
BIOLOGY

9700/31

Paper 3 Advanced Practical Skills 1

October/November 2017

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 regarding these Confidential Instructions, please contact Cambridge stating the Centre number, the nature of the query and the syllabus number quoted above.

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This document consists of **8** printed 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.

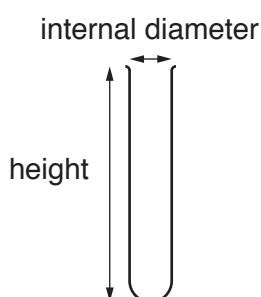
Each candidate must have uninterrupted use of the microscope for at least one hour.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and suitable eye protection 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.

Confidential Instructions**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 suitable beakers or containers for removal of the solutions using syringes
- fresh solutions, materials and rinsing water where appropriate.

More of the solutions and materials 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	✓
1.0 mol dm ⁻³ sucrose solution in a beaker or container, labelled S , provided at room temperature (see Preparation of materials)	at least 200 cm ³	
Pieces of potato in a beaker or container, labelled P (see Preparation of materials)	at least 7 pieces	
Distilled water in a beaker or container, labelled W , provided at room temperature	at least 200 cm ³	
[HH] Methylene blue solution, labelled M , provided at room temperature (see Preparation of materials)	at least 15 cm ³	
10 cm ³ or 20 cm ³ syringes, with the means to wash them out	2	
2 cm ³ or 3 cm ³ syringe, with the means to wash it out	1	
Pipettes, plastic or glass with a teat	2	
Beakers or containers (capacity 75 cm ³ to 100 cm ³)	5	
Test-tubes – large (to hold more than 25 cm ³ but no more than 50 cm ³)	5	
Test-tube rack to hold 5 large test-tubes	1	
Test-tubes – small (capacity 20 cm ³ to 30 cm ³)	5	
Test-tube rack to hold 5 small test-tubes	1	
Glass rod	1	
Ruler, marked in mm	1	
Scalpel or sharp blade	1	
White tile or surface for cutting	1	
Container with tap water (capacity approximately 200 cm ³), labelled For washing	1	
Container (capacity approximately 200 cm ³), labelled For waste	1	
Paper towels	8	
Glass marker pen	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

Preparation of materials

1.0 mol dm⁻³ sucrose solution may be prepared the day before the examination. It should be kept in a covered container in a refrigerator.

0.5% methylene blue solution may be prepared the day before the examination. It should be kept in a covered container.

The solutions must be at **room temperature** for the examination.

(i) S, 1.0 mol dm⁻³ sucrose solution

This is prepared by sprinkling 68.4 g of sucrose, a little at a time, onto the surface of 80 cm³ of distilled water, stirring continuously as you sprinkle. Make up to 200 cm³ with distilled water.

(ii) P, at least 7 pieces of peeled potato wrapped in a damp paper towel in a covered dish, labelled **P**

You may use any variety of the white (or Irish) potato, *Solanum tuberosum*.

Cut each piece of potato with a cross-sectional area of 1.5 cm × 1 cm. Each candidate should be provided with a mixture of different lengths, varying from 4.5 cm to 6 cm.

The potato pieces for each candidate should be prepared on the day of the examination.

[HH] (iii) M, 0.5% methylene blue solution

This is prepared by putting 0.5 g of methylene blue into 80 cm³ of distilled water and stirring continuously. Make up to 100 cm³ with distilled water.

Question 2

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
Potato starch in suspension in a beaker or container, labelled F , provided at room temperature (see Preparation of materials)	at least 15 cm ³	
Maize starch in suspension in a beaker or container, labelled G , provided at room temperature (see Preparation of materials)	at least 15 cm ³	
Microscope slides and coverslips	2	
Forceps (blunt)	1	
Glass rods	2	
Seeker or mounted needle	1	
Pipettes, plastic or glass with teat with the means to wash them out	2	
Black card or paper, approximately 10 cm × 5 cm	1	
Paper towels	8	
Glass marker pen	1	

Preparation of materials

- (i) Microscope with an eyepiece graticule fitted into the eyepiece lens (as described on page 2)

For each candidate:

- the microscope **must** be set up on low power
- the slide must **not** be left on the stage of the microscope.

- (ii) **F**, potato starch suspension

This is prepared by putting 1.5 g of potato starch into 100 cm³ of distilled water. Stir well.

Do not use soluble potato starch.

- (iii) **G**, maize starch suspension

This is prepared by putting 1.5 g of maize starch into 100 cm³ of distilled water. Stir well.

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)(iii)**.

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.

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There are no materials to be supplied by Cambridge.

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This form should be completed and sent with the scripts

SUPERVISOR'S REPORT

October/November 2017

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)(iii)**. 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 8, 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 Supervisor)

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).

Temperature of examination room °C

Results for **Question 1(b)(iii)**