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**BIOLOGY**

**9700/34**

Paper 3 Advanced Practical Skills 2

**October/November 2019**

CONFIDENTIAL INSTRUCTIONS



**This document gives details of how to prepare for and administer the practical exam.**

**The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.**

**The supervisor must complete the report at the end of this document and return it with the scripts.**

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If you have any queries regarding these confidential instructions, contact Cambridge International stating the centre number, the syllabus and component number and the nature of the query.

email info@cambridgeinternational.org  
phone +44 1223 553554  
fax +44 1223 553558

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This document consists of **9** printed pages and **3** blank pages.

## General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

### Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

The following hazard codes are used in these confidential instructions, 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		

Hazard data sheets relating to substances used in this exam should be available from your chemical supplier.

### Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

### During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

### After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
  - the scripts of the candidates specified on the barcode label provided
  - the supervisor's results relevant to these candidates
  - the supervisor's reports relevant to these candidates
  - seating plans for each practical session, referring to each candidate by candidate number
  - the attendance register.

## Specific information for this practical exam

During the exam, the supervisor or other competent biologist (**not** the invigilator) should obtain the results specified on the supervisor's report by following the relevant steps in the question paper. The results should be recorded in the space provided on the supervisor's report.

### Organisation of the exam

- Half the candidates should start on Question 1 and the other candidates should start on Question 2.
- For Question 2, each candidate must have uninterrupted use of a microscope for at least 55 minutes.

### Materials to be supplied by Cambridge International

- Slide **M1**

On receipt of the slides, check that they are labelled **M1** and that no slides are broken. The slides should not be viewed in advance of the exam. The material on the slides is confidential and must not be disclosed to candidates.

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

### Return of slides to Cambridge International

Immediately after the exam, the slides must be:

- returned to Cambridge International in the boxes in which they were received, using the self-adhesive label supplied. 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 International. The order form must **not** be included in the packet of scripts. Slides and boxes will be charged at the rate of £3.25 per slide plus £1 per box.

If the slides are not returned or purchased by the deadline stated on the order form, the charge will be £3.75 per slide plus £1 per box.

### Materials and apparatus for Question 1

Each candidate will need:

materials and apparatus for each candidate	quantity	✓
Small beaker, labelled <b>B</b> , containing 3 potato cylinders stained with 0.1% methylene blue and covered by distilled water, provided at room temperature (see <b>Preparation of materials</b> )	1	
pH2 buffer solution, in a beaker or container, labelled <b>P2</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
pH3 buffer solution, in a beaker or container, labelled <b>P3</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
pH4 buffer solution, in a beaker or container, labelled <b>P4</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
pH5 buffer solution, in a beaker or container, labelled <b>P5</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
pH6 buffer solution, in a beaker or container, labelled <b>P6</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
pH2 buffer solution, in a beaker or container, labelled <b>PU</b> , provided at room temperature (see <b>Preparation of materials</b> )	at least 25 cm <sup>3</sup>	
Distilled water, in a beaker or container, labelled <b>W</b> , provided at room temperature	at least 200 cm <sup>3</sup>	
10 cm <sup>3</sup> syringe, with the means to wash it out	1	
Test-tubes, small, capacity 20–30 cm <sup>3</sup> Test-tubes provided to a candidate must all have the same dimensions	12	
Test-tube racks to hold 6 test-tubes	2	
Bung or cork to fit test-tubes	1	
Glass rod	1	
White card, approximately 10 cm × 10 cm	1	
Forceps, blunt	1	
Ruler, mm	1	
Scalpel or single-edged blade	1	
White tile or cutting surface	1	
Container, with approximately 200 cm <sup>3</sup> of tap water, labelled <b>For washing</b>	1	
Container, capacity at least 250 cm <sup>3</sup> , labelled <b>For waste</b>	1	
Paper towels	10	
Glass marker pen, permanent	1	
Stop-clock or timer, showing seconds	1	
Suitable eye protection	1	

## Preparation of materials

The potato cylinders **must** be prepared the day before the exam and left to soak in 0.1% methylene blue solution overnight.

