Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **October/November 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 problems 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 **8** printed pages.

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CAMBRIDGE International Examinations

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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, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- low-power objective lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- high-power objective lens, ×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** ×10 or ×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

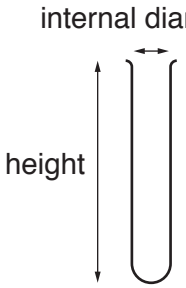
F flammable

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	✓
pH3 buffer, in a beaker or container, labelled **B3**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
pH4 buffer, in a beaker or container, labelled **B4**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
pH5 buffer, in a beaker or container, labelled **B5**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
pH6 buffer, in a beaker or container, labelled **B6**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
pH3.5 buffer, in a beaker or container, labelled **BU**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
10% yeast suspension, in a beaker or container, labelled **Y**, provided at room temperature (see **Preparation of materials**)	at least 50 cm^3	
0.001 mol dm^{-3} calcium chloride solution, in a beaker or container, labelled **C**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
10 cm^3 syringes, with the means to wash them out	2	
1 cm^3 syringe, with the means to wash it out	1	
Test-tubes, small, capacity 20–30 cm^3 These must have the same dimensions, per candidate	5	
Test-tube rack to hold 5 test-tubes	1	
Bung or cork to fit test-tubes	1	
Glass rod	1	
Graph paper scale Strip of graph paper, with **2 mm** divisions and at least 2 cm wide and at least the height of the test-tubes provided (see **Preparation of materials**)	1	
Container with tap water, capacity approximately 200 cm^3, labelled **For washing**	1	
Container, capacity approximately 200 cm^3, labelled **For waste**	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.

Preparation of materials

The buffers, **B3**, **B4**, **B5**, **B6**, **BU**, and solution **C** may be prepared the day before the examination. They should be kept covered in a refrigerator and should be at room temperature before the start of the examination.

(i) **B3**, **B4**, **B5**, **B6**, **BU**, buffers at pH3, pH4, pH5, pH6 and pH3.5

The buffers should be prepared using the following stock solutions:

1 dm^3 of 0.1 mol dm^{-3} citric acid
This is prepared by putting 21.0 g of citric acid monohydrate, $C_6H_8O_7.H_2O$ **[MH]** in 500 cm^3 of distilled water and making up to 1 dm^3 with distilled water. Mix well.

1 dm^3 of 0.1 mol dm^{-3} sodium citrate
This is prepared by putting 29.4 g of trisodium citrate dihydrate, $C_6H_5O_7Na_3.2H_2O$ in 500 cm^3 of distilled water and making up to 1 dm^3 with distilled water. Mix well.

Then 100 cm^3 of each buffer can be prepared as in the table below:

pH	0.1 mol dm^{-3} citric acid / cm^3	0.1 mol dm^{-3} sodium citrate / cm^3	distilled water / cm^3
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
3.5	40.0	10.0	50

(ii) **Y**, 10% yeast suspension

This is prepared by putting 10 g of dried yeast (baker's) into a beaker and making up to 100 cm^3 with distilled water. Mix well.

(iii) **C**, 0.001 mol dm^{-3} calcium chloride solution

This is prepared by putting 1 g of calcium chloride ($CaCl_2$) **[MH]** in 500 cm^3 of distilled water in a beaker and making up to 1 dm^3 with distilled water. This is the stock solution of 0.01 mol dm^{-3}.

Put 10 cm^3 of the stock solution into a beaker and make up to 100 cm^3 with distilled water.

(iv) Graph paper scale

This may be prepared by sticking an A4 sheet of 2 mm graph paper onto a piece of card. From this, for each candidate, cut a piece at least 20 mm in width and at least the same height of the test-tube being used.

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 **J1**

On receipt of the slides, please check that they are labelled **J1** 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)(iv)** and **1(a)(v)**. 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 seating plan should be enclosed with each packet of scripts.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **J1**

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.

This form should be completed and sent with the scripts

SUPERVISOR'S REPORT

October/November 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 '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)(iv)** and **1(a)(v)**. 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).

[Turn over

Temperature of examination room ..... °C

Results for **Questions 1(a)(iv)** and **1(a)(v)**