



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY

9700/34

Advanced Practical Skills 2

May/June 2011

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 or queries regarding these Instructions, please contact CIE
by e-mail: International@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.

This document consists of **8** printed 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.** Centres are reminded that candidates are expected to follow the instructions on the question paper and record all their results. They will not be penalised if these results are not what they expect.

The Supervisor should make sure the Supervisor's report is fully completed and a copy is enclosed with each packet of scripts.

If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Supervisor's Report.

Candidates must be provided with a microscope with:

- Low-power objective lens, e.g. $\times 10$ (equal to 16 mm or $\frac{2}{3}$ ")
- High-power objective lens, e.g. $\times 40$ (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.

Each candidate must have sole, uninterrupted, use of the microscope for at least 55 minutes.

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.

C = corrosive substance

H = harmful or irritating substance

T = toxic substance

F = highly flammable substance

O = oxidising substance

N = harmful to environment

Centres are reminded that they are **not** permitted to open the question paper envelopes before the examination. Centres are also referred to the Handbook for Centres, and in particular Section 3.1.2 (c) (i), Security of Question Papers and Examination Materials, as well as 3.3.11.1, Practical Examinations in Science Subjects.

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 to international@cie.org.uk, by fax to +44 1223 553558 or by phone to +44 1223 553554.

Confidential Instructions

Each candidate should have a **mm ruler** for use in both questions.

Each candidate will require

Question 1

Fresh S1, S2, S3, and S4 and reagents are needed for each candidate.

More of the solutions should be available if requested by candidates.

Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe.

Summary of solutions and reagents

| labelled | contents | hazard | concentration / % | volume / cm ³ |
|----------------------------------|---|----------------------|---|--------------------------|
| S1 | tap water | none | – | at least 20 |
| S2 | starch solution | none | 0.1 | at least 20 |
| S3 | sucrose solution see instructions | none | 2.0 | at least 20 |
| S4 | mixture of starch and glucose solutions | none | 10 cm ³ of each of 0.1% starch and 2% glucose solution | at least 20 |
| Benedict's solution | Benedict's solution | [H] harmful irritant | – | at least 60 |
| iodine | iodine in potassium iodide solution | [H] irritant | – | at least 10 |
| hydrochloric acid | hydrochloric acid | [H] irritant | 1 mol dm ⁻³ | at least 20 |
| sodium hydrogen carbonate | sodium hydrogen carbonate | none | see instructions | see instructions |
| Biuret | see instructions | [H] harmful irritant | see instructions | see instructions |

It is advisable to wear safety glasses/goggles when handling chemicals.

Preparation of solutions and reagents

(i) **S1**, at least 20 cm³ of tap water in a beaker or container, labelled **S1**.

(ii) **S2**, at least 20 cm³ of 0.1% starch solution in a beaker or container, labelled **S2**.

This is prepared by putting 1 g of starch into about 5 cm³ of warm distilled water in a beaker or container and mix to a paste. Make up to 100 cm³ with boiling distilled water, mix and then allow to cool.

Put 10 cm³ of this 1.0% starch solution in a beaker or container and make up to 100 cm³ with distilled water.

This makes a 0.1% starch solution required by candidates.

This makes sufficient for 4 candidates.

(iii) **S3**, at least 20 cm³ of 2% sucrose solution in a beaker or container, labelled **S3**.

This is prepared by dissolving 2 g of sucrose in 50 cm³ of distilled water in a beaker or container. Make up to 100 cm³ with distilled water.

This is sufficient for 4 candidates.

Before the examination the test with the sucrose solution should give a negative result for reducing sugar. Analar sucrose should be used if available. Some types of granulated table sugar may also be suitable.

- (iv) **S4**, at least 20 cm³ of a mixture of 10 cm³ of 0.1% starch made up as for **S2** and 10 cm³ of 2% glucose solution in a beaker or container, labelled **S4**.

2% glucose solution is prepared by dissolving 2 g of glucose in 50 cm³ of distilled water into a beaker or container and mix well. Make up to 100 cm³ with distilled water.

This is sufficient for 4 candidates.

Candidates will require enough of the following reagents to carry out approximately 8 to 10 tests with each reagent.

