ability through failure to understand some point in the theory of the experiment. If an Examiner were present in the laboratory, he/she would be willing to give a hint to enable such a candidate to get on with an experiment. In order to overcome this difficulty, the Supervisor is asked to co-operate with the Examiners to the extent of being ready to give (or allow the Physics teacher to give) a hint to a candidate who is unable to proceed.

The following regulations must be strictly adhered to.

- (i) No hint may be announced to the candidates as a whole.
- (ii) A candidate who is unable to proceed and requires assistance must come up to the Supervisor and state the difficulty. Candidates should be told that the Examiners will be informed of any assistance given in this way.
- (iii) A report must be made of any assistance given to the candidate, with the name and candidate number of the candidate.

It is suggested that the following announcement be made to the candidates.

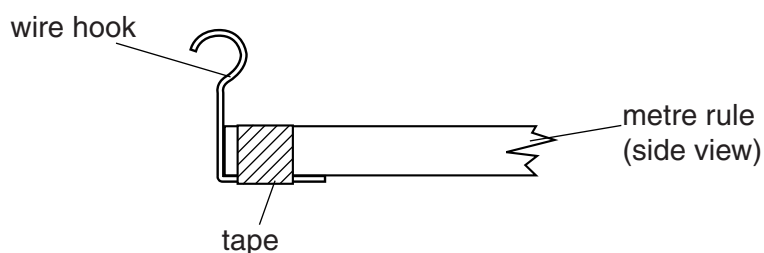
'The Examiners do not want you to waste time through inability to get on with an experiment. Any candidate, therefore, who is unable to get on with the experiment after spending five minutes at it may come to me and ask for help. I shall report to the Examiners any help given in this way, and some marks may be lost for the help given. You may ask me for additional apparatus which you think would improve the accuracy of your experiments, and you should say, on your script, how you use any such apparatus supplied.'

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

- (i) Steel spring (see note 1).
- (ii) 100 g mass (labelled '100 g').
- (iii) Metre rule with small wire hook attached centrally at the 100 cm mark (see note 2).
- (iv) Clamp, boss and stand (see note 3).
- (v) Object of regular shape and mass 200 g (labelled 'X') (see note 4).
- (vi) 30 cm ruler or 50 cm rule.

Notes

1. An expendable steel spring is suitable, for example a 20 mm long spring with a diameter of 16 mm (see www.philipharris.co.uk, item code B8A41397). The spring must be able to support a load of at least 2N without overstretching.
2. The hook could be formed from a piece of wire taped to the rule, as shown in Fig. 1.1. It should be capable of attaching the rule to the spring when the rule is at a small angle to the horizontal with its 0 cm end resting on the bench.

**Fig. 1.1**

3. The clamp, boss and stand should be set up with the spring held in the clamp.
4. The object could be formed from a 100 g mass surrounded by modelling clay, or a block of material of suitable mass. It should be capable of standing freely on the metre rule when one end of the rule is raised by a few centimetres. Candidates should not be able to estimate the mass of the object easily by inspection.
5. Spare springs, spare wire hooks and tape should be available in the laboratory.

Action at changeover

Detach the metre rule from the spring. Check that the hook is not distorted and replace if necessary. Check that the spring has not been deformed by overstretching and replace if necessary.

Question 2

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

- (i) Thermometer: -10°C to 110°C , graduated in 1°C intervals.
- (ii) Piece of white card and piece of black card, each approximately $2\text{ cm} \times 2\text{ cm}$ and of the same thickness (see notes 1 and 2).
- (iii) Clamp, boss and stand (see note 3).
- (iv) Low voltage lamp (12V, 24W or greater is suitable) in holder with power supply connected.
- (v) Card mounted on stand (such as a wooden block) capable of shielding candidates' eyes from the glare of the lamp.
- (vi) 1 cm spacer (see note 4).
- (vii) Stopclock or stopwatch or wall-mounted clock showing seconds. Candidates will be required to take readings at 60s intervals. They may use their own wristwatch.

