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Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/31**

Paper 3 Practical Test **October/November 2022**

CONFIDENTIAL INSTRUCTIONS

7457611284

This document gives details of how to prepare for and administer the practical exam.

The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.

The supervisor must complete the report at the end of this document and return it with the scripts.

INSTRUCTIONS

- If you have any queries regarding these confidential instructions, contact Cambridge International stating the centre number, the syllabus and component number and the nature of the query.
  email info@cambridgeinternational.org
  phone +44 1223 553554

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General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

The following hazard codes are used in these confidential instructions, where relevant:

C	corrosive	**MH**	moderate hazard
HH	health hazard	**T**	acutely toxic
F	flammable	**O**	oxidising
N	hazardous to the aquatic environment		

Hazard data sheets relating to substances used in this exam should be available from your chemical supplier.

Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
  - the scripts of the candidates specified on the bar code label provided
  - the supervisor's results relevant to these candidates
  - the supervisor's reports relevant to these candidates
  - seating plans for each practical session, referring to each candidate by candidate number
  - the attendance register.

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Specific information for this practical exam

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. Candidates should be advised in advance that they may, if they wish, use wrist-watches with stop-watch facilities, providing that such wrist-watches afford the required precision.

Question 1

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

- bar magnet
- plotting compass (see Note)
- metre rule with a millimetre scale.

Note

A plotting compass of approximate diameter 16 mm is suitable, e.g. Philip Harris product code B8R01311.

Action at changeover

Place the magnet, compass and rule side by side on the bench.

Information required by examiners

None

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Question 2

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

- stand, boss, weight and clamp assembled with the clamp on the stand and the weight on the base.
- two **identical** thermometers measuring from –10 to 110 °C to a precision of at least 1 °C
- two **identical** boiling tubes held in a boiling tube rack (see Note 1)
- supply of hot water at approximately 70–80 °C (see Note 2)
- a beaker to use to fill the boiling tubes (see Note 3)
- stop-watch
- paper towel to mop up any spillages.

Notes

1. Draw a line around each tube, 2 cm from the top, to indicate the level to which the tube must be filled. Label one tube with a capital A near the bottom and the other with a capital B in a similar position.

2. This should be supplied by the supervisor from a pre-heated kettle or water bath as the candidate requests it. For a large group, more than one kettle of water will be needed.

3. The beaker should be large enough to hold a little more than the volume of liquid required to fill both boiling tubes to the level indicated. The supervisor should pour the water into the beaker for the candidate as the candidate requests it.

Action at changeover

The supervisor must ensure that both thermometers are laid side by side on the bench and at room temperature. Both boiling tubes must be emptied of water and placed in the boiling tube rack. The beaker should be emptied of water.

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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Question 3

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

- lens (see Note 1)
- plane mirror of approximate size 70 mm × 100 mm
- stand, clamp and two bosses (see Note 2)
- rod (see Note 3)
- 30 cm ruler with a millimetre scale
- metre rule with a millimetre scale.

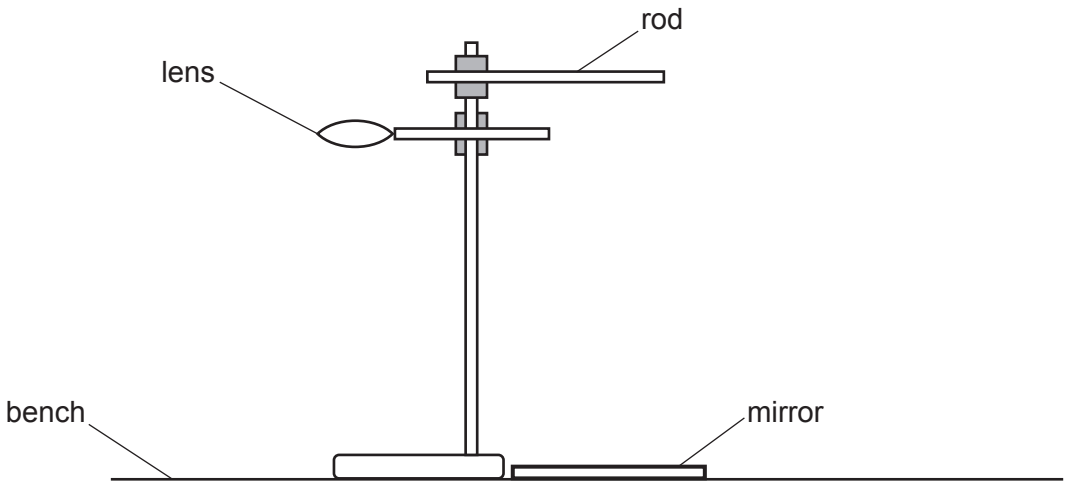

Fig. 3.1

Notes

1. The lens should be a biconvex lens with 15 cm focal length and a diameter of approximately 37 mm.

2. The stand, clamp, bosses, rod and lens should be arranged by the supervisor as shown in Fig. 3.1 before the examination.

