Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/53**

Paper 5 Practical Test **May/June 2025**

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.
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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.

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'.

Question 1

Each candidate will require the following materials and apparatus. Labels do not need to include concentrations.

hazard	materials and apparatus	quantity per candidate
	5% glucose solution in a small beaker or sample bottle, labelled **A** (see note 1.1)	10 cm^3
	protein solution in a small beaker or sample bottle, labelled **B** (see note 1.2)	10 cm^3
	distilled water in a small beaker or sample bottle, labelled **C**	10 cm^3
	5% glucose solution in a small beaker or sample bottle, labelled **D** (see note 1.1)	10 cm^3
	glucose testing strip e.g. Diastix ®	1
	colour chart for glucose testing strip (see note 1.3)	
[MH]	Benedict's solution with dropper, labelled **Benedict's solution**	at least 5 cm^3
[C]	biuret solution with dropper, labelled **biuret solution**	at least 5 cm^3
	access to a hot water-bath of approximately 80 °C (see note 1.4)	
	stop-watch or sight of a clock with a second hand	1
	test-tubes (125 mm × 16 mm)	6
	test-tube rack	1
	test-tube holder	1
	means of labelling glassware e.g. marker pen	
	paper towels	2

Notes

1.1 The glucose solution is made by dissolving 5 g glucose powder in 100 cm^3 distilled water and must test positive with an equal volume of Benedict's solution.

1.2 The protein solution can be made from albumin or powdered egg and must test positive with an equal volume of biuret solution.

1.3 The colour chart may be shared by not more than 4 candidates.

1.4 Water-baths may be individual or communal.

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

Question 2

No materials or apparatus are required for this question.

Question 3

Each candidate will require the following materials and apparatus. Labels do not need to include concentrations.

hazard	materials and apparatus	quantity per candidate
	0.3 mol dm^{-3} sodium thiosulfate solution, labelled **aqueous sodium thiosulfate**	120 cm^3
[C]	0.1 mol dm^{-3} iron(III) nitrate solution, labelled **aqueous iron(III) nitrate** (see note 3.1)	120 cm^3
	distilled or deionised water, labelled **water**	60 cm^3
	conical flasks (see note 3.2)	4
	50 cm^3 measuring cylinder, labelled **S**	1
	50 cm^3 measuring cylinder, labelled **I**	1
	50 cm^3 measuring cylinder, labelled **W**	1
	stop-watch	1
	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	1
	access to distilled or deionised water	
	paper towels	2

Notes

3.1 The aqueous iron(III) nitrate should be made up in 1.0 mol dm^{-3} nitric acid.

3.2 Candidates may be given fewer conical flasks, the minimum being 2, but they will need to be told to rinse them out.

Pre-test

The concentrations of 0.3 mol dm^{-3} sodium thiosulfate solution and 0.1 mol dm^{-3} iron(III) nitrate solution can be adjusted so that the times taken when the following mixtures are added are all less than 4–5 minutes for the colour of the solution to fade, but are all measurable. Concentrations can be varied to achieve this.

volume of sodium thiosulfate / cm^3	volume of water / cm^3	volume of iron(III) nitrate / cm^3
30	0	25
20	10	25
15	15	25
10	20	25

Question 4

Each candidate will require the following materials and apparatus. Labels do not need to include concentrations.

hazard	materials and apparatus	quantity per candidate
[C][MH][N]	aqueous equimolar mixture of 0.5 mol dm^{-3} zinc chloride and 0.5 mol dm^{-3} potassium chloride, labelled **H**	30 cm^3
[C]	access to approximately 1.0 mol dm^{-3} of sodium hydroxide, labelled **sodium hydroxide** (see note 4.1)	
[C]	access to 1.0 mol dm^{-3} dilute nitric acid, labelled **dilute nitric acid** (see note 4.1)	
	access to 0.1 mol dm^{-3} barium nitrate solution in a bottle with a dropper or supplied with a dropping pipette, labelled **barium nitrate** (see notes 4.1 and 4.2)	
	access to 0.05 mol dm^{-3} silver nitrate solution in a bottle with a dropper or supplied with a dropping pipette, labelled **silver nitrate** (see note 4.1)	
[MH][N]	access to 1.0 mol dm^{-3} ammonia solution in a bottle with a dropper or supplied with a dropping pipette, labelled **ammonia** (see note 4.1)	
	test-tubes (125 mm × 16 mm) (see note 4.3)	5
	test-tube rack	1
	Bunsen burner and a means to light it	1
	heat proof mat	1
	wooden splints	2
	paper towels	2
	access to distilled or deionised water	

