
BIOLOGY

9700/33

Paper 3 Advanced Practical Skills 1

May/June 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 queries 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 **9** printed pages and **3** 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.

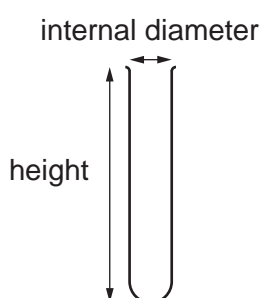
Each candidate must have uninterrupted use of the microscope for at least one hour.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and 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 a suitable beaker, or container, for removal of the solutions 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	✓
Mixture of 10 cm ³ of 0.02% starch suspension and 10 cm ³ of 0.2% glucose solution in a beaker or container, labelled S1 , provided at room temperature (see Preparation of materials)	at least 20 cm ³	
20 cm ³ of 1.0% starch suspension in a beaker or container, labelled S2 , provided at room temperature (see Preparation of materials)	at least 20 cm ³	
Mixture of 10 cm ³ of 0.02% starch suspension and 10 cm ³ of 0.2% glucose solution in a beaker or container, labelled S3 , provided at room temperature (see Preparation of materials) <i>note: solutions S1 and S3 are the same</i>	at least 20 cm ³	
Mixture of 10 cm ³ 0.002% starch suspension and 10 cm ³ of 20% glucose solution in a beaker or container, labelled S4 , provided at room temperature (see Preparation of materials)	at least 20 cm ³	
[MH][N] Benedict's solution (qualitative) in a beaker or container, labelled Benedict's , provided at room temperature	at least 50 cm ³	
[N] Iodine solution in a beaker or container, labelled iodine , provided at room temperature and kept out of direct sunlight (see Preparation of materials)	at least 30 cm ³	
5 cm ³ syringes, with the means to wash them out	2	
2 cm ³ or 3 cm ³ syringes, with the means to wash them out	2	
Pipette, plastic or glass with a teat	1	
Test-tubes – small, maximum capacity 25 cm ³ , suitable for heating	4	
Test-tube rack to hold 4 small 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 4 test-tubes, 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	
Thermometer, –10 °C to 110 °C	1	
Glass rod	1	
Spotting tile	1	
Container with tap water (capacity approximately 200 cm ³), labelled For washing	1	
Container (capacity approximately 400 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

The following stock solutions may be prepared the day before the examination and kept in covered containers.

However, solutions **S1**, **S2**, **S3** and **S4** for candidates (as in the Table 1.1) should be prepared on the day of the examination.

You will need the following stock solutions:

1% starch suspension

This is prepared by putting 1.0g of starch into about 25cm³ of warm distilled water in a beaker or container. Mix to a paste. Make up to 100cm³ with warm distilled water. Heat to boiling for 1 to 2 minutes, stirring well. Allow to cool. This is used in **S2** and to make the 0.2% starch suspension.

0.2% starch suspension

This is prepared by adding 20cm³ of the 1% starch solution to 80cm³ of distilled water and mixing well. This starch concentration is **not** required by the candidates but is needed to prepare the following two concentrations.

0.02% starch suspension

This is prepared by adding 10cm³ of the 0.2% starch solution to 90cm³ of distilled water and mixing well. This is used in **S1** and **S3**.

0.002% starch suspension

This is prepared by adding 10cm³ of the 0.02% starch solution to 90cm³ of distilled water and mixing well. This is used in **S4**.

20% glucose solution

This is prepared by sprinkling 20.0g of glucose into 50cm³ of warm distilled water and making up to 100cm³ with distilled water. This is used in **S4**.

2% glucose solution

This is prepared by adding 10cm³ of the 20% glucose solution to 90cm³ of distilled water and mixing well. This glucose concentration is **not** required by the candidates but is needed to prepare the following concentration.

0.2% glucose solution

This is prepared by adding 10cm³ of the 2% glucose solution to 90cm³ of distilled water and mixing well. This is used in **S1** and **S3**.

(i) **S1**, **S2**, **S3** and **S4** should be made up (on the day of the examination) as in Table 1.1.

Table 1.1

solution	starch suspension/cm ³			glucose solution/cm ³	
	1%	0.02%	0.002%	20%	0.2%
S1		10			10
S2	20				
S3		10			10
S4			10	10	

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

Stock solution: 0.1 mol dm⁻³

This is prepared by putting 8.0 g of potassium iodide in a beaker or container. Add 2 cm³ of distilled water to moisten the potassium iodide. Add 2.5 g of iodine (if necessary, crush to small pieces) to the moist potassium iodide, add 15 cm³ of distilled water and stir well.

When no more iodine dissolves, add another 15 cm³ of distilled water and stir well. Repeat with two more volumes of 15 cm³ of distilled water and then make up to a total volume of 100 cm³.

It is not essential that all the iodine dissolves. This gives a red-brown coloured 0.1 mol dm⁻³ iodine solution.

You **must** dilute this iodine solution to 0.01 mol dm⁻³ and this will form a **yellow/orange** solution.

Prepare a 0.01 mol dm⁻³ solution by taking 10 cm³ of the **0.1 mol dm⁻³ stock solution** of iodine and making up to 100 cm³ with distilled water.

Prepare the 0.01 mol dm⁻³ iodine solution **no more than one hour before** the examination. Keep the solution away from direct sunlight, for example in a brown glass bottle.

Question 2

Each candidate will require:

- (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
- **no** slide must be left on the stage of the microscope.

- (ii) Slide **K1**

On receipt of the slides, please check that they are labelled **K1** and that no slides are broken. The material is **confidential** (so **must not** be disclosed to candidates) and the slides should **not** be viewed in advance of the examination.

The number of slides supplied by Cambridge will be equal to half the candidate entry.

Therefore, half the candidates should start on **Question 2** and the other candidates should start on **Question 1**.

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.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **K1**

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

Immediately after the examination the microscope slides **must** be:

- returned to Cambridge in the containers in which they were received, using the self-adhesive label. The slides must **not** be included in the packet of scripts.

or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. The order form must **not** be included in the packet of scripts.

Slides and boxes will be charged at the rate of £3 per slide plus £1 per box.

If the items are not returned or purchased by the deadline stated on the order form, they will be charged at £3.50 per slide plus £1 per box.

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This form should be completed and sent with the scripts.

SUPERVISOR'S REPORT

May/June 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 normal 'Special Consideration Form' as detailed in the Handbook for Centres.

- 3 During the examination the Supervisor (or other 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 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 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)**