Notes

1. The black card could be made by colouring one side of a piece of white card.
2. The white card should be attached to the bulb of the thermometer, for example with adhesive tape. There should be good contact between the card and thermometer bulb and the material used to secure the card should not be placed between them. The card should be securely attached but candidates must be able to remove the white card without difficulty and replace it with the black card.
3. The clamp, boss and stand should be set up with the thermometer clamped securely as shown in Fig. 2.1. Candidates should be able to read temperatures up to 80°C without removing the thermometer from the clamp. The bulb of the thermometer should be level with the filament of the lamp.

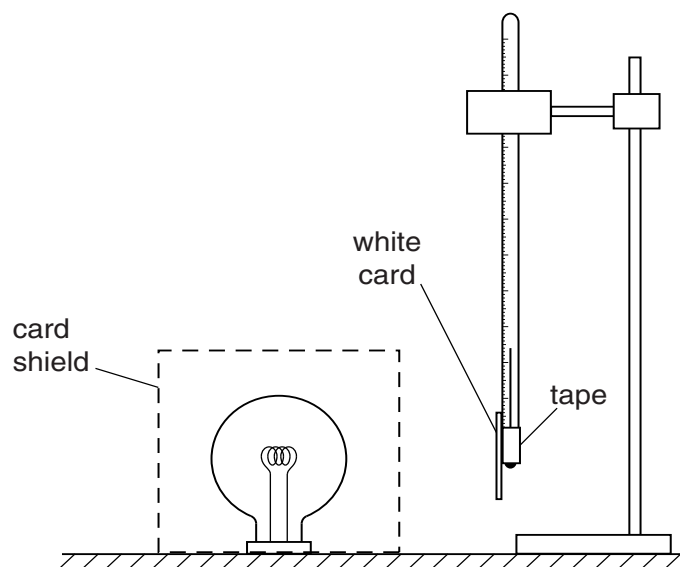


Fig. 2.1

4. The spacer may be made from a piece of card cut to 1 cm width. The width should be marked as shown in Fig. 2.2.

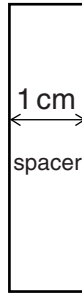


Fig. 2.2

5. There should be access to spare white and black card and the means of fixing it to the thermometer.

Action at changeover

Remove black card and replace with white card. Ensure that the thermometer is secure and the lamp is switched off.

Question 3

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

- (i) Filament lamp 6.5V, 0.3A or similar, in a suitable holder (for example, see www.philipharris.co.uk, item code B8A56753). See note 4.
- (ii) Power source of approximately 6V (see note 3). Where candidates are supplied with a variable power source, the voltage should be set by the Supervisor and fixed, e.g. taped.
- (iii) Switch. The switch may be an integral part of the power source.
- (iv) Resistance wire (see note 1).
- (v) A strip of wood or plastic approximately 1 metre in length. A metre rule would be suitable.
- (vi) Sufficient connecting leads to set up the circuit (see note 2).
- (vii) Crocodile clip attached to a long lead.
- (viii) Ammeter capable of measuring currents up to 1.00 A with a minimum resolution of 0.05 A.
- (ix) Voltmeter capable of measuring 6.0V with a minimum resolution of 0.1 V, with two connecting leads.

Notes

1. Approximately 105 cm of straight bare wire, taped to the strip of wood or plastic. The wire may be constantan (diameter 0.38 mm (28 swg) or 0.32 mm (30 swg)) or nichrome (diameter 0.45 mm (26 swg)) or any suitable wire which may be connected to a 6V power source without becoming too hot. The taping must allow connections to be made at points along the wire. Constantan wire is also known as eureka wire.
2. The circuit is to be set up for candidates as shown in Fig. 3.1 with the crocodile clip attached approximately $\frac{1}{4}$ of the way along the wire.

