



# Cambridge IGCSE™ (9–1)

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**CO-ORDINATED SCIENCES**

**0973/51**

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.**

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## 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](mailto:info@cambridgeinternational.org)  
phone +44 1223 553554

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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:

<b>C</b>	corrosive	<b>MH</b>	moderate hazard
<b>HH</b>	health hazard	<b>T</b>	acutely toxic
<b>F</b>	flammable	<b>O</b>	oxidising
<b>N</b>	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, 5 and 6 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
	small beaker, in a water-bath at about 40 °C, containing apple puree, labelled <b>A</b> (see note 1)	approx. 50 g
	small beaker, in a water-bath at about 40 °C, containing apple puree, labelled <b>B</b> (see note 1)	approx. 50 g
<b>[MH]</b> <b>[HH][C]</b>	pectinase enzyme in a test-tube, in a water-bath at about 40 °C, labelled <b>enzyme</b> (see note 2)	2 cm <sup>3</sup>
	tap water in a test-tube, in a water-bath at about 40 °C, labelled <b>warm water</b>	2 cm <sup>3</sup>
	means to support test-tubes	
	25 cm <sup>3</sup> measuring cylinders	2
	filter funnels (see note 3)	2
	approximately 15 cm filter paper (to fit filter funnel)	4
	glass stirring rod	1
	stop-watch	1
	means to label glassware e.g. marker pen	1
	paper towels	3

### Notes

- Apple puree can be bought in tins or prepared from mashed apples and water. It should be loose enough to be easily poured. Additional water is added to achieve this. It must test positive with Benedict's solution. Sufficient glucose powder can be added to achieve this.
- Undiluted pectinase ready supplied in liquid form can be used, or a 10% solution made up from crystals. Gloves should be available to candidates who are sensitive to enzymes.
- The filter funnel should be the largest that can be placed in the measuring cylinder and remain stable.

**Question 2**

Each candidate should be provided with:

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

**Notes**

1. If candidates are sharing a water-bath, a means of labelling a test-tube needs to be provided. A water-bath can be provided for each candidate using a beaker and a supply of hot water at 80 °C. Candidates should be warned of the dangers of burns and scalds when using very hot water.
2. A supply of apple juice which tests positive with Benedict's solution and negative with biuret solution should be available for candidates who do not have juice from Question 1.

## Question 3

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
[HH]	0.1 mol dm <sup>-3</sup> potassium peroxodisulfate, K <sub>2</sub> S <sub>2</sub> O <sub>8</sub> , labelled <b>K</b> (see notes 1 and 5)	approx. 100 cm <sup>3</sup>
	mixture containing equal volumes of 0.3 mol dm <sup>-3</sup> potassium iodide, KI, and 0.006 mol dm <sup>-3</sup> sodium thiosulfate, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , labelled <b>H</b> (see notes 2 and 5)	approx. 100 cm <sup>3</sup>
	1% starch solution, supplied with a dropper, labelled <b>starch solution</b>	approx. 10 cm <sup>3</sup>
[MH]	0.5 mol dm <sup>-3</sup> ammonium iron(II) sulfate, labelled <b>iron(II) chloride</b> (see note 3)	approx. 5 cm <sup>3</sup>
	0.5 mol dm <sup>-3</sup> sodium chloride, labelled <b>sodium chloride</b>	approx. 5 cm <sup>3</sup>
[C]	0.5 mol dm <sup>-3</sup> iron(III) chloride, labelled <b>iron(III) chloride</b>	approx. 5 cm <sup>3</sup>
	0.5 mol dm <sup>-3</sup> copper(II) chloride, labelled <b>copper chloride</b>	approx. 5 cm <sup>3</sup>
	distilled water, labelled <b>distilled water</b>	10 cm <sup>3</sup>
	10 cm <sup>3</sup> syringe labelled <b>K</b>	1
	10 cm <sup>3</sup> syringe labelled <b>H</b>	1
	2 cm <sup>3</sup> syringes	5
	conical flasks (see note 4)	6
	stop-watch	1
	white tile	1
	paper towels	3
	means to label the syringes e.g. marker pen	1

## Notes

1. This solution needs to be made no earlier than the day before the examination.
2. Once prepared, this solution should not be stored or left in the light.
3. This solution needs to be made no earlier than the day before the examination.
4. A smaller number of conical flasks can be used, the minimum being two. Candidates will need to be advised to wash the flasks thoroughly between experiments.
5. The concentrations should be adjusted so that when 10 cm<sup>3</sup> of solution **H** is added to a mixture of 10 cm<sup>3</sup> of solution **K** with 5 drops of starch solution, the time for the colour change is between 1 and 2 minutes. (Nearer to 1 minute would be preferable.)

**Question 4**

No apparatus or materials are required for Question 4.

