Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/31**

Paper 3 Practical Test **October/November 2025**

CONFIDENTIAL INSTRUCTIONS

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

This document has **12** pages. Any blank pages are indicated.

DC (CJ/SW) 349016/4

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.

Specific information for this practical exam

During the exam, the supervisor (**not** the invigilator) must do the experiments in Questions 1, 2 and 3 and record the results on a spare copy of the question paper, clearly labelled 'supervisor's results'.

Question 1

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

- power supply (see Note 1)
- ammeter capable of measuring a current up to 1.5A with a precision of 0.1A or better. Either an analogue or a digital meter is suitable
- voltmeter capable of measuring up to 5V with a precision of 0.1V. Either an analogue or a digital meter is suitable
- switch in the 'off' position (open)
- coil of 28 swg constantan wire with a resistance of approximately 2Ω (see Notes 2 and 3)
- 6 connecting wires to enable the supervisor to set up the circuit shown in Fig. 1.1
- 2 crocodile clips (see Notes 2 and 4)
- thermometer with range –10 °C to 110 °C with 1 °C graduations
- stirrer made from non-conductive material, e.g. glass
- 100 cm^3 heat resistant glass beaker
- supply of water at room temperature in a separate container
- 100 cm^3 measuring cylinder
- stopwatch
- paper towels to mop up spillages.

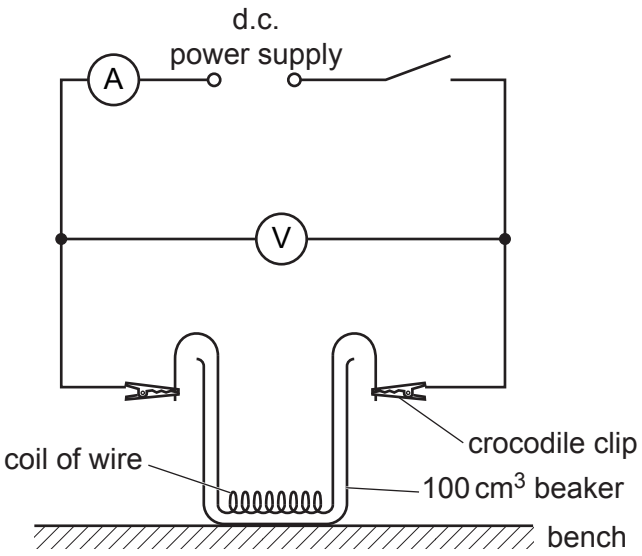

Fig. 1.1

Notes

1. The power supply should be able to deliver a current of just under 1.5A. If a variable supply is used, the control dial should be fixed to deliver 1.5A to the circuit shown in Fig. 1.1, and the dial taped over by the supervisor to prevent any adjustment by the candidate.

   A power supply of higher voltage (but no higher than 12 V) can be used in series with an appropriate resistor to fix the current at 1.5A. The series resistor would need a high power rating and would need to be placed on a heat proof mat.

   Alternatively, three dry cells of 1.5 V each can be used in series, but they discharge quickly and will need to be replaced at changeover.

   Candidates should be warned that the coil of wire and the resistor (if used) will get hot.

2. A 50 cm length of constantan wire of 28 swg (0.38 mm diameter) should give an approximate resistance of 2 Ω.

   The wire should be wound around a pencil to form a coil of approximate diameter 0.7 cm, which should then be placed at the bottom of the beaker with the two ends protruding over the sides of the beaker as shown in Fig. 1.1. The turns of the coil **must not** touch each other.

   The ends of the wire should hang over the top edge of the beaker to provide a connection for the crocodile clips. They should be taped in place, leaving enough of the wire bare to allow for the connection to the crocodile clips.

   The wire should be taped inside the beaker to make sure that the coil does not move around inside the beaker.

3. If 28 swg constantan wire is not available, the following are alternatives:

   - constantan wire of lower swg (larger diameter). The length of wire used will need to be increased to give a total resistance of 2 Ω
   - 50 cm length of 24 swg nichrome wire. This should also give an approximate resistance of 2 Ω.

   Shorter lengths of higher swg (lower diameter) **should not** be used because the wire may overheat and melt.

4. The two crocodile clips should be used to connect the coil to the remainder of the circuit.

Action at changeover

The supervisor should check that the circuit is set up as in Fig. 1.1 with the switch open. Water in the 100 cm^3 beaker should be discarded. The supervisor should ensure that there is sufficient water (at least 100 cm^3) at room temperature for the next candidate and that the turns of the coil are not touching each other. If dry cells are used as a power source, these will need to be replaced.

Information required by examiners

A sample set of numerical results, clearly marked ‘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):

- illuminated slit (see Notes 1 and 2)
- rectangular transparent block (see Note 3)
- 30 cm ruler with mm divisions
- protractor.

Notes

1. A sheet of stiff card or thin wood, approximately 60 mm × 60 mm, fixed to a wooden support, is suitable.

   The sheet must have a slit approximately 25 mm to 30 mm long and 1 mm to 2 mm wide as shown in Fig. 2.1.

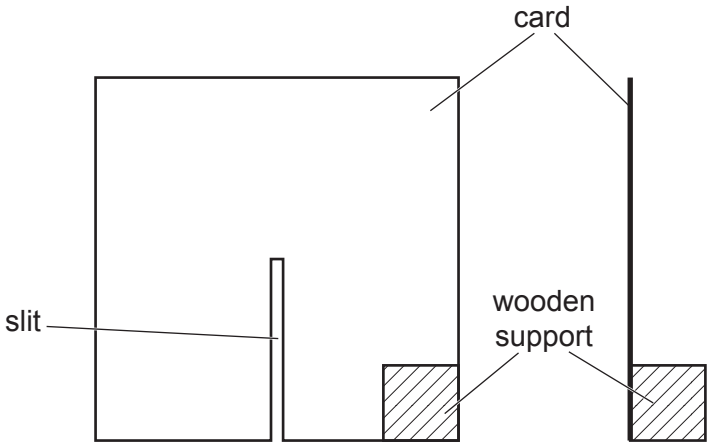

Fig. 2.1

   A low voltage lamp of power approximately 24 W or higher, with a suitable power supply, should be used to illuminate the slit.

