Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 2024**

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 or other competent biologist (**not** the invigilator) should obtain the results needed for the supervisor's report by following the relevant steps in the question paper. The results should be recorded in the supervisor's report.

Organisation of the exam

- All candidates must have access to the materials required for Question 2 throughout the whole period of the exam.
- Half of the candidates will have access to the microscope and slide for a maximum time of one hour from the start of the exam. These candidates should start with Question 1. After one hour, or sooner if candidates have finished Question 1, they should move on to Question 2.
- For Question 1, two candidates are **not** permitted to share the same microscope at the same time.
- The other candidates should start with Question 2. After one hour, these candidates should be given access to the microscope. They should then move on to Question 1 as soon as they are ready.
- Candidates will only have access to the microscope and slide for one hour. They should be advised that they can answer any part of the exam paper **not** requiring the microscope throughout the whole period of the exam.
- Access arrangements to microscopes, including instructions on which question to start with and timings, must be explained to candidates before the start of the exam.

Materials to be supplied by Cambridge International

- None

Materials and apparatus for Question 1

Each candidate will need:

materials and apparatus for each candidate	quantity	✓
Microscope with: ● an eyepiece lens, ×10 magnification ● a low-power objective lens, ×10 magnification ● a high-power objective lens, ×40 magnification	1 between 2	
Onion tissue covered by 1.0 mol dm^{-3} sodium chloride solution, in a beaker, labelled **U1**, provided at room temperature (see **Preparation of materials**)	2 pieces in at least 50 cm^3	
Onion tissue covered by 0.5 mol dm^{-3} sodium chloride solution, in a beaker, labelled **U3**, provided at room temperature (see **Preparation of materials**)	2 pieces in at least 50 cm^3	
Onion tissue covered by distilled water, in a beaker, labelled **U2**, provided at room temperature (see **Preparation of materials**) Note: This item is described differently in the question paper. This is intentional. Candidates should **not** be informed.	2 pieces in at least 50 cm^3	
Microscope slides and coverslips	3	
Teat pipette	1	
200 cm^3 distilled water, in a beaker labelled **For washing** (also used in Question 2)	1	
Container, capacity approximately 200 cm^3, labelled **For waste** (also used in Question 2)	1	
White tile	1	
Mounted needle	1	
Blunt forceps	1	
Scalpel or single-edged razor blade	1	
Marker pen, permanent (also used in Question 2)	1	
Paper towels	8	

Preparation of materials

The sodium chloride solutions may be prepared the day before the examination and kept covered to prevent evaporation.

Each solution should be kept in a covered container in a refrigerator. Solutions should be at room temperature before the start of the exam.

- Microscope

  Any lenses which are **not** ×10 or ×40 should be removed or replaced.

  For each candidate:
  – the microscope must be set up on low power
  – slides must **not** be left on the stage of the microscope.

- **U1**, 1.0 mol dm^{-3} sodium chloride solution

  This is prepared by putting 5.8 g of sodium chloride in 50 cm^3 of distilled water and mixing well. Make up to 100 cm^3 with distilled water.

  This solution is needed to soak the pieces of onion.

  The 1.0 mol dm^{-3} sodium chloride solution is also used as a stock solution to make **U3**.

- **U3**, 0.5 mol dm^{-3} sodium chloride solution

  This is prepared by adding 50 cm^3 of distilled water to 50 cm^3 of the 1.0 mol dm^{-3} sodium chloride solution. Mix well.

  This solution is needed to soak the pieces of onion.

- Pieces of onion tissue

  The onions must be as fresh as possible to avoid the effects of storage.
  The pieces of onion should be prepared at least one hour before the start of the examination and left in the sodium chloride solutions in covered containers to prevent evaporation.

  Two pieces of onion need to be placed in each of the solutions **U1**, **U2** and **U3**. Make sure the pieces of onion are completely covered by the solutions.

  Onion pieces are prepared as shown in Fig. 1.1.