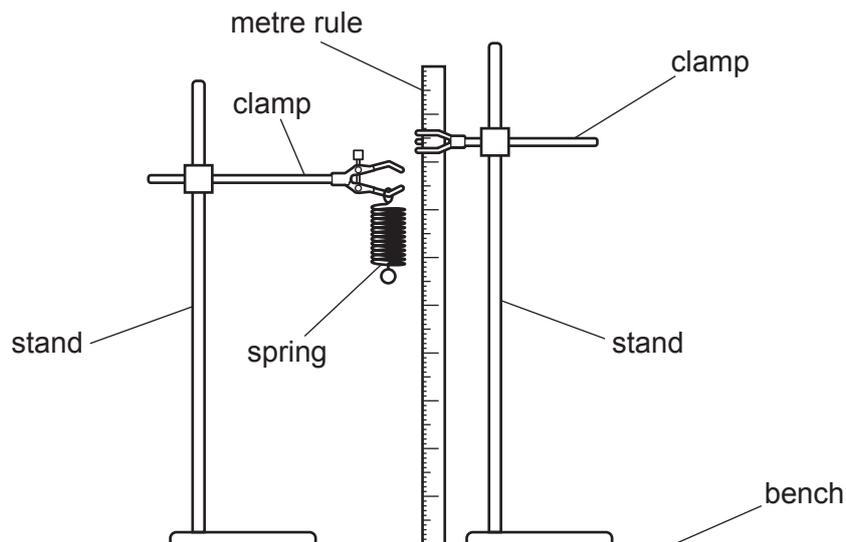
**Question 5**

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	bosses, clamps and stands	2
	metre rule with a millimetre scale (see note 2)	1
	steel spring (see note 3)	1
	set-square	1
	masses of 100 g, 200 g, 300 g, 400 g and 500 g (see note 4)	

**Notes**

- The apparatus is to be set up for candidates as shown in Fig. 5.1. The spring must be sufficiently high above the bench so that when the 5.0 N load is suspended from the spring, the bottom of the load is above the surface of the bench.



**Fig. 5.1** (not to scale)

- The metre rule 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.
- An expendable steel spring is suitable, for example a 55 mm long spring of diameter 15 mm and spring constant approximately  $25 \text{ N m}^{-1}$  (see [www.philipharris.co.uk](http://www.philipharris.co.uk), catalogue number B8G87194). The spring must be capable of supporting at least 5.0 N without overstretching.
- Four 100 g slotted masses together with a 100 g mass hanger, each labelled 1.0 N, is ideal. If slotted masses are not available, a light hook must be provided so that the masses labelled 1.0 N, 2.0 N, 3.0 N, 4.0 N and 5.0 N can be suspended from the spring.

**Action at changeover**

Restore the apparatus to the set-up shown in Fig. 5.1.

### Question 6

Each candidate should be provided with:

hazard	materials and apparatus	quantity per candidate
	clamp, boss and stand	1
	thermometer, $-10^{\circ}\text{C}$ to $110^{\circ}\text{C}$ graduated in $1^{\circ}\text{C}$ intervals	1
	stop-watch	1
	$250\text{ cm}^3$ beaker (see note 1)	1
	$250\text{ cm}^3$ of hot water (see note 2)	1
	paper towels	3

### Notes

1. If the beaker does not have a mark on its side indicating the  $200\text{ cm}^3$  level, a mark should be drawn to indicate this level.
2. The hot water should have a temperature of approximately  $80^{\circ}\text{C}$ . The hot water should be supplied by the supervisor and be ready for immediate use.
3. The thermometer is to be held vertically using a clamp, boss and stand and set up by the supervisor, as shown in Fig. 6.1. Ensure that the clamp does not obscure the temperature scale of the thermometer.

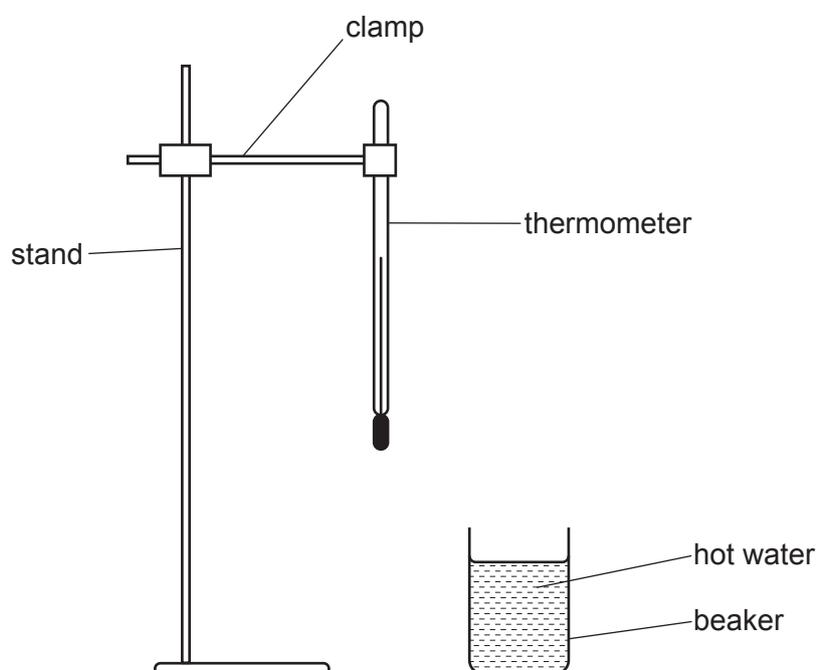


Fig. 6.1

4. Candidates must be able to easily and safely move the thermometer into the water.
5. Candidates should be warned of the dangers of burns and scalds when using very hot water.

6. Spare beakers and thermometers should be available in case of breakages.

**Action at changeover**

The water must be poured away and replaced by a fresh supply of hot water for the next candidate.

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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) .....