
BIOLOGY

9700/33

Paper 3 Advanced Practical Skills 1

October/November 2016

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given, including the identity of material on microscope slides where appropriate, does not reach the candidates either directly or indirectly.



If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: info@cie.org.uk
by phone: +44 1223 553554
by fax: +44 1223 553558
stating the Centre number, the nature of the query and the syllabus number quoted above.

This document consists of **10** printed pages and **2** blank pages.

Instructions for preparing apparatus

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the biology teacher to test the apparatus appropriately. **No access to the Question Paper is permitted in advance of the examination.**

Candidates must be provided with a microscope with:

- Eyepiece lens, $\times 10$ (equal to 16 mm or $\frac{2}{3}$ ")
- Low-power objective lens, $\times 10$ (equal to 16 mm or $\frac{2}{3}$ ")
- High-power objective lens, $\times 40$ (equal to 4 mm or $\frac{1}{6}$ ")
- Eyepiece graticule fitted within the eyepiece and visible in focus at the same time as the specimen.

To avoid confusion, only the lenses specified above should be fitted in the microscopes to be used in the examination. Any lenses which are **not** $\times 10$ or $\times 40$ should be removed or replaced.

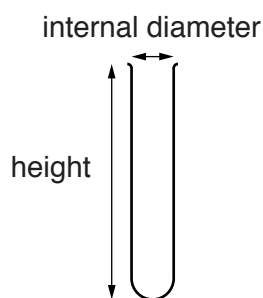
Each candidate must have uninterrupted use of the microscope for at least one hour.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with the COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant.

C = corrosive	MH = moderate hazard
HH = health hazard	T = acutely toxic
F = flammable	O = oxidising
N = hazardous to the aquatic environment	



When small test-tubes are provided, it is expected that these are approximately 150 mm in height.

If other dimensions of apparatus are required, these will be specified.

Centres are reminded that they are **not** permitted to open the Question Paper envelopes before the examination. Centres should also refer to the Handbook for Centres.

If there are any difficulties with any aspect of setting up this practical examination that the Centre is not able to resolve, it is essential for Centres to contact the Product Manager as soon as possible by **e-mail** info@cie.org.uk, by **fax** +44 1223 553558 or by **phone** +44 1223 553554.

Confidential Instructions

No access to the Question Paper is permitted in advance of the examination.

In advance of the examination:

the day before the examination or at least one hour before the start of the examination put pieces of onion epidermis into 1.0 mol dm^{-3} sucrose solution.

See **Preparation of materials**.

For both Questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker or container for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

More of the solutions should be available if requested by candidates.

If a candidate breaks any of the apparatus, or loses any of the materials supplied, the matter should be rectified and a note made in the Supervisor's Report.

Solutions should be disposed of in accordance with local safety regulations.

Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
Piece of onion tissue covered by 1.0 mol dm ⁻³ sucrose solution in a beaker or container, labelled U (see Preparation of materials)	1	
Microscope (as described on page 2) <ul style="list-style-type: none"> must be set up on low power no slide must be left on the stage of the microscope. 	1	
Microscope slides and coverslips	2	
Forceps (blunt)	1	
Scalpel or sharp blade	1	
Seeker or mounted needle	1	
Pipette, plastic or glass with teat	1	
White tile or surface for cutting	1	
1.0 mol dm ⁻³ sucrose solution in a beaker or container, labelled S , provided at room temperature (see Preparation of materials)	at least 50 cm ³	
Distilled water in a beaker or container, labelled W , provided at room temperature	at least 100 cm ³	
1.0 mol dm ⁻³ hydrochloric acid in a beaker or container, labelled H , provided at room temperature	at least 50 cm ³	
Sodium hydrogencarbonate (bicarbonate) powder in a petri dish or suitable shallow dish, labelled A , with a spatula	approximately 5 g	
Benedict's solution (qualitative) in a beaker or container, labelled Benedict's , provided at room temperature	at least 50 cm ³	
10 cm ³ syringes with the means to wash them out	2	
2 cm ³ or 3 cm ³ or 5 cm ³ syringes with the means to wash them out	2	
Beaker or container, maximum capacity 100 cm ³	5	
Beaker or container (capacity approximately 400 cm ³), approximately half full with cold tap water, labelled C	1	
Test-tubes, maximum capacity 25 cm ³ , suitable for heating	6	
Test-tube rack to hold 6 test-tubes	1	
Test-tube holder to hold hot test-tubes	1	
Beaker (capacity approximately 400 cm ³), with water at 45 °C to 50 °C, suitable for heating as a water-bath and large enough to hold 6 test-tubes and labelled hot water . The Supervisor may use a thermostatically controlled water-bath to provide the hot water for candidates.	1	
Bunsen burner, bench mat, gauze and tripod to support water-bath	1	

Container with water (capacity approximately 200 cm ³), labelled For washing	1	
Container (capacity approximately 200 cm ³), labelled For waste	1	
Glass rod	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

It is advisable to wear suitable eye protection when handling chemicals.