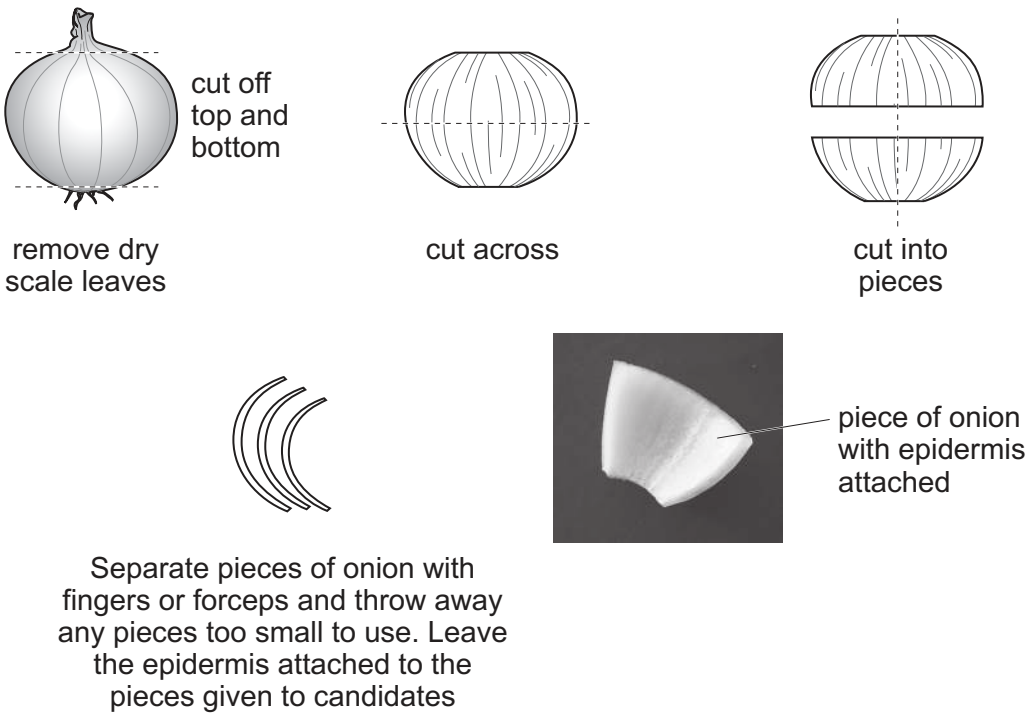

Fig. 1.1

Materials and apparatus for Question 2

Each candidate will need:

materials and apparatus for each candidate	quantity	✓
1.0% starch suspension, in a beaker, labelled **R1**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
1.0% starch suspension, in a beaker, labelled **S**, provided at room temperature (see **Preparation of materials**)	at least 50 cm^3	
Iodine solution, in a beaker, labelled **iodine**, provided at room temperature and kept out of direct sunlight, with a dropping pipette (see **Preparation of materials**)	at least 20 cm^3	
Distilled water, in a beaker, labelled **R2**, provided at room temperature	at least 20 cm^3	
Distilled water, in a beaker, labelled **W**, provided at room temperature	at least 150 cm^3	
10 cm^3 syringes	2	
5 cm^3 syringe	1	
1 cm^3 syringe	1	
Beakers, capacity 50–100 cm^3	5	
Test-tubes, small, capacity 20–30 cm^3	7	
Test-tube rack, to hold 7 small test-tubes	1	
Glass rod	1	
White card (approximately 10 cm × 10 cm)	1	
200 cm^3 distilled water, in a beaker labelled **For washing** (also used in Question 1)	1	
Container, capacity approximately 200 cm^3, labelled **For waste** (also used in Question 1)	1	
Paper towels	8	
Marker pen, permanent (also used in Question 1)	1	
Suitable eye protection	1	

Preparation of materials

R1, **S** and the **stock** solution of iodine (0.1 mol dm^{-3}) may be prepared the day before the exam. Each solution should be kept in a covered container in a refrigerator overnight.

The 0.01 mol dm^{-3} **iodine** solution must be prepared no more than **one hour** before the start of the exam.

R1 and **S** should be at room temperature before the start of the exam.

- **R1** and **S**, 1.0% starch suspension

  These are prepared by putting 1 g of **soluble** starch into a small volume of distilled water and mixing to make a paste. Make up to 100 cm^3 with hot distilled water. Heat the suspension to dissolve the starch, mixing well.

  These starch suspensions must be at room temperature for the exam.

- **iodine**, 0.01 mol dm^{-3} iodine in potassium iodide solution

  This is prepared by making a 0.1 mol dm^{-3} stock solution of iodine, then diluting it to make the 0.01 mol dm^{-3} solution:
  - Put 8.0 g of potassium iodide in a beaker or container.
  - Add 2 cm^3 of distilled water to moisten the potassium iodide.
  - Add 2.5 g of iodine **[MH][N]** (if necessary, crush to small pieces) to the moist potassium iodide.
  - Add 15 cm^3 of distilled water and stir well.
  - When no more iodine dissolves, add another 15 cm^3 of distilled water and stir well.
  - Repeat with two more volumes of 15 cm^3 of distilled water and then make up to a total volume of 100 cm^3. It is not essential that all the iodine dissolves.
    This gives a red-brown coloured 0.1 mol dm^{-3} iodine solution.
  - Put 10 cm^3 of the 0.1 mol dm^{-3} iodine solution into a beaker or container.
  - Make up to 100 cm^3 with distilled water. Mix well.

  This makes the 0.01 mol dm^{-3} iodine solution and is a yellow-orange colour.

  Prepare the 0.01 mol dm^{-3} iodine solution no more than **one hour** before the exam.

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Supervisor's report

Syllabus and component number	9	7	0	0	/	3	1
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.

Temperature of exam room .....°C

Results for Question **2(b)(ii)**

Results for Question **2(b)(iv)**

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) .....