



### 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 7 and 8) 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.

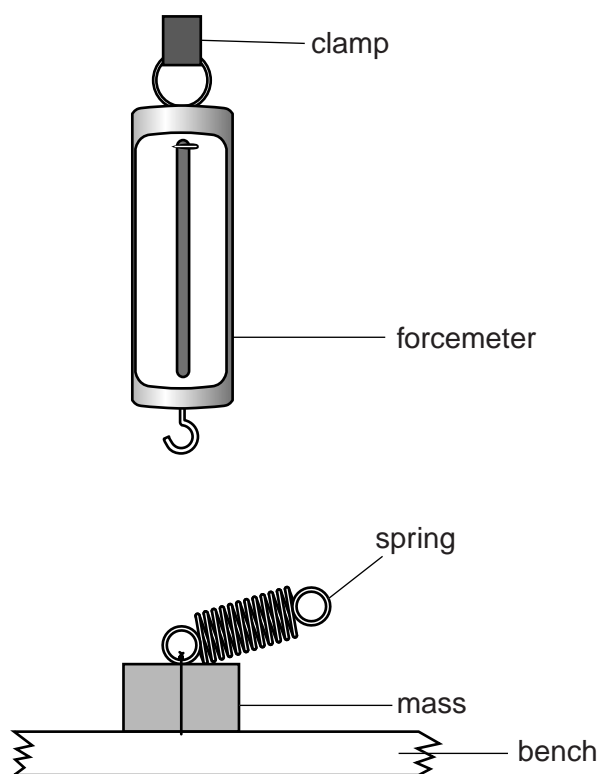
'The Examiners do not want you to waste time through inability to get on with an experiment. Any candidate, therefore, who is unable to get on with the experiment after spending five minutes at it may come to me and ask for help. I shall report to the Examiners any help given in this way, and some marks 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.'

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

- (i) Expendable spring, approximately 55 mm length  $\times$  15 mm diameter, capable of supporting at least 500 g without overstretching (e.g. Philip Harris expendable steel spring B8G87194, [www.philipharris.co.uk](http://www.philipharris.co.uk)). See notes 1 and 3.
- (ii) Metre rule.
- (iii) Forcemeter with 0 – 10 N scale (See note 2).
- (iv) Mass of at least 700 g. A 1 kg mass is suitable (See note 1).
- (v) Clamp, boss and stand (See note 3).
- (vi) String (See note 1).

### Notes

1. One end of the spring must be attached to the mass, using a short length of string.
2. The apparatus is to be set up as shown in Fig. 1.1. The forcemeter should be hung on the clamp. Zero the forcemeter before hanging it on the clamp.
3. The stand must be sufficiently tall to hold the forcemeter with the spring, loaded with a 500 g mass, hanging from the forcemeter, with the mass just above the bench level. A shorter spring may be substituted if necessary.



**Fig. 1.1**

### Action at changeover

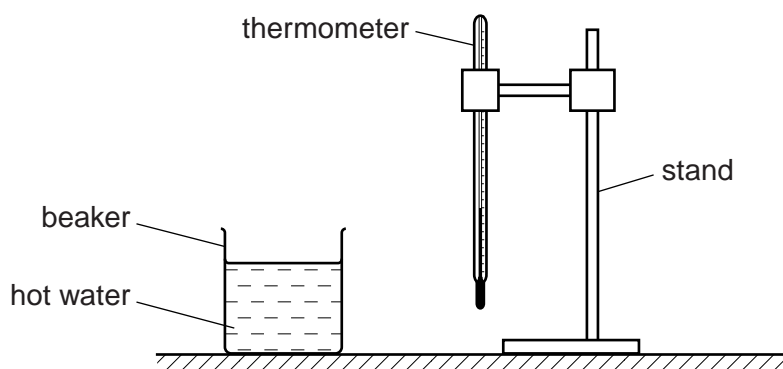
Check that the apparatus is set up ready for the next candidate, as shown in Fig 1.1.

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

- (i) Thermometer,  $-10^{\circ}\text{C}$  to  $110^{\circ}\text{C}$ , graduated in  $1^{\circ}\text{C}$  intervals.
- (ii)  $250\text{ cm}^3$  beaker, containing  $250\text{ cm}^3$  of hot water (see note 2).
- (iii) Clamp, boss and stand.
- (iv) Stopclock, stopwatch or wall-mounted clock showing seconds. Candidates will be required to take readings at 30s intervals. They may use their own wristwatch facility if they wish. The question will refer to a stopclock.
- (v) Supply of paper towels to mop up any spillages of water.

