



### 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

**HH** health hazard

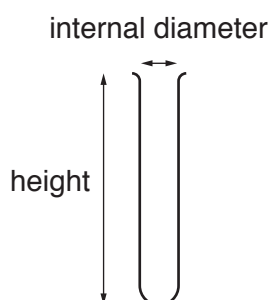
**F** flammable

**N** hazardous to the aquatic environment

**MH** moderate hazard

**T** acutely toxic

**O** oxidising



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                    | ✓ |
|--|-----------------------------|---|
| 10% sucrose solution in a beaker or container, labelled <b>S</b> , provided at room temperature (see <b>Preparation of materials</b> )   | at least 20 cm <sup>3</sup> |   |
| Distilled water in a beaker or container, labelled <b>W</b> , provided at room temperature   | at least 50 cm <sup>3</sup> |   |
| 0.01% potassium manganate(VII) solution in a beaker or container, labelled <b>P</b> , provided at room temperature (see <b>Preparation of materials</b> )  | at least 20 cm <sup>3</sup> |   |
| <b>[MH]</b> 1 mol dm <sup>-3</sup> sulfuric acid in a beaker or container, labelled <b>A</b> , provided at room temperature  | at least 20 cm <sup>3</sup> |   |
| <b>[MH] [HH] [C]</b> 1% invertase solution in a beaker or container, labelled <b>E</b> , provided at room temperature (see <b>Preparation of materials</b> )   | at least 20 cm <sup>3</sup> |   |
| Distilled water in a small test-tube, labelled <b>Z</b>  | at least 4 cm <sup>3</sup>  |   |
| 5 cm <sup>3</sup> syringes, with the means to wash them out  | 2                           |   |
| 2 cm <sup>3</sup> syringe, with the means to wash it out   | 1                           |   |
| 2 cm <sup>3</sup> syringe, labelled <b>E</b> , with the means to wash it out   | 1                           |   |
| Beakers, capacity 50–100 cm <sup>3</sup>   | 5                           |   |
| Test-tubes, small, capacity 20 cm <sup>3</sup> to 30 cm <sup>3</sup>   | 5                           |   |
| Test-tube rack, to hold 6 small test-tubes   | 1                           |   |
| Beaker, capacity approximately 400 cm <sup>3</sup> , with water at 45–50 °C, labelled <b>Hot water</b><br>The Supervisor may use a thermostatically controlled water-bath to provide additional hot water if requested by candidates | 1                           |   |
| Beaker, capacity approximately 400 cm <sup>3</sup> , with cold water below 30 °C, labelled <b>Cold water</b>   | 1                           |   |
| Beaker or container, capacity approximately 400 cm <sup>3</sup> , labelled <b>Water-bath</b> , to act as a water-bath and large enough to hold 5 test-tubes  | 1                           |   |
| Thermometer, –10 °C to 110 °C  | 1                           |   |
| Container, capacity approximately 200 cm <sup>3</sup> , with tap water labelled <b>For washing</b>   | 1                           |   |
| Container, capacity approximately 200 cm <sup>3</sup> , labelled <b>For waste</b>  | 1                           |   |
| White card, approximately 10 cm × 10 cm  | 1                           |   |
| Paper towels   | 8                           |   |
| Glass marker pen (permanent)   | 1                           |   |
| Stop-clock or timer showing seconds  | 1                           |   |
| Suitable eye protection  | 1                           |   |

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

Solutions **S** and **P** may be prepared the day before the examination and kept in a covered container in a refrigerator.  
Solutions **S** and **P** should be at room temperature before the start of the examination.

### Preparation of materials

**(i) S**, 10% sucrose solution

This is prepared by sprinkling 10g of sucrose, a little at a time, onto the surface of 80 cm<sup>3</sup> of warm distilled water, stirring continuously as you sprinkle. Make up to 100 cm<sup>3</sup> with distilled water.

**(ii) P**, 0.01% potassium manganate(VII) solution

This is prepared by dissolving 1 g of potassium manganate(VII) **[O] [MH] [N]** in 100 cm<sup>3</sup> of distilled water. Then take 1 cm<sup>3</sup> of this solution and add to 99 cm<sup>3</sup> of distilled water.

**[MH][HH][C] (iii) E**, 1% invertase solution

This is prepared by adding 1 cm<sup>3</sup> of invertase solution (supplied by Cambridge) to 99 cm<sup>3</sup> of distilled water. Mix well.

### 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
- the slide **must not** be left on the stage of the microscope.

**(ii)** Slide **L1**

On receipt of the slides, please check that they are labelled **L1** 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(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.

## MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide L1
- Invertase solution

## 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 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 direct to Cambridge on the 'Special Consideration Form' as detailed in the Cambridge Handbook.

- 3 During the examination the Supervisor or a competent biologist (not the invigilator) should follow the steps in **Question 1** in order to obtain results for **1(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 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 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)**