



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/52

Paper 5 Practical Test

February/March 2024

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.

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, 3, 4, 5 and 6 and record the results on a spare copy of the question paper, clearly labelled 'Supervisor's Results'.

For Question 1

Each candidate will require:

- (i) boiling tube (approximately 150 mm × 25 mm) and stopper with delivery tube to fit boiling tube, see note 1
- (ii) container for collecting gas over water, see note 1
- (iii) 25 cm³ measuring cylinder, see note 1
- (iv) 2 bosses, clamps and stands, see note 1
- (v) 10 cm³ potato puree, labelled **potato puree**, see note 2
- (vi) 10 cm³ freshly made 10 volumes (3%) hydrogen peroxide solution labelled **hydrogen peroxide solution** in a container suitable for use with the syringe
- (vii) 5 cm³ syringe without needle
- (viii) stop-watch
- (ix) stirring rod
- (x) test-tube (approximately 125 mm × 16 mm) and a means to support it
- (xi) universal indicator solution labelled **universal indicator solution** supplied with a pH colour chart and with a dropping pipette, see note 3
- (xii) 2 paper towels.

Notes

1. The apparatus should be set up as shown in Fig. 1.1.

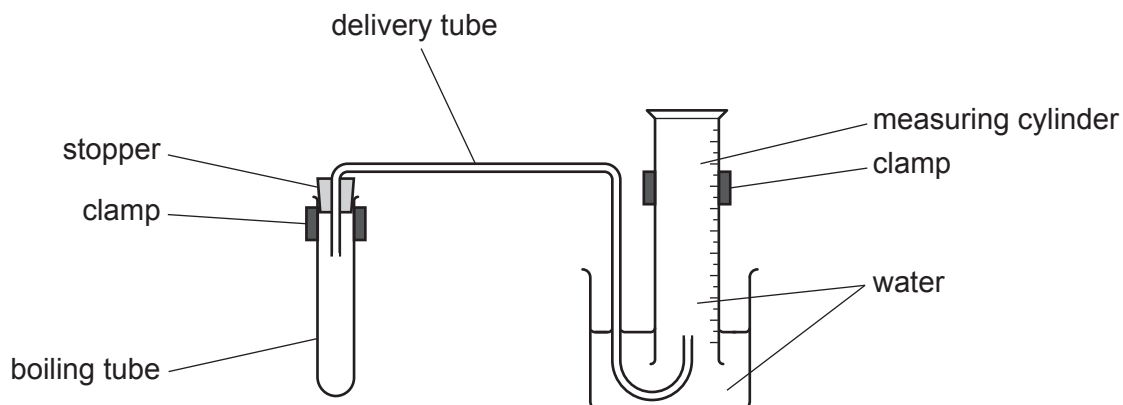


Fig. 1.1

The delivery tube can be glass or flexible plastic.

2. Potato puree can be made by liquidising peeled, raw potato with distilled/deionised water. It should be runny enough to pour easily and freshly made on the day of the exam.

Prior to the exam the supervisor should check that 2 cm depth of potato puree in a boiling tube mixed with 2 cm³ of hydrogen peroxide solution produces 10–20 cm³ of gas in 6 minutes. The concentration of the hydrogen peroxide solution may be adjusted to achieve this.

3. These reagents may be shared between no more than 4 candidates.

For Question 2

No apparatus or materials are required for Question 2.

For Question 3

Each candidate will require:

[low hazard]	150 cm ³ 0.1 mol dm ⁻³ sodium thiosulfate solution labelled aqueous sodium thiosulfate , see note 3
	150 cm ³ 0.1 mol dm ⁻³ iron(III) nitrate solution labelled aqueous iron(III) nitrate , see note 3
	2 cm ³ distilled water labelled aqueous sodium ions , supplied with a dropping pipette, see note 2
[MH]	2 cm ³ 0.1 mol dm ⁻³ copper(II) sulfate solution labelled aqueous copper(II) ions , supplied with a dropping pipette, see note 2
	2 cm ³ 0.1 mol dm ⁻³ iron(II) sulfate solution labelled aqueous iron(II) ions , supplied with a dropping pipette, see note 2 and note 4
[MH][N]	2 cm ³ 0.1 mol dm ⁻³ zinc sulfate solution labelled aqueous zinc ions , supplied with a dropping pipette, see note 2
	distilled water
	6 conical flasks, see note 1
	25 cm ³ or 50 cm ³ measuring cylinder labelled S
	25 cm ³ or 50 cm ³ measuring cylinder labelled I
	stop-watch
	cross on a piece of white paper drawn with a black ball point pen, the cross needs to extend beyond the base of a conical flask when the conical flask is placed on it, see note 5
	a few paper towels