**Notes**

1. The beaker of hot water, thermometer, clamp, boss, and stand are to be set up for the candidates as shown in Fig. 2.1.

**Fig. 2.1**

2. The hot water is to be supplied for each candidate by the Supervisor. The water temperature should be between  $80^{\circ}\text{C}$  and  $100^{\circ}\text{C}$ .
3. Candidates should be warned of the dangers of burns and scalds when using very hot water.
4. The candidates must be able easily and safely to move the thermometer in and out of the water. It must be possible to clamp the thermometer both horizontally and vertically.

**Action at changeover**

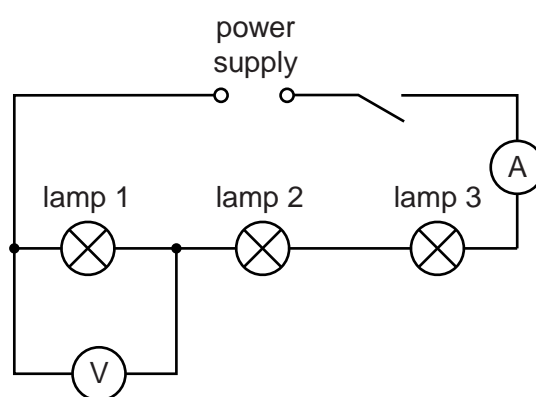
Empty the beaker. Refill the beaker with hot water. Return the thermometer to the vertical position, as shown in Fig. 2.1.

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

- (i) Power supply of approximately 1.5V – 2V. Where candidates are provided with a power supply with a variable output voltage, the voltage setting should be set by the Supervisor and fixed (e.g. taped).
- (ii) Three similar lamps in suitable holders. Any low voltage lamps will suffice, provided that they glow when connected as shown in Fig. 3.1.
- (iii) Switch. The switch may be an integral part of the power source.
- (iv) Ammeter capable of reading up to 1.0A with a minimum precision of 0.05A.
- (v) Voltmeter capable of measuring the supply p.d. with a minimum precision of 0.1V.
- (vi) Sufficient connecting leads to construct the circuit shown in Fig. 3.1, with two spare leads.

#### Notes

1. The components are to be connected by the Supervisor as shown in Fig. 3.1.



**Fig. 3.1**

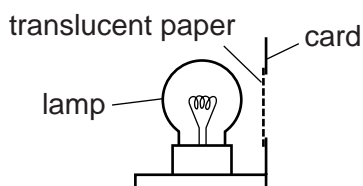
2. The lamps are to be labelled 'lamp 1', 'lamp 2' and 'lamp 3'.
3. The candidates will be required to rearrange the circuit. The circuit should be arranged so that this can be done without difficulty.

#### Action at changeover

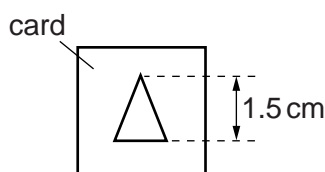
Reconnect the circuit as shown in Fig. 3.1.

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

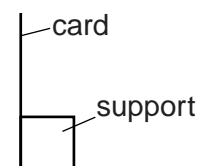
- (i) Converging lens, focal length approximately 150 mm, with a suitable holder.
- (ii) Illuminated object with a triangular hole of height 1.5 cm (see Figs 4.1 and 4.2). The hole is to be covered with thin translucent paper (e.g. tracing paper).
- (iii) Metre rule.
- (iv) Screen. A white sheet of stiff card approximately 150 mm × 150 mm, fixed to a wooden support is suitable (see Fig. 4.3).



**Fig. 4.1**



**Fig. 4.2**



**Fig. 4.3**

#### Notes

1. The lamp for the illuminated object should be a low-voltage lamp, approximately 24W or higher power (a car headlamp bulb is suitable), with a suitable power supply.
2. The centre of the hole which forms the object, the lamp filament, and the centre of the lens in its holder are all to be at the same height above the bench.
3. The apparatus is to be situated away from direct sunlight.

#### Action at changeover

Check that the apparatus is ready for the next candidate.

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**This form must be completed and returned with the scripts.**

**REPORT ON PRACTICAL PHYSICS**

(IGCSE OCTOBER/NOVEMBER 2013)

*General*

The Supervisor is invited 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

