



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/53

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, 3, 4 and 5 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
	insect pollinated flower, radially symmetrical with between 4 and 6 petals of approximately 4 to 10 cm, large enough to see the petals, carpel and stamen easily (e.g. a lily or tulip or a suitable local alternative) (see note 1)	1
	white tile	1
	30 cm ruler graduated in mm	1

Notes

1. When the student removes 3 petals, the internal parts of the flower should be visible.

Question 2

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	milk in a small beaker, labelled milk (see note 1)	10 cm ³
[MH][HH][C]	4% protease solution in a small beaker, labelled 4% enzyme solution (see note 2)	10 cm ³
[MH][HH][C]	2% protease solution in a small beaker, labelled 2% enzyme solution (see note 2)	10 cm ³
[MH][HH][C]	1% protease solution in a small beaker, labelled 1% enzyme solution (see note 2)	10 cm ³
	test-tubes (approximately 125 mm × 16 mm) and a means to support them	3
	5 cm ³ syringes	4
	glass stirring rod	1
	stop-watch	1
	access to means of labelling glassware	
	paper towels	3

Notes

- Milk to be made as a 2% solution from powdered skimmed milk with a protein content of around 35%, not fresh milk. Use 2g of powdered milk for every 100 cm³ of distilled water.
- Powdered protease enzyme e.g. pepsin/trypsin, can be made up to a 4% solution. Use 4g of powdered enzyme for every 100 cm³ of distilled water.

Prior to the exam, the supervisor should test that when equal volumes of milk and 4% enzyme are mixed at room temperature, the milk should clear in about 1 minute. The enzyme concentration may be adjusted accordingly. Candidates must **not** be made aware of any changes to the enzyme concentration.

The 2% enzyme solution is made by mixing 50 cm³ of 4% enzyme solution and 50 cm³ of distilled water.

The 1% enzyme solution is made by mixing 25 cm³ of 4% enzyme solution and 75 cm³ of distilled water.

The small beakers can be substituted for similar containers, but these must allow access with the 5 cm³ syringes.

Gloves should be available to candidates who are sensitive to enzymes.

Question 3

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. 80 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. 50 cm ³
	distilled water, labelled distilled water	approx. 40 cm ³
	1% starch solution supplied with a dropper and labelled starch solution	approx. 10 cm ³
	10 cm ³ syringe, labelled K	1
	10 cm ³ syringe, labelled H	1
	10 cm ³ syringe, labelled W	1
	conical flasks (see note 3)	5
	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. Solution **H**, distilled water and starch solution are placed in a conical flask. When solution **K** is added, the time of the fastest reaction should be measurable, and the slowest reaction should be no more than 3 minutes. Concentrations may be adjusted to achieve this.

volume of solution H /cm ³	volume of distilled water/cm ³	drops of starch solution	volume of solution K /cm ³
2	8	5	10
4	6	5	10
6	4	5	10
8	2	5	10
10	0	5	10

Question 4

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
[MH] [C] [N]	0.5 mol dm ⁻³ zinc chloride supplied in a beaker, labelled L	approx. 25 cm ³
	0.5 mol dm ⁻³ sodium iodide, labelled M	approx. 5 cm ³
	access to 0.5 mol dm ⁻³ ammonia solution with a dropping pipette, labelled aqueous ammonia	
[MH]	access to 0.4 mol dm ⁻³ sodium hydroxide solution with a dropping pipette, labelled aqueous sodium hydroxide	
[MH]	access to 1.0 mol dm ⁻³ nitric acid, labelled nitric acid	
	access to 0.5 mol dm ⁻³ barium nitrate, labelled aqueous barium nitrate	
[MH][N]	access to 0.1 mol dm ⁻³ silver nitrate, labelled aqueous silver nitrate	
	test-tubes (approximately 125 mm × 16 mm) and a means to support them	5
	paper towels	3

Question 5

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	piece of plasticine (modelling clay) of mass approximately 100 g (see note 1)	1
	30 cm ruler with a millimetre scale	1
	100 cm ³ measuring cylinder	1
	piece of cotton or thread (see note 2)	1
	250 cm ³ beaker containing approximately 100 cm ³ of cold water	1
	access to a balance capable of measuring mass to 1 g	
	paper towels	3
	rectangular blocks of wood (see note 3)	2

Notes

1. The plasticine must be moulded into an approximate cubical shape. Use a plasticine or modelling clay which does not break up in water.
2. The cotton or thread must be long enough for candidates to be able to lower a piece of the plasticine into the measuring cylinder.
3. The dimensions of the blocks are not important, as long as they are at least 10 cm long × 4 cm high. The wooden blocks must have smooth, straight sides.

Action at changeover

Mould the two pieces of plasticine back into a single approximate cubical shape.

Question 6

No apparatus or materials are required for Question 6.

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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)