Notes

- Candidates can be given fewer conical flasks, the minimum being 2, but they will need to be told to rinse them out with distilled water.
- Only one drop of each of these solutions is needed for Question 3.
- When 20 cm³ of 0.1 mol dm⁻³ sodium thiosulfate and 20 cm³ of 0.1 mol dm⁻³ iron(III) nitrate solution are mixed, the time taken for the mixture to go colourless should be between 1 and 2 minutes. The concentrations can be adjusted to achieve this.
- The aqueous iron(II) sulfate should be made up with 0.5 mol dm⁻³ sulfuric acid.
- Spare crosses on paper need to be available in case the papers get wet. Centres may prefer to draw the cross with a permanent marker onto a white tile, candidates will need to be made aware of this change.

For Question 4

Each candidate will require:

	10 cm ³ of 0.1 mol dm ⁻³ zinc chloride solution labelled aqueous J , supplied with a dropping pipette
[MH]	10 cm ³ of 0.1 mol dm ⁻³ copper(II) sulfate solution labelled aqueous K , supplied with a dropping pipette, see note 1
[C]	approximately 10 cm ³ of 1 mol dm ⁻³ dilute nitric acid, labelled dilute nitric acid
[low hazard]	access to 0.1 mol dm ⁻³ barium nitrate solution in a bottle with a dropper or supplied with a dropping pipette, labelled aqueous barium nitrate , see note 2 and note 4
	access to 0.05 mol dm ⁻³ silver nitrate solution in a bottle with a dropper or supplied with a dropping pipette, labelled aqueous silver nitrate , see note 4
[C][MH][N]	20 cm ³ of 1.0 mol dm ⁻³ ammonia solution in a bottle with a dropper or supplied with a dropping pipette, labelled aqueous ammonia , see note 5
	distilled water
	9 test-tubes of size approximately 125 mm × 16 mm and a means to support them, see note 3
	a few paper towels

Notes

1. These may be the same solutions used in Question 3.
2. This may be aqueous barium chloride labelled as **barium nitrate**.
3. Candidates can be given fewer test-tubes, the minimum being 3, but they will need to be told to rinse them out with distilled water.
4. These reagents may be shared between no more than 4 candidates.
5. If candidates have their own sample of aqueous ammonia, the container may need plastic film covering the opening to the container.

For Question 5

Each candidate will require:

- (i) a converging lens with a focal length $f = 15$ cm, with holder
- (ii) a metre ruler graduated in millimetres
- (iii) an illuminated object with a hole in the shape of an equilateral triangle of side approximately 2 cm, see note 1
- (iv) a white screen, see note 2.

The apparatus should be assembled as shown in Fig. 5.1.

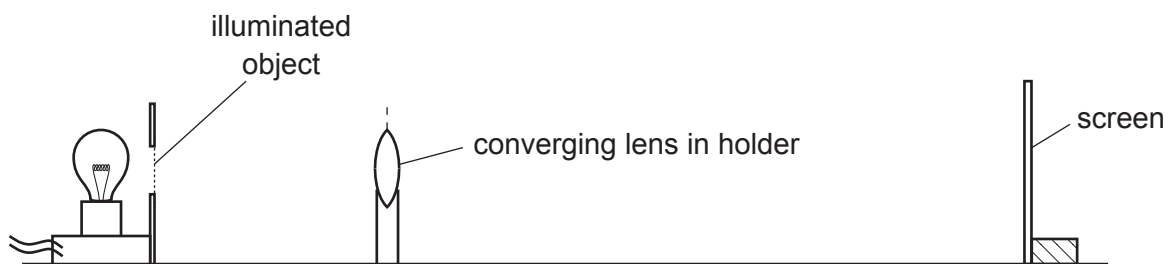


Fig. 5.1

Notes

1. The object can be made by cutting a triangular hole of side 2 cm in a piece of white card and covering the hole with translucent paper.