The lens should be held horizontal with the central plane parallel to the bench.

The lens should stay horizontal and parallel to the bench when the clamp holding it is moved to the other side of the stand or up and down the stand.

The stand must be tall enough to allow the rod to be clamped at least 40 cm above the mirror. If there is any concern about the stand toppling, a small weight may be placed on the base of the stand.

3. A suitable rod is a brightly coloured pencil of approximate length 170 mm and diameter 7 mm. If a sharpened pencil is used, a small blob of adhesive putty should be placed over the point for safety.

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Action at changeover

The supervisor must ensure that the apparatus is in the configuration shown in Fig. 3.1 with the rod and lens close together on opposite sides of the stand and approximately half-way up the stand.

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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Question 4

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

- power supply (see Note 1)
- card with the voltage of the power supply V_S recorded on it
- 28 s.w.g. nichrome resistance wire attached to a metre rule with a millimetre scale (see Note 2)
- resistor of resistance 22 Ω taped over and labelled X
- connecting leads and crocodile clips (see Note 3)
- 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).

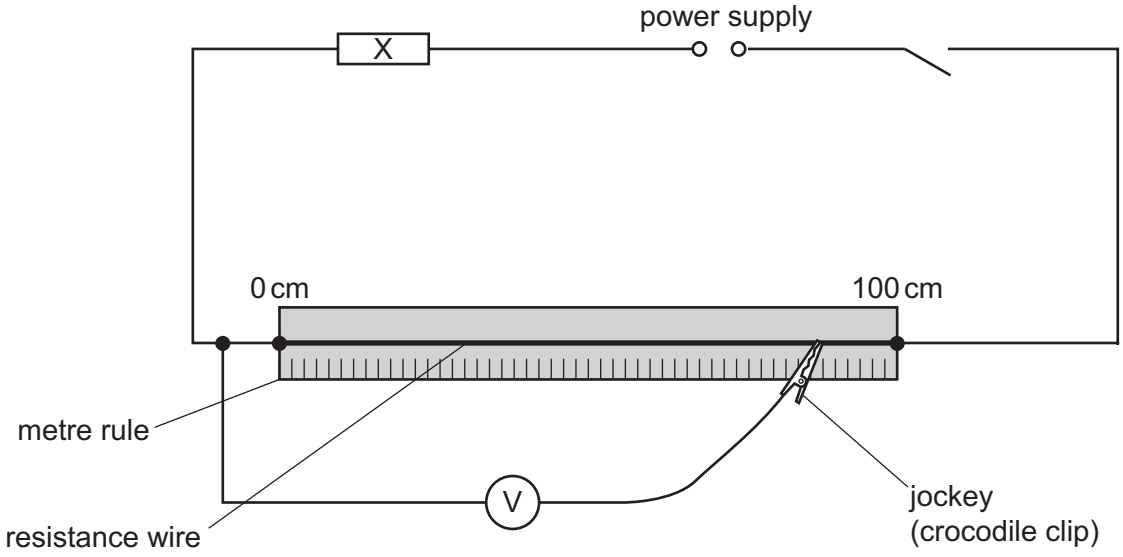

Fig. 4.1

The supervisor needs to set up the circuit shown in Fig. 4.1

Notes

1. The following are suitable power sources:

- three 1.5 V dry cells in suitable holders connected in series
- four 1.2 V rechargeable cells in suitable holders connected in series
- d.c. power supply of 4–5 V. Where candidates are provided with a power supply with a variable output p.d., the p.d. must be set by the supervisor and fixed (e.g. taped).

The card must be labelled 'Voltage V_S of the power supply = …… V' and completed by writing the voltage in volts to the precision of the meter used by the candidate.

2. The resistance wire must cover the full length of the metre rule and must be secured at the 5 cm mark and the 95 cm mark using adhesive tape.

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3. These will be used to construct the circuit shown in Fig. 4.1. One crocodile clip must be attached to the end of a flying wire to act as a jockey as shown in Fig. 4.1.

4. If a digital meter is used it must be set to a suitable range e.g. 0–20 V. The voltmeter must be connected to the circuit so that there is a positive reading when the jockey (crocodile clip) is clipped to the resistance wire around the 50 cm mark.

Action at changeover

The supervisor must ensure that the apparatus is in the configuration shown in Fig. 4.1. If cells are used, they must be checked and replaced if necessary.

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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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

Centre name .....

Time of the practical session .....

Laboratory name/number .....

Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).

You must include:

- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

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Space for supervisor to record results, if relevant, e.g. temperature of the laboratory; results for Question 1.

Declaration

1 Each packet that I am returning to Cambridge International contains all of the following items:
- the scripts of the candidates specified on the bar code label provided
- the supervisor's results relevant to these candidates
- the supervisor's reports relevant to these candidates
- seating plans for each practical session, referring to each candidate by candidate number
- the attendance register.

2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.

3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.

4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed ..... (supervisor)

Name (in block capitals) .....

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