The buffer solutions, **P2, P3, P4, P5, P6, PU** can be prepared the day before the exam. They should be kept covered in a refrigerator overnight.

**P2, P3, P4, P5, P6, PU** and the **potato cylinders** should be at room temperature before the start of the exam.

- **P2/PU, P3, P4, P5, P6** buffer solutions at approximately pH2, pH3, pH4, pH5 and pH6.

The buffers should be prepared using the following stock solutions:

### 1 dm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> citric acid

This is prepared by putting 21.0g of citric acid monohydrate (C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>•H<sub>2</sub>O) [**MH**] in 500 cm<sup>3</sup> of distilled water and making up to 1 dm<sup>3</sup> with distilled water. Mix well.

### 1 dm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sodium citrate

This is prepared by putting 29.4g of sodium citrate dihydrate (C<sub>6</sub>H<sub>5</sub>O<sub>7</sub>Na<sub>3</sub>•2H<sub>2</sub>O) in 500 cm<sup>3</sup> of distilled water and making up to 1 dm<sup>3</sup> with distilled water. Mix well.

Then 100 cm<sup>3</sup> of each buffer can be prepared as in the table below:

pH	0.1 mol dm <sup>-3</sup> citric acid /cm <sup>3</sup>	0.1 mol dm <sup>-3</sup> sodium citrate /cm <sup>3</sup>	distilled water /cm <sup>3</sup>
2.0	50.0	0.0	50
3.0	46.4	3.6	50
4.0	33.0	17.0	50
5.0	20.6	29.4	50
6.0	10.0	40.0	50

- **0.1% methylene blue solution**

This is prepared by putting 0.1 g of methylene blue into 80 cm<sup>3</sup> of distilled water in a beaker and making 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.

- **B, potato cylinders**

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 potato cylinders are needed per candidate. However, a candidate can request more.

The potato cylinders are prepared the day before the exam and as described on page 6.

**The day before the exam:**

- Remove the outer skin from the potatoes.
- Use a cork borer to produce cylinders of potato that are approximately 8–10 mm in diameter.
- Cut the potato cylinders into lengths of 4–5 cm. Each candidate should be given 3 potato cylinders of **different** lengths.
- Put the potato cylinders into a container so that the pieces do not overlap and cover with freshly prepared 0.1% methylene blue solution.
- Leave to soak overnight.

**On the day of the exam:**

- Pour off the methylene blue solution.
- Add tap water to cover the potato cylinders.
- Pour off the water and then add fresh tap water.
- Repeat four times.
- For each candidate put 3 potato cylinders (of different length) into a beaker labelled **B**.
- Add enough fresh tap water to cover the 3 potato cylinders. The tap water in **B** may become blue.

## Materials and apparatus for Question 2

Each candidate will need:

materials and apparatus for each candidate	quantity	✓
Microscope with: <ul style="list-style-type: none"> <li>● an eyepiece lens, <math>\times 10</math> magnification</li> <li>● a low-power objective lens, <math>\times 10</math> magnification</li> <li>● a high-power objective lens, <math>\times 40</math> magnification</li> <li>● an eyepiece graticule fitted into the eyepiece lens</li> </ul>	1 between 2	
Slide <b>M1</b>	1 between 2	

### Preparation of materials

- Microscope

Any lenses which are **not**  $\times 10$  or  $\times 40$  should be removed or replaced.

The eyepiece graticule must be visible and in focus at the same time as the specimen.

For each candidate:

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

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**Supervisor's report**

Syllabus and component number

9	7	0	0	/	3	4
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Centre number

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Centre name .....

Time of the practical session .....

Laboratory name/number .....

**Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).**

You must include:

- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

Temperature of exam room.....°C

Results for Question 1(a)(iv)

Results for Question 1(a)(v)

### Declaration

- 1 Each packet that I am returning to Cambridge International contains the following items:
  - the scripts of the candidates specified on the barcode label provided
  - the supervisor's results relevant to these candidates
  - the supervisor's reports relevant to these candidates
  - seating plans for each practical session, referring to each candidate by candidate number
  - the attendance register
- 2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.
- 3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.
- 4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed ..... (supervisor)

Name (in block capitals) .....