Fig. 5.2

The illumination can be provided by a 12 V, 24 W lamp or similar placed close to the triangular object. The orientation of the triangle must be as shown in Fig. 5.2.

2. The screen can be made from a sheet of white card (15 cm \times 15 cm approx.). Some means of supporting the screen vertically must be supplied (e.g., fixing the white card to a small block of wood) as shown in Fig. 5.3.

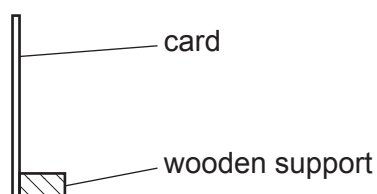


Fig. 5.3

3. The lamp filament, the centre of the hole in the object card and the centre of the lens should be arranged to be the same height above the bench.

Action at Changeover

Check that the apparatus is ready for the next candidate.
Switch off the lamp.

For Question 6

Each candidate will require:

- (i) two bosses, two clamps and two stands
- (ii) metre ruler with a millimetre scale, see note 2
- (iii) steel spring, see note 3
- (iv) set-square
- (v) masses of 100g, 200g and 400g, see note 4
- (vi) load of mass 150g labelled *L*, see note 5.

Notes

1. The apparatus is to be set up for candidates as shown in Fig. 6.1. The spring must be sufficiently high above the bench so that when the 400g load is suspended from the spring, the bottom of the load is above the surface of the bench.

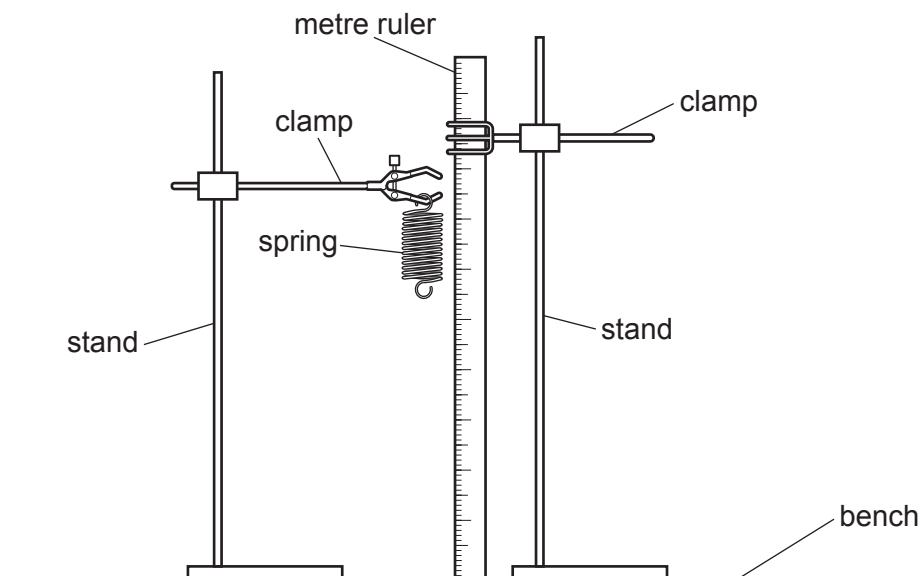


Fig. 6.1

2. The metre ruler is to be set up for candidates vertically in a clamp close to, and parallel to the spring, with the 100 cm end touching the bench.
3. An expendable steel spring is suitable, for example a 55 mm long spring of diameter 15 mm and spring constant approximately 25 Nm^{-1} . The spring must be capable of supporting at least 500 g without overstretching.
4. Three 100 g slotted masses together with a 100 g mass hanger are ideal. If slotted masses are not available, a light hook must be provided so that the masses can be suspended from the spring.
5. The load L must be supplied with a light hook attached to enable the mass to be suspended from the spring. The mass of the load must be hidden from candidates. The load must be labelled L .

Action at Changeover

Restore the apparatus to the set-up shown in Fig. 6.1.

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Supervisor's report

Syllabus and component number

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Centre number

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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)