   Alternatively, a ray box and slit may be used, if available.

2. It must be possible for the candidate to arrange the lamp and the slit to give a single beam of light diagonally across the page of these confidential instructions.

3. A transparent Perspex, acrylic or glass block with approximate dimensions 110 mm × 70 mm × 20 mm is suitable. The block should not have a length greater than 120 mm.

   Ideally, all candidates should have similar blocks.

Action at changeover

The supervisor should ensure that the slit and lamp (or ray box) are still providing the beam across the page.

Information required by examiners

A sample set of numerical results, clearly marked ‘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):

- 5 marbles (glass balls) of approximate diameter 1.5 cm
- small dish to hold five marbles (glass balls)
- access to a top pan electronic balance capable of measuring mass to the nearest 0.1 g
- clamp, stand and boss
- 2 metre rules arranged as shown in Fig. 3.1 with a small gap between them to act as a ramp for a marble to roll down (see Note 1)
- small amount of adhesive putty to hold the rules together
- small block of wood to act as a stopper at the end of the ramp (see Note 2)
- stopwatch
- additional metre rule or half-metre rule or a 30 cm ruler (see Note 3).

The two metre rules should be set up as shown in Fig. 3.1, making a ramp ready for the candidate to use. The ramp should be 4.0 cm above the bench at its 90 cm mark. This is achieved by adjusting the height of the clamp. The marbles should be placed in the small dish and left by the side of the ramp arrangement.

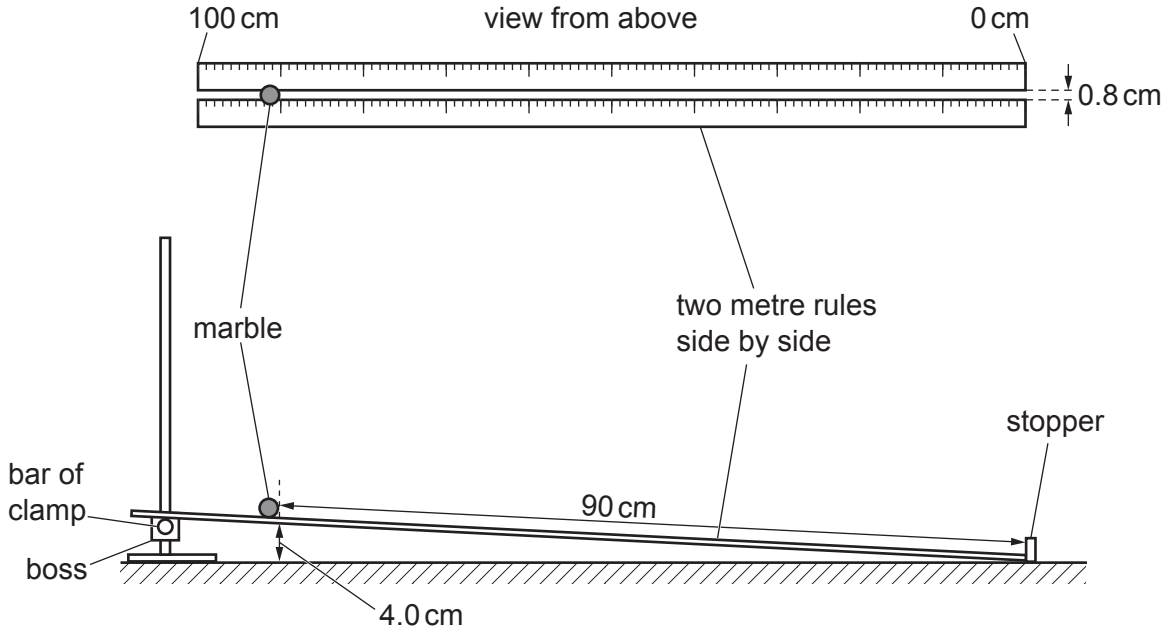

Fig. 3.1

Notes

1. The two metre rules are arranged horizontally side by side with a small gap between them. They should be held together with a small piece of adhesive putty at the top and bottom and should be approximately 0.8 cm apart throughout their length.

   The ends of the track could also be fastened together using adhesive tape in addition to the adhesive putty. If used, the tape should be placed so that it does not cover the top of the track.

   The pair of rules should then be placed so that they rest with one end on the bar of the clamp. The 0.8 cm gap between the rules provides a ramp for the marbles to travel along.

The tracks could also be made from long, straight strips of wood with straight edges and of length 1.0 to 1.1 m, width 25 to 30 mm, and thickness 0.6 to 0.8 mm. These pieces of wood would have to be marked with a thin line at 90 cm from the ends of the rules that rest on the bench.

2. The block should be a piece of wood of approximate dimensions 5 cm × 5 cm × 5 cm. It should be placed to act as a stopper for the marble when it reaches the end of the track.

3. If there are not enough metre rules for each candidate for a third to be supplied to each candidate here, a 30 cm ruler can be used instead but the candidate should be advised to take account of the small amount of dead space at the edge of the ruler.

Action at changeover

Ensure the apparatus is set up as in Fig. 3.1.

Information required by examiners

A sample set of numerical results, clearly marked ‘supervisor’s results’, obtained out of sight of the candidates.

Question 4

Planning question – no apparatus required for this question.

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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.

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) .....