Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/32**

Paper 3 Practical Test **May/June 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 (WW/SW) 346829/4

[Turn over

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):

- a rectangular transparent glass or acrylic (Perspex) block, 10 cm × 6 cm × 1.5 cm or similar size
- a 30 cm ruler with a millimetre scale
- a protractor
- an illuminated slit with lamp (see Note 1).

Notes

1 A sheet of stiff card or thin wood can be used. It should be approximately 60 mm × 60 mm and fixed to a wooden support.

The sheet must have a slit 30 mm long and 1 mm to 2 mm wide as shown in Fig. 1.1.

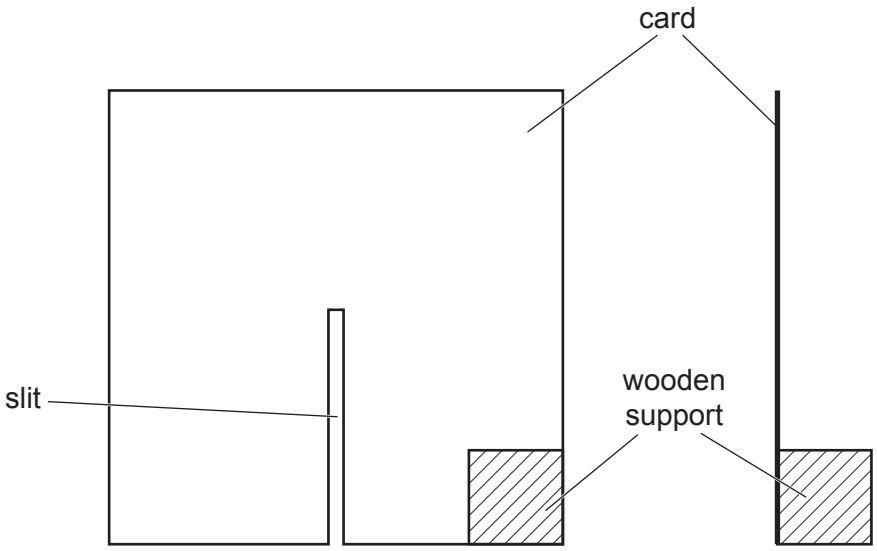

Fig. 1.1

The filament lamp for the illuminated slit should be a low voltage lamp, 24 W or greater, with a suitable power supply. An LED lamp with equivalent brightness can be used.

The lamp, placed behind the stiff card, must be capable of projecting a beam of light at least 25 cm long across a sheet of paper before and after refraction by the block.

A ray box with a slit can be used, if available.

2 The apparatus should be set up in a dimly lit area of the laboratory, if possible.

Action at changeover

Check that the apparatus is intact and still working.

Switch off the lamp if it has been left on.

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):

- a power source of 4.5 V to 5 V (see Note 1)
- a switch or plug key
- a voltmeter capable of measuring a potential difference of up to 5 V, with a minimum resolution of 0.1 V, and with two connecting leads (see Note 2)
- a thermistor (see Notes 3 and 6)
- one resistor of nominal value 220 Ω, with a power rating of 0.25 W or higher (see Notes 4 and 6)
- sufficient connecting leads to assemble the circuit shown in Fig. 2.1 (see Note 5)

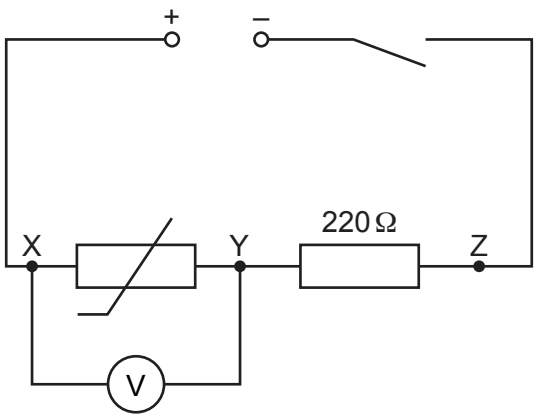

Fig. 2.1

- a 100 cm^3 beaker
- a stirring thermometer, –10 °C to 110 °C, graduated in 1 °C intervals
- a supply of hot water (see Notes 7 and 8)
- paper towels to mop up spillages.

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 to 5 V.

Where candidates are supplied with a power supply with a variable output voltage, the voltage setting should be set by the supervisor and fixed (e.g. taped).

