



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

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**BIOLOGY**

**9700/31**

Paper 31 Advanced Practical Skills

**May/June 2010**

**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: 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.

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This document consists of 7 printed pages and 1 blank page.



### 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.**

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 sort out, it is essential for Centres to contact the Product Manager as soon as possible by e-mail to [international@cie.org.uk](mailto:international@cie.org.uk), by fax to +44 1223 553558 or by phone to +44 1223 553554.

**Confidential Instructions**

Each candidate will require

**Question 1**

**Fresh Z, E, S, A and P 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.**

(i) **Z**, one test-tube with 9 cm<sup>3</sup> of distilled water, labelled **Z**.

(ii) **E**, at least 30 cm<sup>3</sup> of 1% invertase solution, in a small beaker or container, labelled **E**.

This is prepared by adding 1 cm<sup>3</sup> of invertase solution (supplied by Cambridge) to 99 cm<sup>3</sup> of distilled water and stirring thoroughly.

(iii) **S**, at least 40 cm<sup>3</sup> of 10% sucrose solution, in a small beaker or container, labelled **S**.

This is prepared by dissolving 10 g of sucrose in 75 cm<sup>3</sup> of distilled water and making up to 100 cm<sup>3</sup> with distilled water.

[H] [C] (iv) **A**, at least 20 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> sulfuric acid, in a small beaker or container, labelled **A**.

This is prepared from (98%) sulfuric acid by adding 55 cm<sup>3</sup> of the sulfuric acid to 500 cm<sup>3</sup> of distilled water and making up to 1 dm<sup>3</sup> with distilled water

This is an exothermic reaction, **add the acid to the water**.

[H] (v) **P**, at least 20 cm<sup>3</sup> of 0.01% potassium permanganate, in a small beaker or container, labelled **P**.

This is prepared by dissolving 1.0 g of potassium permanganate in 100 cm<sup>3</sup> of distilled water. Then take 1 cm<sup>3</sup> of this solution and add to 99 cm<sup>3</sup> of distilled water.

Sulfuric acid is **harmful** and **corrosive**, potassium permanganate is **harmful** and should be disposed of with care to the environment.

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

**E, S and P** can be made up the day before the examination and stored in a refrigerator.

However, these must be at room temperature for the examination.

Apparatus

(i) Two 10 cm<sup>3</sup> syringes or one with the means to wash it out.

(ii) Three 2 cm<sup>3</sup> or 5 cm<sup>3</sup> syringes or one with the means to wash it out.

(iii) Container with tap water, labelled **For washing**.

- (iv) Five test-tubes.
- (v) Test-tube rack or container to hold at least five test-tubes.
- (vi) One 100 cm<sup>3</sup> beaker.
- (vii) Glass rod.
- (viii) A sheet of white paper.
- (ix) Stop clock, stop watch or sight of a clock with a second hand.
- (x) Glass marker pen.
- (xi) Safety goggles/glasses.

The Supervisor should, **out of the sight of the candidates**, carry out **Question 1** and write the **results** in the Supervisor's report 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

- (i) Slide **J1** (supplied by Cambridge)
- (ii) 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 (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen.

On receipt of the slides, please check that they are labelled **J1** and that all slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

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

The number of slides supplied by Cambridge will be equal to half the candidate entry. Therefore, half of the candidates should start **Question 1** and the other half should start on **Question 2**.

**MATERIALS TO BE SUPPLIED BY CAMBRIDGE**

- (i) Question papers
- (ii) Invertase
- (iii) Slide J1
- (iv) Eyepiece graticule

**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. They must **not** be included in the package of scripts.

Or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. They must **not** be included in the package 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.

**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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- 3. The Supervisor should, **out of sight of the candidates**, carry out **Question 1** and write the **results** in the Supervisor's report 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**.

- 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 .....

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**.

