



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/52

Paper 5 Practical Test

May/June 2023

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, 2, 4, 5, 6 and 7 and record the results on a spare copy of the question paper, clearly labelled 'supervisor's results'.

Question 1

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	test-tube (approximately 125 mm × 16 mm) half-filled with water, labelled W , and a means to support it (see note 1)	1
	access to hydrogencarbonate indicator with dropper, labelled hydrogencarbonate indicator	
	test-tubes (approximately 125 mm × 16 mm) half-filled with water, labelled A , B and C , and a means to support them (see note 2)	1 set

Notes

- The water in test-tube **W** needs to turn red when hydrogencarbonate indicator is added.
- The water in test-tube **A** needs to turn yellow when hydrogencarbonate indicator is added.
The water in test-tube **B** needs to turn purple when hydrogencarbonate indicator is added.
The water in test-tube **C** needs to turn red when hydrogencarbonate indicator is added.

Question 2

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	test-tubes (approximately 125 mm × 16 mm) with approximately 2 cm depth of nutrient solution, labelled D , E and F , and a means to support them (see note 1)	1 set
	test-tube holder	1
	access to a water-bath of approximately 80 °C (see note 2)	
[MH]	access to Benedict's solution with a dropper, labelled Benedict's solution	
	paper towels	3
	stop-watch or sight of a clock with a second hand	

Notes

1. Nutrient solution **D** should turn Benedict's solution yellow/green.

Nutrient solution **E** should turn Benedict's solution red.

Nutrient solution **F** is water (Benedict's solution remains blue).

Solutions **D** and **E** can be a solution of glucose with the concentrations adjusted to give the correct colours.

2. If candidates are sharing a water-bath, then a means of labelling glassware must be provided e.g. a marker pen. Candidates should be made aware of the dangers of burns and scalds when hot water is used.

Question 3

No apparatus or materials are required for Question 3.

Question 4

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
[HH]	0.1 mol dm ⁻³ potassium peroxodisulfate, K ₂ S ₂ O ₈ , labelled K (see note 1)	approx. 50 cm ³
	mixture containing equal volumes of 0.3 mol dm ⁻³ potassium iodide, KI, and 0.006 mol dm ⁻³ sodium thiosulfate, Na ₂ S ₂ O ₃ , labelled H (see note 2)	approx. 40 cm ³
	1% starch solution supplied with a dropper, labelled starch solution	approx. 10 cm ³
	10 cm ³ syringe, labelled K	1
	10 cm ³ syringe, labelled H	1
	conical flasks (see note 3)	3
	stop-watch	1
	white tile	1
	paper towels	3

Notes

1. This solution needs to be made no earlier than the day before the examination.
2. Once prepared, this solution should not be in the light.
3. A smaller number of conical flasks can be used, the minimum being one. Candidates will need to be advised to wash the flasks thoroughly between experiments.
4. Concentrations should be adjusted so that the time taken for the colour change, when 4 cm³ of solution **H** is added to a mixture of 10 cm³ of solution **K** and 5 drops of starch solution, is between 1 and 2 minutes.

Question 5

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	1 mol dm ⁻³ lithium chloride, labelled L	approx. 20 cm ³
	1 mol dm ⁻³ potassium sulfate, labelled M	approx. 20 cm ³
[MH]	0.4 mol dm ⁻³ sodium hydroxide supplied with a dropper, labelled sodium hydroxide	approx. 10 cm ³
[C]	access to 1 mol dm ⁻³ nitric acid, labelled nitric acid (see note 1)	
	access to 0.5 mol dm ⁻³ barium nitrate, labelled barium nitrate (see note 1)	
[MH][N]	access to 0.1 mol dm ⁻³ silver nitrate, labelled silver nitrate (see note 1)	
	wooden splints	2
	test-tubes (approximately 125 mm × 16 mm) and a means to support them	8
	Bunsen burner and a means to light it	1
	paper towels	3

Notes

- Solutions of nitric acid, barium nitrate and silver nitrate may be shared, with no more than four candidates sharing one bottle.

Question 6

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	metre rule with a millimetre scale	1
	pivot – a prism or triangular wooden block placed on the bench	1
	40 g mass (see note 1)	1
	10 g slotted masses (see note 2)	8

Notes

1. The mass must be secured to the rule, with its centre above the 15.0 cm mark of the rule. The value of the mass must be hidden from candidates.
2. Candidates will be required to use combinations of these masses to make up masses of 40 g, 60 g and 80 g. These masses will be placed on the rule by the candidate. If slotted masses are not available, it must be possible to stack the masses used on the rule.

Action at changeover

Check that the 40 g mass is still securely attached to the rule. Place the rule, pivot and slotted masses separately on the bench.

Question 7

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	convex lens with focal length $f = 15\text{ cm}$, with holder	1
	metre rule with a millimetre scale	1
	illuminated object with a hole in the shape of an equilateral triangle of side approximately 2 cm (see note 1)	1
	white screen (see note 2)	1

Notes

- The object can be made by cutting a triangular hole in a piece of white card and covering the hole with translucent paper, as shown in Fig. 7.1.

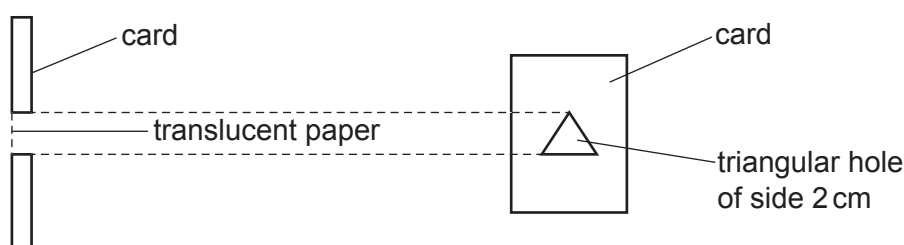


Fig. 7.1

The orientation of the triangle must be as shown in Fig. 7.1.

The illumination can be provided by a 12V, 24W lamp, or similar.

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.

- The screen can be made from a sheet of white card (approximately 10 cm × 10 cm). Some means of supporting the screen vertically must be supplied (e.g., fixing the white card to a small block of wood). See Fig. 7.2.

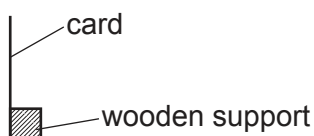


Fig. 7.2

- The apparatus is to be set up for candidates with the metre rule placed on the bench, the illuminated object placed at the 0 cm mark of the metre rule, the lens at the 50.0 cm mark and the screen at the 100 cm mark.

Action at changeover

Check that the lamp filament, the centre of the hole in the object card and the centre of the lens are the same height above the bench.

Arrange the apparatus as described in note 3.

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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)