Notes

4.1 These reagents may be shared by not more than 4 candidates.

4.2 This may be aqueous barium chloride labelled as **barium nitrate**.

4.3 Candidates can be given fewer test-tubes, the minimum being 3, but they will need to be told to rinse them out.

Question 5

Each candidate will require the following materials and apparatus.

hazard	materials and apparatus	quantity per candidate
	d.c. power supply set to approximately 6 V **or** four 1.5 V dry cells in a holder, with a sufficient number of connecting leads (see notes 5.1 and 5.2)	1
	voltmeter capable of measuring up to 2.5 V with a minimum precision of 0.1 V (see note 5.3)	1
	ammeter capable of measuring up to 1.00 A with a minimum precision of 0.05 A (see note 5.3)	1
	switch (the switch may be an integral part of the power supply)	1
	12 V, 24 W filament lamp and holder	1
	variable resistor, labelled **Y** (up to 50 ohms or capable of producing voltages across the filament lamp up to 2.5 V in the circuit in Fig. 5.1)	1

Notes

5.1 The circuit shown in Fig. 5.1 must be set up for the candidates.

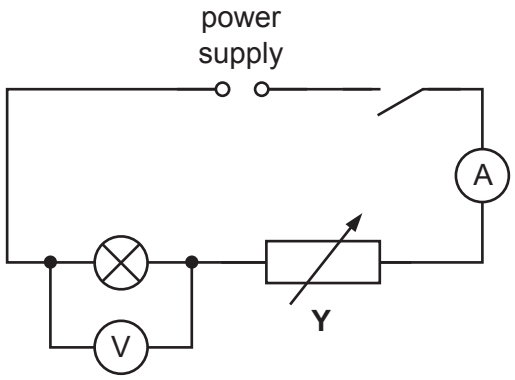

Fig. 5.1

5.2 If candidates are supplied with a power source of variable voltage output, the voltage should be set by the supervisor and fixed (e.g. taped).

If dry cells are used as the power source, check they remain adequately charged during the examination. Spare cells should be available.

5.3 Either analogue or digital meters are suitable. Any variable settings should be set by the supervisor and fixed (e.g. taped).

Action at changeover

Check that the circuit is still connected correctly and working. Open the switch.

Question 6

Each candidate will require the following materials and apparatus.

hazard	materials and apparatus	quantity per candidate
	expendable steel spring approximately 55 mm long and a diameter of 15 mm, with a spring constant of approximately 0.25 N / cm	1
	clamp, stand and boss (see note 6.1)	1
	30 cm or 50 cm ruler, graduated in millimetres	1
	mass of 200 g (see note 6.2)	1

Notes

6.1 The apparatus is to be set up for candidates as shown in Fig. 6.1.

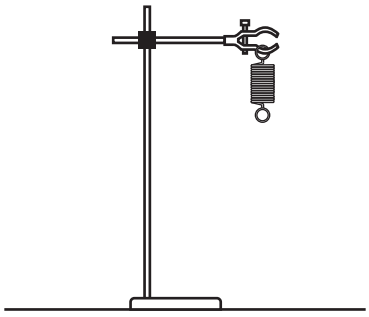

Fig. 6.1

The spring is to be sufficiently high above the bench so that when the 200 g mass is suspended on the spring, the bottom of the mass is at least 10 cm above the surface of the bench.
Ensure the spring is held tightly in the clamp.

6.2 A 100 g mass hanger with one 100 g slotted mass are suitable. If these are not available, a suitable light hook must be provided so that the 200 g mass can be attached to the spring.

Action at changeover

Reset the apparatus as in Fig. 6.1 and replace the spring if it has been permanently stretched.

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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.

Space for supervisor to record results, where relevant.

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) .....