The positive terminal of the power supply must be labelled.

2 The voltmeter must have two connecting leads that can be connected between various points in the circuit. The positive (+) terminal of the voltmeter must be marked with a '+' sign. The ends of the leads, where they are connected to the voltmeter, must be taped in place securely so that they cannot be removed.

3 The RS component code of a suitable thermistor is RS 191-2229.

4 The resistor must be labelled 220 Ω.

The RS component code of a suitable resistor is RS 707-7612.

5 The supervisor must assemble the circuit shown in Fig. 2.1 for the candidates in advance of the examination. The thermistor must be placed inside the beaker. Terminals X, Y and Z must be labelled. The connecting leads to the thermistor must be long enough to allow the thermistor to rest on the bottom of the beaker, which must be at least 30 cm distant from the rest of the circuit.

6 The resistor and the thermistor must have suitable terminals so that the candidate can connect the voltmeter in parallel with either of these components.

7 Each candidate will require about 50–80 cm^3 of hot water. The hot water is to be provided by the supervisor for each candidate. The hot water should be supplied at a temperature of approximately 80 °C.

8 Candidates should be told to take care and be warned of the danger of burns and scalds when using hot water.

Action at Changeover

The beaker must be emptied and dried or replaced with a clean, dry 100 cm^3 beaker.

The circuit must be restored to its original state as shown in Fig. 2.1, with the switch open.

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):

- two bosses, clamps and stands (see Note 1)
- a metre rule marked in cm and mm (see Note 2)
- a steel spring (see Note 3)
- a set square
- five 100 g masses, each labelled 1.0 N, so that total masses of 100 g, 200 g, 300 g, 400 g and 500 g can be assembled. (see Note 4).

Notes

1 The apparatus is to be set up for candidates as shown in Fig. 3.1. The spring must be sufficiently high above the bench so that when a 500 g mass is suspended from the spring, the bottom of the load is above the surface of the bench.

The base of the stand supporting the spring should be secured with a G-clamp or a weight.

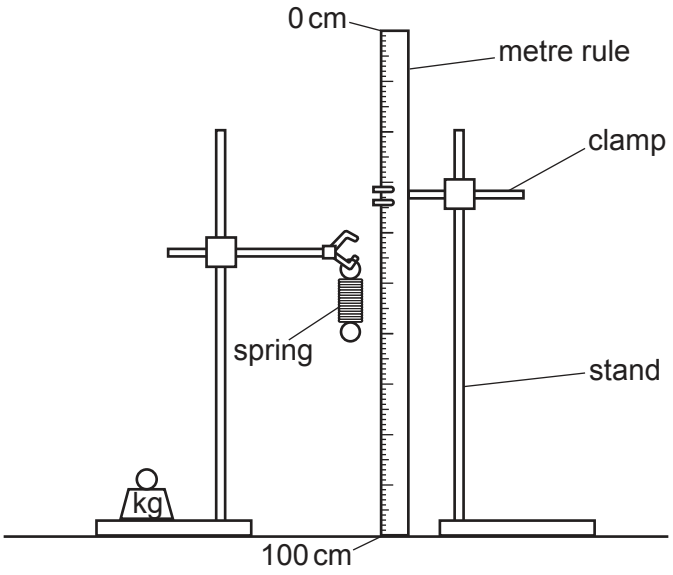

Fig. 3.1

2 The metre rule is to be set up for candidates. The rule should be held in a clamp so that it is perpendicular to the bench, close to and parallel to the spring. **The 100 cm end must touch the bench.** If the rule has scales numbered in opposite directions, then the scale on one side must be taped over or masked. The rule should be clamped at a point above the top of the spring.

3 This should be an expendable steel spring with a spring constant of approximately 25 N / m. The spring must be capable of supporting a load of at least 5.0 N without overstretching.

If new springs are used, they must be conditioned prior to the practical test by stretching them gently a few times, within their normal range of extension.

4 Four 100 g slotted masses together with a 100 g mass hanger, each labelled 1.0 N, are ideal. If a mass hanger is not available, a light hook attached to a loop of string must be provided so that the masses can be suspended from the spring.

Action at Changeover

Check the spring and replace it with a new conditioned spring if it has been permanently deformed.

Restore the apparatus to the set-up shown 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 is required for this question.

BLANK PAGE

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) .....