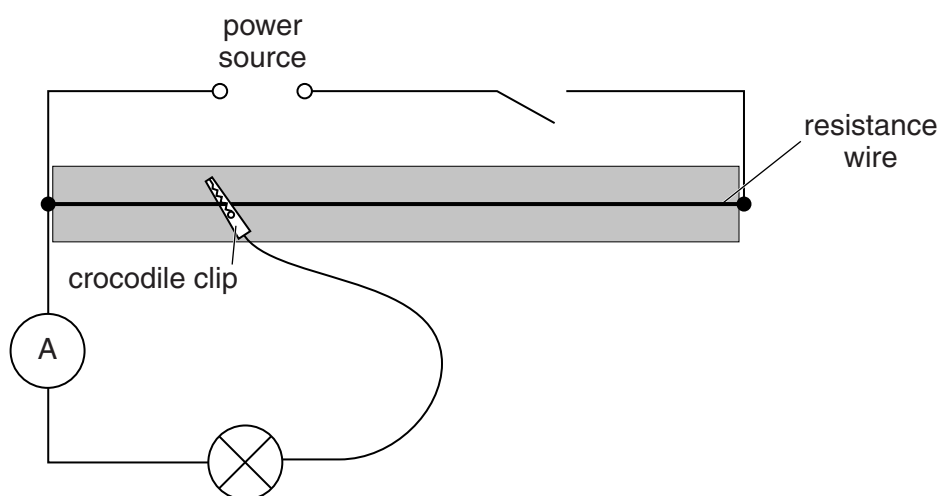


Fig. 3.1

3. If cells are to be used as the power source, they must remain adequately charged throughout the examination.
4. The lamp holder must have connecting terminals which will enable candidates to connect the voltmeter across the lamp.
5. Spare lamps and leads should be available.

Action at changeover

Disconnect the voltmeter. Ensure that the circuit is connected as shown in Fig. 3.1. Check the lamp and power source.

Question 4

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

- (i) Converging lens of focal length approximately 15 cm (± 2 cm) with a suitable holder (see note 2).
- (ii) Metre rule.
- (iii) Illuminated object consisting of rigid card with a triangular hole of height approximately 1.5 cm (see Fig. 4.1). The hole is to be covered with thin translucent paper (e.g. tracing paper) secured with adhesive tape.
- (iv) Screen. A white sheet of stiff card approximately 150 mm \times 150 mm, fixed to a wooden support is suitable (see Fig. 4.2).

Notes

1. The lamp used for the illuminated object should be low voltage, 24W or greater.
2. The lamp filament, centre of the hole which forms the object and the centre of the lens in its holder should all be the same height above the bench.
3. The work station should be situated away from direct sunlight.

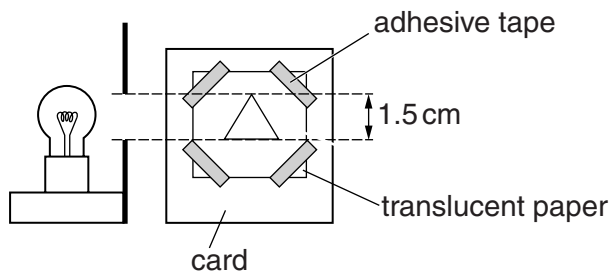


Fig. 4.1

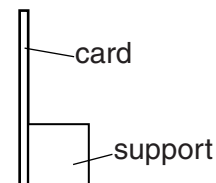


Fig. 4.2

Action at changeover

None.

BLANK PAGE

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

This form must be completed and returned with the scripts.

REPORT ON PRACTICAL PHYSICS

(IGCSE OCTOBER/NOVEMBER 2012)

General

The Supervisor is required to give details of any difficulties experienced by particular candidates giving their names and candidate numbers. These should include reference to:

- (a) difficulties due to faulty apparatus;
- (b) accidents to apparatus or materials;
- (c) any other information that is likely to assist the Examiner, especially if this cannot be discovered in the scripts;
- (d) any help given to a candidate.

Information required

A plan of workbenches, giving details by candidate number of the places occupied by the candidates for each experiment for each session, must be enclosed with the scripts.



Information required (cont.)

A list by name and candidate number of candidates requiring help, with details of the help provided.

CENTRE NO.

NAME OF CENTRE

Declaration (to be signed by the Supervisor and the person responsible for preparing the apparatus)

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

SIGNED
Supervisor

SIGNED
Person responsible for preparing the apparatus