- [H] (v) **Benedict's solution**, at least 60 cm³ of Benedict's solution, in a beaker or container, labelled **Benedict's solution**. This should be qualitative Benedict's solution as provided by your supplier or made up by the technician. Please note it is important to use hydrated copper sulphate crystals when making up the Benedict's solution.
- [H] (vi) **Iodine**, in potassium iodide solution, at least 20 cm³ provided in a bottle with a pipette (teat), labelled **iodine**.
- [H] (vii) **Hydrochloric acid**, at least 20 cm³ of 1 mol dm⁻³ HCl, in a bottle with a teat pipette, labelled **hydrochloric acid**.
- (viii) **Sodium hydrogen carbonate** (bicarbonate) or alternative which candidates normally use in the test for non-reducing sugars, in a suitable container, labelled accordingly, with the means to add it to large test-tubes for example a spatula or syringe.
- [H] (ix) **Biuret reagent**, or the reagents which candidates normally use to test for proteins, in suitable containers, labelled accordingly.

Apparatus for each candidate

| Apparatus | Quantity | ✓ |
|---|----------|---|
| 10 cm ³ syringe or one with the means to wash it out | 2 | |
| 2 cm ³ or 5 cm ³ syringe | 1 | |
| Spatula | 1 | |
| Container with tap water, labelled For washing | 1 | |
| Container, labelled For waste | 1 | |
| Paper towels | 4 | |
| Spotting tile or white tile | 1 | |
| Glass rod or dropping pipette (teat) | 1 | |
| Test-tubes – large suitable for heating | 4 | |
| Test-tube holder – suitable to handle hot, large test-tubes | 1 | |
| Test-tube rack or container to hold four large test-tubes | 1 | |
| Water-bath equipment Bunsen burner, tripod, gauze, bench mat, at least a 400 cm ³ beaker with water suitable for a water bath (at approximately 40–45 °C), matches and a thermometer –10 °C to 110 °C | 1 | |
| Stop clock, stop watch or sight of a clock with a second hand | 1 | |
| Glass marker pen | 1 | |
| Safety goggles/glasses | 1 | |

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's report (**not** on a spare Question paper) which should be enclosed with the candidates' scripts. Please ensure that if the scripts are in several packets that a copy of the Supervisor's report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

Question 2

Summary of solutions and reagents

| labelled | contents | hazard | concentration | volume / cm ³ |
|----------|-----------|--------|---------------|--|
| water | tap water | none | – | at least 25 in a bottle with a dropping pipette (teat) |

| labelled | contents | hazard | details | quantity |
|----------|----------|--------|--|---|
| P | rhubarb | none | rhubarb may be canned fresh material needs to be boiled to soften it. | one 2 cm to 3 cm length in a shallow container covered in water |

Apparatus for each candidate

| Apparatus | Quantity | ✓ |
|---|----------|---|
| clean microscope slides | 2 | |
| glass cover slips – for example 2 cm by 1 cm | 2 | |
| dropping pipette (teat) | 1 | |
| mounted needle or seeker or other means to position cover slip on slide | 1 | |
| forceps | 1 | |
| container, labelled For waste | 1 | |
| paper towels | 4 | |
| Microscope with: <ul style="list-style-type: none"> • Low-power objective lens, e.g. × 10 (equal to 16 mm or $\frac{2}{3}$") • High-power objective lens, e.g. × 40 (equal to 4 mm or $\frac{1}{6}$") • Eyepiece graticule (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen or the eyepiece graticule provided by the Centre. Centres are advised to keep these for future use as they will not be supplied in 2012. | 1 | |

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- (i) Question papers
- (ii) Eyepiece graticule – if the Centre has its own eyepiece graticules these can be used.

note: no slide is required.

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

There is no material to return to Cambridge.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form in these Confidential Instructions. For Centres where more than one script package is used, there must be a copy of the completed Report Form in each script package.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script package.

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This form should be completed and sent to the Examiner with the scripts.

REPORT ON PRACTICAL BIOLOGY

A Level

May/June Session 2011

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 CIE on the normal 'Special Consideration Form' as detailed in Part 6 of the Handbook for Centres.

3. During the examination, the Supervisor should, **out of sight of the candidates**, carry out **Question 1**, using the same solutions and reagents as the candidates. These results should be written in the Supervisor's report 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. The invigilator should **not** carry out **Question 1**.



Results for Question 1:

- 4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session on a separate piece of paper.

Declaration (to be signed by the Principal)

The preparation of this practical examination has been carried out so as to maintain fully the security of the examination.

Signed

Name (in block capitals)

Centre number (of enclosed scripts)

Centre name

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

