



# Cambridge IGCSE™

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**CO-ORDINATED SCIENCES**

**0654/52**

Paper 5 Practical Test

**February/March 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, 4 and 5 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) 2 test-tubes (125 × 15 mm) and a means to support them
- (ii) a white spotting tile
- [MH] (iii) Benedict's solution, labelled **Benedict's solution**, supplied either in a bottle with a dropper or with a separate dropping pipette
- [C] (iv) biuret solution, labelled **biuret solution**, supplied either in a bottle with a dropper or with a separate dropping pipette
- (v) iodine solution, labelled **iodine solution**, supplied either in a bottle with a dropper or with a separate dropping pipette
- (vi) access to a water-bath at approximately 80 °C
- (vii) approximately 5 cm<sup>3</sup> of glucose and protein solution, labelled **A**. See Note 1
- (viii) approximately 5 cm<sup>3</sup> of protein and starch solution, labelled **B**. See Note 2
- (ix) 2 dropping pipettes.

### Notes

1. Test-tube **A** needs to contain approximately equal volumes of 1% glucose solution and protein solution. The protein can be made from egg white or albumin powder. It must give a positive result with biuret solution.
2. Test-tube **B** needs to contain approximately equal volumes of protein solution and 1% starch solution. The protein can be made from egg white or albumin powder. It must give a positive result with biuret solution.

**For Question 2**

Each candidate will require:

- (i) 5 dropping pipettes
- (ii) 10 cm<sup>3</sup> DCPIP 0.1% solution, labelled **DCPIP**. See Note 1
- (iii) a white spotting tile with deep wells. See Note 7
- (iv) 10 cm<sup>3</sup> of lemon juice labelled **E**. See Note 2
- (v) 10 cm<sup>3</sup> of apple or white grape juice labelled **F**. See Note 3
- (vi) 10 cm<sup>3</sup> of water containing a dissolved vitamin C tablet labelled **G**. See Note 4
- (vii) 10 cm<sup>3</sup> of water containing a dissolved vitamin C tablet labelled **H**. See Note 5
- (viii) paper towels.

**Notes**

1. DCPIP (2,6-dichlorophenolindophenol) will decolourise readily by oxidation with air and should be freshly prepared and kept in a stoppered bottle, preferably made of dark glass.
2. This can be from freshly squeezed lemons or purchased as juice. The juice should be decanted from any pulp.
3. Fresh fruit can be squeezed but the juice needs to be clear juice (not cloudy) without pulp.
4. Prior to the examination, one vitamin C tablet should be added to 200 cm<sup>3</sup> water and fully dissolved.
5. Prior to the examination, one vitamin C tablet should be added to 100 cm<sup>3</sup> water and fully dissolved.
6. Prior to the examination, using a spotting tile with 2 drops of DCPIP in each of four wells and adding dropwise, test juices **E**, **F**, **G** and **H** ensuring that the DCPIP is decolourised before each well is full and all juices give different results. The concentration of the DCPIP or fruit juice may be adjusted to achieve this.
7. Four heavy glass watch glasses with flat bases placed on white paper may be used as an alternative. This must be noted on the supervisor's report. Candidates should be advised of this change to the procedure in the Question Paper.

**For Question 3**

Each candidate will require:

- (i) 75 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> hydrochloric acid, labelled **hydrochloric acid**
- [C] (ii) 50 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> sodium hydroxide solution, labelled **sodium hydroxide**
- (iii) a clean polystyrene / expanded foam cup, labelled **plastic cup**
- (iv) 250 cm<sup>3</sup> beaker (to hold the polystyrene cup)
- (v) 50 cm<sup>3</sup> measuring cylinder
- (vi) 50 cm<sup>3</sup> burette either in a burette stand or clamped in a clamp, boss and stand
- (vii) small funnel suitable for filling the burette
- (viii) thermometer, -10 °C to +110 °C with 1 °C graduations, suitable for stirring
- (ix) access to distilled water
- (x) paper towels.

**Action at changeover**

Empty the burette (or replace with a clean burette) and reclamp.

**For Question 4**

Each candidate will require:

- [F] (i) universal indicator solution in a bottle with a dropper or supplied with a dropping pipette, labelled **universal indicator**. See Note 1
- (ii) pH colour chart for use with the universal indicator
- (iii) 3 test-tubes, approximately 125 mm × 16 mm and a means to support them
- (iv) the remaining 1.0 mol dm<sup>-3</sup> hydrochloric acid (from Question 3) labelled **hydrochloric acid**
- [C] (v) the remaining 1.0 mol dm<sup>-3</sup> sodium hydroxide solution (from Question 3) labelled **sodium hydroxide**
- (vi) paper towels.

**Notes**

1. Universal indicator may be shared between candidates.

**Action at changeover:**

Replace the plastic cup.

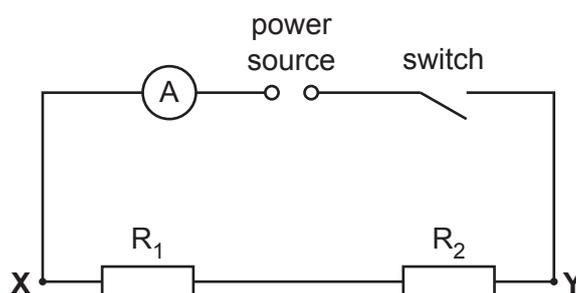
**For Question 5**

Each candidate will require:

- (i) a power source of approximately 1.5–2.0 V. Where candidates are supplied with a power source with a variable output voltage, the voltage setting should be set by the supervisor and fixed (e.g. taped)
- (ii) a switch – this can be an integral part of the power supply
- (iii) an ammeter capable of measuring currents up to 1.0 A with a minimum resolution of 0.05 A
- (iv) 2 resistors of nominal value  $4.7\ \Omega$  with a power rating of 2 W. See Notes 2 and 3
- (v) sufficient connecting leads to set up the circuit shown in Fig. 5.1, plus four additional leads. See Note 1
- (vi) a voltmeter capable of measuring the supply voltage with a minimum resolution of 0.1 V.

**Notes**

1. The circuit is to be set up for candidates as shown in Fig. 5.1 with points X and Y labelled and with the additional leads and the voltmeter within easy reach.



**Fig. 5.1**

2. The resistors must all have suitable terminals so that candidates can easily and quickly connect the voltmeter. Candidates will also be required to rearrange the resistors.
3. The resistors must be labelled  $R_1$  and  $R_2$  and positioned as shown in Fig. 5.1.

**Action at Changeover**

Reconnect the resistors so that the circuit is as shown in Fig. 5.1.

Disconnect the voltmeter.

**For 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) .....