Preparation of materials

The sucrose solution may be prepared the day before the examination and kept covered to prevent evaporation.

Onion tissue may be prepared the day before the examination or at least one hour before the start of the examination and put into the 1.0 mol dm⁻³ sucrose solution.

These should be put into a refrigerator overnight but removed to reach room temperature before the start of the examination.

(i) S, 1.0 mol dm⁻³ sucrose solution

This is prepared by dissolving 34.2 g of sucrose in 80 cm³ of distilled water and making up to 100 cm³ with distilled water.

Some of this solution is needed to soak the pieces of onion, **U**.

(ii) U, 1.0 mol dm⁻³ sucrose solution containing pieces of onion

Preparation of pieces of onion

- Candidates should **not** be given red onion. Onions with white flesh should be used, either with dry brown scales (yellow onion) or with dry white scales (white onion).
- The onions must be as fresh as possible to avoid the effects of storage.
- The pieces of onion **must** be prepared at least one hour before the start of the examination and left in **U** with the containers covered to prevent evaporation. They may be prepared the day before the examination as described above.

Cut the onion pieces as shown in Fig. 1.1.

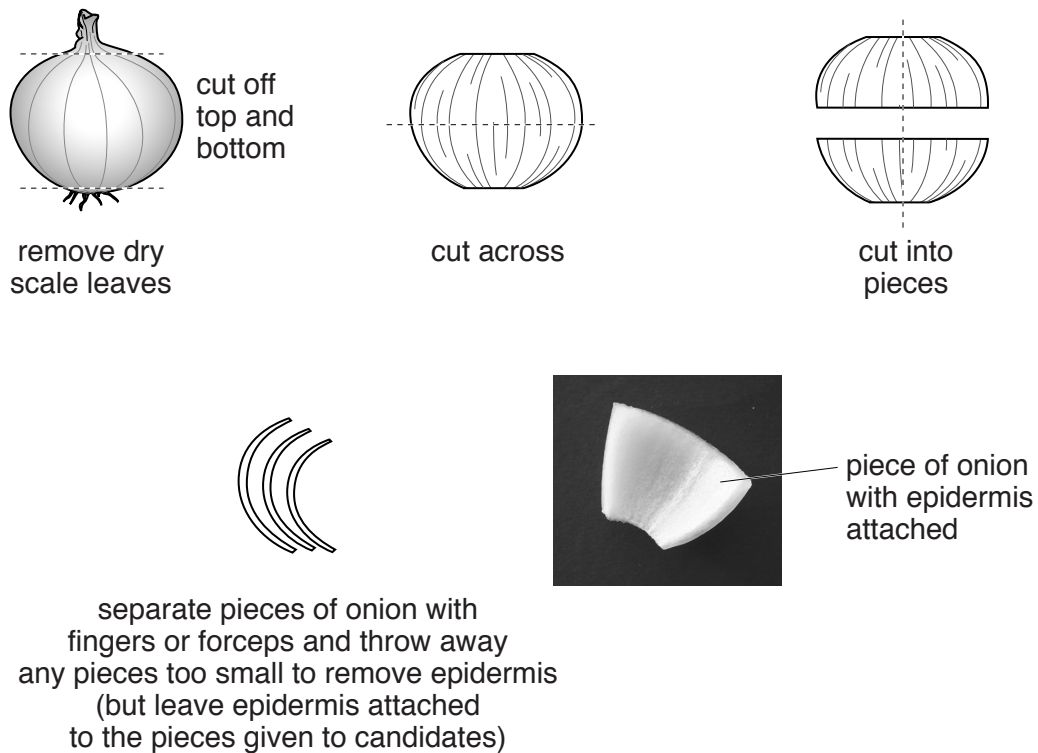


Fig. 1.1

Put the number of pieces of onion required for all candidates, with some spares, into large containers with enough of 1.0mol dm^{-3} of sucrose solution to submerge the onion pieces. Cover the containers.

