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Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/32**

Paper 3 Practical Test **May/June 2024**

CONFIDENTIAL INSTRUCTIONS

4593132105

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

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 power source of 4.5 V to 5 V (see Note 1)
- ammeter capable of measuring a current of up to 1 A with a precision of at least 0.05 A (see Note 2)
- voltmeter capable of measuring a potential difference of up to 1 V with a precision of at least 0.1 V (see Note 2)
- a semiconducting diode (see Note 3)
- two resistors of nominal value 10 Ω (see Notes 4 and 6)
- two resistors, one of nominal value 3.3 Ω and the other of nominal value 6.8 Ω (see Notes 5 and 6)
- switch
- sufficient connecting leads to assemble the circuit shown in Fig. 1.1 (see Note 7)
- two additional connecting leads to be placed by the side of the circuit.

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 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). If sets of cells are used then spare sets should be available.

2 An analogue or a digital meter is suitable.

3 The diode must be able to withstand a current of 0.5 A, with a power rating of at least 0.5 W. The diode must have suitable terminals so that it can be connected into the circuit. A 1N4001 diode is suitable (RS component code RS 751-2718).

4 One of the 10 Ω resistors should be labelled 10 Ω. The other 10 Ω resistor should be labelled P and its value should be concealed from the candidates. The resistors should have a power rating of 3 W, or higher. The resistors must have suitable terminals so that they can be connected into the circuit. The RS component code of a suitable 10 Ω resistor is RS 762-9380.

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5 The 3.3Ω and 6.8Ω. resistors should be labelled with their resistance values. The resistors should have a power rating of 3W, or higher. The resistors must have suitable terminals so that they can be connected into the circuit. The RS component code of a suitable 3.3Ω resistor is RS 151-619. The RS component code of a suitable 6.8Ω resistor is RS 485-1672.

6 The resistors labelled 3.3Ω, 6.8Ω and 10Ω must be placed by the side of the circuit shown in Fig. 1.1.

7 The supervisor should assemble the circuit as shown in Fig. 1.1. The terminals X and Y must be clearly labelled and a gap left between them. The supervisor must check the circuit by connecting terminals X and Y with one of the additional connecting leads and closing the switch. Readings should be obtained on the ammeter and voltmeter. If the ammeter reading is zero, the supervisor should check that the diode has not been connected the wrong way round. After this check has been carried out, the switch must be opened and the connecting lead between terminals X and Y must be removed and placed by the side of the circuit with the other connecting lead and the 3.3Ω, 6.8Ω and 10Ω resistors.

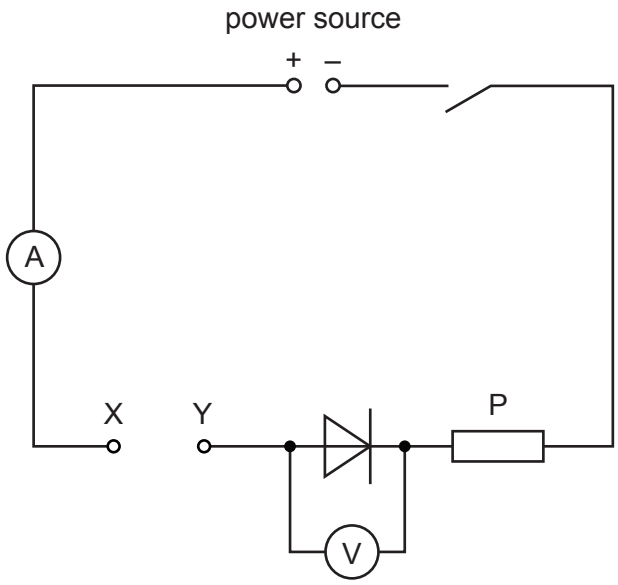


Fig. 1.1

Action at changeover

The circuit must be restored to its original state as shown in Fig. 1.1 with a gap between terminals X and Y. The supervisor should repeat the test described in Note 7 to check that the voltmeter and ammeter readings have not changed significantly. If the current is zero, then the diode must be replaced. The leads and resistors must be placed by the side of the circuit.

