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**BIOLOGY**

**9700/35**

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.**

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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.

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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.

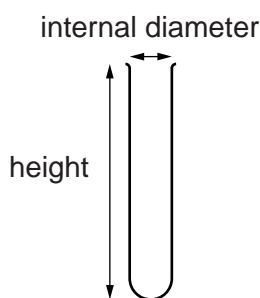
Each candidate must have uninterrupted use of the microscope for at least one hour.

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

<b>C</b> = corrosive	<b>MH</b> = moderate hazard
<b>HH</b> = health hazard	<b>T</b> = acutely toxic
<b>F</b> = flammable	<b>O</b> = oxidising
<b>N</b> = 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](mailto: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 the plant tissue, **P**, must be prepared.

The container should be covered and put in a refrigerator overnight but removed to reach room temperature before the start of the examination.

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 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	✓
Pieces of potato tissue, in tap water, in a beaker or container with a suitable cover to prevent evaporation, labelled <b>P</b> , provided at room temperature (see <b>Preparation of materials</b> )	3 pieces	
<b>[F][HH]</b> 25% ethanol in a beaker or container, labelled <b>E</b> , provided at room temperature (see <b>Preparation of materials</b> ) <i>note: this concentration is intentionally different to that stated in the Question Paper.</i>	at least 40 cm <sup>3</sup>	
<b>[F][HH]</b> 10% ethanol in a beaker or container, labelled <b>U</b> , provided at room temperature (see <b>Preparation of materials</b> ) <i>note: this concentration is intentionally different to that stated in the Question Paper.</i>	at least 15 cm <sup>3</sup>	
Distilled water in a beaker or container, labelled <b>W</b> , provided at room temperature	at least 250 cm <sup>3</sup>	
5 cm <sup>3</sup> syringes with the means to wash them out	2	
Beaker or container, maximum capacity 100 cm <sup>3</sup>	5	
Beaker or container, maximum capacity 100 cm <sup>3</sup> , labelled <b>R</b>	1	
Test-tubes The test-tubes provided must be large enough to allow the pieces of potato to fit.	6	
Test-tube rack to hold 6 test-tubes	1	
Glass rod	1	
White tile or surface for cutting	1	
Knife or sharp blade or scalpel	1	
White card or white paper, approximately 10 cm × 10 cm	1	
Container with tap water (capacity approximately 200 cm <sup>3</sup> ), labelled <b>T</b>	1	
Container with water (capacity approximately 200 cm <sup>3</sup> ), labelled <b>For washing</b>	1	
Container (capacity approximately 400 cm <sup>3</sup> ), labelled <b>For waste</b>	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 plant tissue, **P**, must be prepared the day before the examination and kept covered to prevent evaporation.

The container should be covered and put in a refrigerator overnight but removed to reach **room temperature** before the start of the examination.

- (i) **P**, pieces of plant tissue, in water, in a beaker or container with a suitable cover to prevent evaporation

You may use any variety of the white (or Irish) potato, *Solanum tuberosum*. The potato should be as fresh as possible to avoid the effects of storage.

3 pieces of potato are needed per candidate. However, a candidate can request further samples of potato.

### To prepare the potato

- Remove the outer skin.
- Cut slices of potato 0.5 cm thick e.g. with a large kitchen knife.
- Cut each slice of potato into strips with the same cross-sectional area, 0.5 cm × 0.5 cm. Do **not** use cork borers as this may compress the tissues.
- Cut the potato strips into approximately 5 cm lengths.
- Put the prepared potato into a shallow tray so that the pieces do not overlap and **cover** with freshly prepared 0.1% methylene blue solution.

### To prepare 0.1% methylene blue solution

- Put 0.1 g of methylene blue into 80 cm<sup>3</sup> of distilled water in a beaker and make up to 100 cm<sup>3</sup> with distilled water.

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

### On the day of the examination prepare the potato pieces as follows:

- Pour off the methylene blue solution
- Add tap water to cover the pieces
- Pour off the water and then add fresh tap water
- Repeat four times
- Add enough fresh tap water to cover 3 pieces of the potato ready to put out for the candidate in a beaker or container, labelled **P**. The tap water in **P** may still be blue
- Cover to prevent evaporation.

### [F][HH] (ii) **E**, 25% ethanol

This is prepared by putting 25 cm<sup>3</sup> of 99% ethanol into 50 cm<sup>3</sup> distilled water then making up to 100 cm<sup>3</sup> with distilled water.

### [F][HH] (iii) **U**, 10% ethanol

This is prepared by putting 10 cm<sup>3</sup> of 99% ethanol into 50 cm<sup>3</sup> distilled water then making up to 100 cm<sup>3</sup> with distilled water.

**Question 2**

Each candidate will require:

**(i) 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**.

**(ii) Microscope (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.

## 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

- 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 and £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

**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(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 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).

Temperature of examination room ..... °C

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