Before the examination, ensure that the solution containing the piece of onion for each candidate is at room temperature.

Question 2

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
0.01% starch solution in a beaker or container, labelled P1 , provided at room temperature and covered to prevent evaporation (see Preparation of materials)	at least 10 cm ³	
1.0% starch solution in a beaker or container, labelled P2 , provided at room temperature and covered to prevent evaporation (see Preparation of materials)	at least 10 cm ³	
0.05% starch solution in a beaker or container, labelled P3 , provided at room temperature and covered to prevent evaporation (see Preparation of materials).	at least 10 cm ³	
[N] Iodine solution in a beaker or container, labelled iodine , provided at room temperature and kept out of direct sunlight. This must be prepared as in Preparation of materials .	at least 10 cm ³	
Spotting tile or white tile	1	
Pipettes, plastic or glass with teat with the means to wash them out	2	
Container with tap water (capacity approximately 100 cm ³), labelled For washing	1	
Container (capacity approximately 100 cm ³), labelled For waste	1	
Paper towels	8	

Preparation of materials

You will need the following stock solution:

1.0% starch stock solution, P2

This is prepared by putting 1 g of starch into 10 cm³ of warm distilled water in a beaker or container and stirring well. Make up to 100 cm³ with distilled water, boil for approximately 2 minutes, stirring well, then cool to room temperature.

(i) P1, 0.01% starch solution

This is prepared by putting 1 cm³ of the 1.0% starch stock solution into 99 cm³ of distilled water and stirring well.

(ii) P3, 0.05% starch solution

This is prepared by putting 5 cm³ of the 1.0% starch stock solution into 95 cm³ of distilled water and stirring well.

(iii) [N] iodine, 0.01 mol dm⁻³ iodine solution

This is prepared by firstly making a 0.1 mol dm⁻³ iodine solution.

Put 8 g of potassium iodide into a beaker or container. Moisten the potassium iodide with a few drops of distilled water. Add 2.54 g of iodine to the potassium iodide and stir well. Make up to 100 cm³ by adding small volumes of distilled water and stirring well. Continue to stir until the iodine has dissolved.

Then put 10 cm³ of **this** iodine solution (0.1 mol dm⁻³) into a beaker or container and make up to 100 cm³ with distilled water, this makes the 0.01 mol dm⁻³ required for candidates.

This solution must be made up immediately before the start of the examination and kept out of direct sunlight.

SUPERVISOR'S REPORT

The Supervisor's Report is essential in order to allow the Examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

During the examination, the Supervisor or other competent biologist (not the Invigilator) should follow the steps in **Question 1** in order to obtain results for **1(b)(ii)** and **1(b)(iii)** and **Question 2(a)(ii)**.

The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**.

These results should be written in the Supervisor's Report, **not** on a spare question paper.

SEATING PLAN

Provide a **seating plan** of work benches, on separate paper, giving details of the places occupied by the candidates for **each question** using each candidate's number.

The Supervisor's Report and the candidates' seating plan should be enclosed with each packet of scripts.

NO MATERIALS TO BE SUPPLIED by CAMBRIDGE**RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE**

There are no materials to return to Cambridge.

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This form should be completed and sent with the scripts.

SUPERVISOR'S REPORT

October/November 2016

The Supervisor or Teacher responsible for the subject should provide the following information.

- 1 Was any difficulty experienced in providing the necessary materials? If so, give brief details.

- 2 Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:
 - (a) difficulties arising from faulty specimens or microscopes;
 - (b) accidents to apparatus or materials;
 - (c) assistance provided in case of colour blindness;
 - (d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.

All other cases of individual hardship, e.g. illness or disability, should be reported direct to Cambridge on the 'Special Consideration Form' as detailed in the Handbook for Centres.

- 3 During the examination, the Supervisor or a competent biologist should follow the steps in **Question 1** in order to obtain results for **1(b)(ii)** and **1(b)(iii)** and **Question 2(a)(ii)**. The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**.
These results should be written on page 12, which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts.
- 4 Enclose a **seating plan** of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for **each question**.

Declaration (to be signed by the Principal or the Examinations Officer)

The preparation of this practical examination has been carried out so as to maintain the security of the examination.

Signed

Name (in block capitals)

Centre number (of enclosed scripts)

Centre name

If scripts are despatched in more than one envelope, it is essential that **each envelope** includes a copy of the

- relevant Supervisor's Report
- appropriate seating plan(s).



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Temperature of examination room °C

Result for **Questions 1(b)(ii) and 1(b)(iii)**

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

