
BIOLOGY

9700/34

Paper 3 Advanced Practical Skills 2

May/June 2018

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 **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.

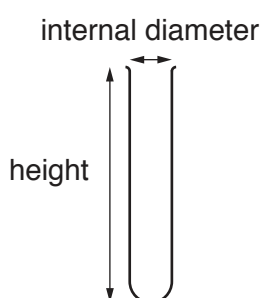
Each candidate must have uninterrupted use of the microscope for at least one hour.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and 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 needles)
- 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 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	✓
[F][MH][HH] 15% ethanol in a beaker or container, labelled E , provided at room temperature (see Preparation of materials)	at least 50 cm ³	
[F][MH][HH] 10% ethanol in a beaker or container, labelled U , provided at room temperature (see Preparation of materials)	at least 20 cm ³	
20% glucose solution in a beaker or container, labelled G , provided at room temperature (see Preparation of materials)	at least 100 cm ³	
Distilled water, in a beaker or container, labelled W , provided at room temperature	at least 100 cm ³	
Beaker, labelled Y , holding 6 test-tubes with 1 g of dried yeast in each test-tube. The test-tubes should be large, capacity 30 cm ³ to 50 cm ³	1 beaker + 6 test-tubes	
Universal Indicator paper, 5 cm lengths in a shallow container, labelled P , provided with a pH colour chart	at least 3 lengths	
10 cm ³ syringes, with the means to wash them out	3	
Beakers or containers, capacity 75 cm ³ to 100 cm ³	5	
Test-tube rack(s), to hold 6 large test-tubes or test-tube rack, to hold 5 test-tubes plus a container to hold 1 large test-tube	1	
Beaker, capacity approximately 400 cm ³ , with water between 50 °C and 60 °C, labelled Hot water The Supervisor may use a thermostatically controlled water-bath to provide additional hot water if requested by candidates	1	
Beaker, capacity approximately 400 cm ³ , with cold water below 30 °C, labelled Cold water	1	
Beaker or container, capacity 400 cm ³ , labelled Water-bath , to act as a water-bath and be large enough to hold 6 large test-tubes	1	
Thermometer, –10 °C to 110 °C	1	
Container, capacity approximately 200 cm ³ , with tap water labelled For washing	1	
Container, capacity approximately 400 cm ³ , labelled For waste	1	
White tile	1	
Paper towels	8	
Glass marker pen (permanent)	1	
Glass rod	1	
Scissors	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

Solution **G** may be prepared the day before the examination and kept in a covered container in a refrigerator.
All the materials should be at room temperature before the start of the examination.

[F][MH][HH] (i) **E**, 15% ethanol

This is prepared by putting 15 cm³ of 99% ethanol into 50 cm³ distilled water. Make up to 100 cm³ with distilled water.

[F][MH][HH] (ii) **U**, 10% ethanol

This is prepared by putting 10 cm³ of 99% ethanol into 50 cm³ distilled water. Make up to 100 cm³ with distilled water.

There should be no naked flames in the room where the examination is carried out.

(iii) **G**, 20% glucose solution

This is prepared by sprinkling 20 g of glucose into 50 cm³ of distilled water, stirring well. Make up to 100 cm³ with distilled water.

Question 2

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
7% yeast in 2% sucrose solution in a beaker or container, labelled Y , provided at room temperature (see Preparation of materials)	at least 20 cm ³	
[HH][MH][N] Methylene blue solution in a beaker or container, labelled M , provided at room temperature and kept out of direct sunlight. This must be prepared as in Preparation of materials .	at least 10 cm ³	
Iodine solution in a beaker or container, labelled I , provided at room temperature and kept out of direct sunlight. This must be prepared as in Preparation of materials .	at least 10 cm ³	
Microscope with an eyepiece graticule fitted into the eyepiece lens (as described on page 2) <ul style="list-style-type: none"> • the microscope must be set up on low power • the slide not be left on the stage of the microscope 	1	
Microscope slides and coverslips	3	
Seeker or mounted needle	1	
Pipette, plastic or glass with teat with the means to wash them out	2	
Container, capacity approximately 100 cm ³ , with tap water, labelled For washing	1	
Container, capacity approximately 100 cm ³ , labelled For waste	1	
Paper towels	8	
Glass marker pen (permanent)	1	

Preparation of materials

- (i) **Y**, 7% yeast suspension in 2% sucrose solution

2% sucrose solution

This is prepared by sprinkling 2g of sucrose, a little at a time, onto the surface of 80 cm³ of distilled water, stirring continuously as you sprinkle. Make up to 100 cm³ with distilled water.

7% yeast suspension in 2% sucrose solution

This should be prepared 30 minutes before the candidates start **Question 2**.

In a large container add 7g of dried yeast to 40 cm³ of warm 2% sucrose solution.

Stir and make up to 100 cm³ with warm sucrose solution. This should be kept for approximately 30 minutes at a temperature between 35 °C and 40 °C.

To help put the 20 cm³ of **Y** into the beaker for each candidate, it is suggested that the yeast suspension is poured into a second beaker, leaving the froth behind.

[HH][MH][N] (ii) M, 0.1% methylene blue solution

Put 0.1 g of methylene blue **[HH][MH][N]** into 80 cm³ of distilled water in a beaker. Make up to 100 cm³ with distilled water.

If any methylene blue comes into contact with your skin wash off immediately with water.

(iii) I, 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 2.5 g of iodine to the potassium iodide and stir well. Make up to 100 cm³ 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 just 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(a)(ii)** and **1(a)(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

There are 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

May/June 2018

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 directly to Cambridge on the normal 'Special Consideration Form' as detailed in the Cambridge Handbook.

- 3 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(a)(ii)** and **1(a)(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 packet, it is essential that **each packet** includes a copy of the:

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

Temperature of examination room °C

Results for **Question 1(a)(ii)** and **1(a)(iii)**