If cells are used, they may 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.

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Question 2

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

- a test-tube (see Note 1)
- a 250 cm^3 glass beaker
- a thermometer, –10 °C to 110 °C, graduated in 1 °C intervals
- a 100 cm^3 or 250 cm^3 measuring cylinder
- a stop-watch
- a clamp, boss and stand
- supply of hot water (see Notes 2 and 3)
- supply of cold water (see Note 4)
- supply of warm water (see Note 5)
- supply of paper towels to mop up any spillages.

Notes

1 A boiling tube 25 mm × 150 mm is suitable. The test-tube (or boiling tube) should be set up for candidates so that it is clamped to the stand as shown in Fig. 2.1. The candidate should be able to move the clamp holding the test-tube up and down the stand.

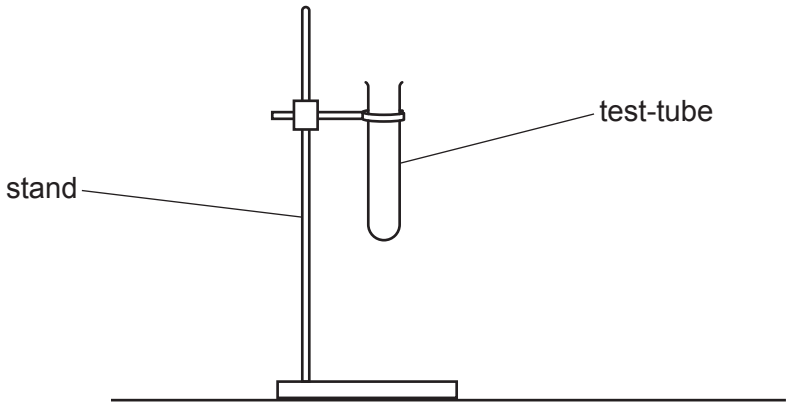


Fig. 2.1

2 Each candidate will require approximately 100 cm^3 of hot water. The hot water should be supplied and maintained at a constant temperature of between approximately 80 °C and 90 °C. The supervisor will be asked by the candidate for the test-tube to be approximately one-third filled with hot water at different times throughout the experiment.

3 Candidates should be warned of the dangers of burns and scalds when using very hot water.

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4 Each candidate will require at least 200 cm^3 of cold water/water at room temperature of approximately 21 – 23 °C. The water should be available in a container labelled 'cold water' on the bench.

5 Each candidate will require at least 200 cm^3 of warm water. The water should be supplied in a container labelled 'warm water' at a temperature of approximately 40 °C.

6 Spare beakers, test-tubes (or boiling-tubes) and thermometers should be available in case of breakages.

Action at changeover

Remove the thermometer from the test-tube. Remove the beaker from the stand and empty the water from the beaker and the test-tube. Restore the apparatus to the set-up shown in Fig. 2.1. Refresh the warm and cold water in the labelled containers.

Information required by examiners

A 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):

- a metre rule with a millimetre scale (see Note 1)
- a pivot (see Note 2)
- a 50 g mass to be secured to the metre rule (see Note 3)
- a set of 10 × 10 g slotted masses (see Note 4).

Notes

1 If the metre rule has two scales in opposite directions along its length, one of the scales must be taped over using opaque tape.

2 A prism or triangular wooden block is suitable. The pivot must be placed on the bench.

3 The 50 g mass must be firmly fixed to the rule, with the centre of the mass above the 5.0 cm mark on the rule. The value of the mass must be hidden from the candidates.

4 Candidates will combine masses from the set of masses to make up masses of 50 g, 60 g, 70 g, 80 g, 90 g and 100 g which will be placed on the rule.

Action at changeover

Place the rule, pivot and masses side by side on the bench. Re-attach the fixed 50 g mass to the rule if necessary.

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.

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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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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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