Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 2019**

CONFIDENTIAL INSTRUCTIONS

3230519219

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.

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.

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

DC (KS) 156352/4

Cambridge Assessment International Education

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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:

C	corrosive	**MH**	moderate hazard
HH	health hazard	**T**	acutely toxic
F	flammable	**O**	oxidising
N	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 needed for the supervisor's report by following the relevant steps in the question paper. The results should be recorded in 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 used of a microscope for at least 55 minutes.

Materials to be supplied by Cambridge International

- Slide **J1**

  On receipt of the slides, check that they are labelled **J1** and that no slides are broken. The slides must **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	✓
[HH] plant extract solution in a beaker or container, labelled **E**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
[MH] 1% hydrogen peroxide solution in a beaker or container, labelled **H**, provided at room temperature (see **Preparation of materials**)	at least 25 cm^3	
[O] [MH] [N] 1% potassium manganate(VII) solution in a beaker or container, labelled **P**, provided at room temperature (see **Preparation of materials**)	at least 50 cm^3	
[MH] 1 mol dm^{-3} sulfuric acid in a beaker or container, labelled **A**, provided at room temperature	at least 25 cm^3	
pH 3 buffer in a beaker or container, labelled **B3**, provided at room temperature (see **Preparation of materials**)	at least 10 cm^3	
pH 4 buffer in a beaker or container, labelled **B4**, provided at room temperature (see **Preparation of materials**)	at least 10 cm^3	
pH 5 buffer in a beaker or container, labelled **B5**, provided at room temperature (see **Preparation of materials**)	at least 10 cm^3	
pH 6 buffer in a beaker or container, labelled **B6**, provided at room temperature (see **Preparation of materials**)	at least 10 cm^3	
pH 7 buffer in a beaker or container, labelled **B7**, provided at room temperature (see **Preparation of materials**)	at least 10 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 50 cm^3	
2 cm^3 or 3 cm^3 syringe, labelled **P**, with the means to wash it out	1	
2 cm^3 or 3 cm^3 syringes, with the means to wash them out	3	
Beakers or containers, capacity 50–100 cm^3	6	
Glass rod	1	
White tile	1	
Container with approximately 200 cm^3 of tap water, 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	

Preparation of materials

The mung beans must be germinated 2 days **before** the examination.
Pre-test the plant extract in advance of the examination in case you need to replace the mung beans.

Solutions **P**, **A** and the buffers **B3**, **B4**, **B5**, **B6** and **B7**, may be prepared the day before the examination. They should be kept in covered containers in a refrigerator.

P, **A**, **B3**, **B4**, **B5**, **B6** and **B7** should be at room temperature before the start of the examination.

[HH]● **E**, plant extract solution

Soak the mung beans for approximately 24 hours in tap water.

Put the soaked mung beans onto damp paper towels in a tray, in a dark cupboard for approximately 24 hours to allow them to start to germinate.

On the day of the exam prepare the plant extract solution by using 10 g of germinated mung beans:

- Put approximately 10 g of germinated mung beans into a container with 100 cm^3 of water and liquidise.
- Strain the mixture through a fine sieve or muslin and keep the liquid plant extract solution. This may contain small pieces of plant material.
- This should produce at least 80 cm^3 of plant extract solution.

Pre-test for E:

- Put 1 cm^3 of **E** into a test-tube.
- Put 1 cm^3 of **H** into the same test-tube.
- Bubbles should appear within 30 seconds. If the bubbles take longer than 30 seconds, **either** increase the mass of mung beans **or** replace the mung beans.

[MH]● **H**, 1% hydrogen peroxide solution

This is prepared on the day of the examination. Put 20 cm^3 of 6% (20 vol) hydrogen peroxide into 100 cm^3 of distilled water. This gives a total volume of 120 cm^3.

[O] ● [MH] [N] **P**, 1% potassium manganate(VII) solution

This is prepared by putting 1 g of potassium manganate(VII) into 80 cm^3 of distilled water in a beaker and making up to 100 cm^3 with distilled water. Mix well.

- **B3**, **B4**, **B5**, **B6**, buffers at pH3, pH4, pH5 and pH6

  The buffers are 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 ($C_6H_8O_7 \cdot H_2O$) **[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 ($C_6H_5O_7Na_3 \cdot 2H_2O$) 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:

buffer	pH	0.1 mol dm^{-3} citric acid /cm^3	0.1 mol dm^{-3} sodium citrate /cm^3	distilled water /cm^3
B3	3.0	46.4	3.6	50
B4	4.0	33.0	17.0	50
B5	5.0	20.6	29.4	50
B6	6.0	10.0	40.0	50

- **B7**, buffer at pH7

  This buffer is prepared using the following stock solutions:

  1 dm^3 of 0.1 mol dm^{-3} sodium hydroxide
  This is prepared by putting 4.0 g of sodium hydroxide **[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} potassium dihydrogen phosphate
  This is prepared by putting 13.6 g of potassium dihydrogen phosphate (KH_2PO_4) **[MH]** in 500 cm^3 of distilled water and making up to 1 dm^3 with distilled water. Mix well.

  Then 100 cm^3 of pH7 buffer can be prepared as in the table below:

buffer	pH	0.1 mol dm^{-3} sodium hydroxide/cm^3	0.1 mol dm^{-3} potassium dihydrogen phosphate/cm^3	distilled water/cm^3
B7	7.0	18.5	31.5	50

Materials and apparatus for Question 2

Each candidate will need:

materials and apparatus for each candidate	quantity	✓
Microscope with: ● an eyepiece lens, ×10 magnification ● a low-power objective lens, ×10 magnification ● a high-power objective lens, ×40 magnification ● an eyepiece graticule fitted into the eyepiece lens	1 between 2	
Slide **J1**	1 between 2	

Preparation of materials

- Microscope

  Any lenses which are **not** ×10 or ×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	1
Centre number							

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.

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Temperature of examination room ..... °C

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

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) .....