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

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills **May/June 2007**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given 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@ucles.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 **6** printed pages and **2** blank pages.

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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**.

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. × 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 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

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

T = toxic 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, Dr Rick Nelms, 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.

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Confidential Instructions

Each candidate must be supplied with the following apparatus and materials.

Question 1

Candidates are expected to carry out an investigation into enzyme inhibition using amylase and lead nitrate.

Each candidate will require:

[H] **(i)** 20 cm^3 of iodine in potassium iodide solution, labelled **iodine**. The usual formulation used in the centre for starch-testing will be suitable. This can be made up well in advance of the examination.

[H] **(ii)** 50 cm^3 of 1% amylase solution, labelled **S3**. This should be made up by dissolving 1 cm^3 of the amylase solution supplied by CIE in 80 cm^3 of water and then making up to 100 cm^3. This should be tested to ensure that 1 cm^3 will remove all of the starch from 4 cm^3 of 1% starch solution in less than 5 minutes. This can be kept in a refrigerator overnight but should be at room temperature at the start of the examination.

If this is **not** successful, please use locally available amylase (this may be obtained as a liquid or as a powder (for powder, use 1 g made up to 100 cm^3 using distilled water). If this also fails, as an emergency replacement **only**, please use amylase extracted from germinating bean seeds (germinate 100 bean seeds for several days, and then liquidise with a small volume of water and filter through coarse cloth or muslin – the liquid filtrate is the amylase solution – it will vary in activity so testing will be required to find an appropriate concentration).

[T, O, N] **(iii)** 100 cm^3 of 1% lead nitrate solution, labelled **S1 (Toxic)**. This should be prepared by dissolving 1 g of lead nitrate in 80 cm^3 of distilled water and then making up to 100 cm^3. This can be made up several days before the examination.

(iv) 100 cm^3 of 1% starch suspension, labelled **S2**. This should be made up by mixing 1 g of very fine starch powder with a little distilled water, which should then be made up to 80 cm^3 with boiling distilled water. The mixture should be stirred thoroughly and allowed to cool. When cool it should be made up to 100 cm^3 with cold distilled water. This must be made up freshly for each examination session.

(v) 6 test-tubes with rack and means of washing test-tubes.

(vi) 10 cm^3 syringe and means of washing it.

(vii) Syringe for measuring 1 cm^3 and 5 cm^3 and means of washing it.

(viii) Water bath or beaker, Bunsen or other burner, tripod and gauze.

(ix) Glass marker pen or wax pencil or small labels and pencil.

(x) White tile.

(xi) Glass rod.

(xii) Sight of a clock with second hand or stop-watch or stop-clock.

(xiii) 20 cm^3 of distilled water, labelled **distilled water**.

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Question 2

Each candidate will require:

(i) Slide **T1** (from Cambridge).

(ii) Transparent ruler to measure to an accuracy of 1 mm.

(iii) A microscope with:

- 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 (from Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen.

MATERIALS TO BE SUPPLIED BY CIE

(i) Question papers.

(ii) Slide **T1** (question 2, shared between two candidates).

(iii) Graticule scale for use as an eyepiece graticule

(iv) Amylase enzyme (non-animal origin) (question 1).

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

Immediately after the examination, microscope slides **must** be returned to CIE in the containers in which they were received, using the self-adhesive label for the parcel. They must **not** be included in the parcel of scripts. It may be possible to buy the slides, in which case an order form will be enclosed with the slides, and should be returned to CIE using the self-adhesive label for the letter. Slides and containers not returned in good condition will be charged at a rate of £4 per item to which may be added administrative costs.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form attached to these instructions. For Centres where more than one script envelope is used, there must be a copy of the complete Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible. The Report Form should always be completed by every Centre. Please include information relevant to all candidates, and also to individual candidates.

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

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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 2007

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.

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3. 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. The space below can be used for this, or it may be on separate 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**.

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Candidates must be provided with a microscope with:

- Low-power objective lens, e.g. × 10 (equal to 16 mm or $\frac{2}{3}$″)
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- Eyepiece graticule fitted within the eyepiece and visible in focus at the same time as the specimen.

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Question 1

Candidates will be expected to carry out a simple test for reducing sugar using Benedict's solution.

Each candidate will require:

(i) 5 cm^3 of a 0.2% glucose solution, coloured yellow with 1 drop of food dye, labelled **F1**. This should be prepared by dissolving 0.2 g of glucose in 80 cm^3 of distilled water, adding 1 drop of yellow food colouring, then making up to 100 cm^3. This can be made up the day before the examination.

(ii) 50 cm^3 of 0.8% glucose solution, labelled **F2**. This should be prepared by dissolving 0.8 g of glucose in 80 cm^3 of distilled water and then making up to 100 cm^3. This can be made up the day before the examination.

(iii) 20 cm^3 of Benedict's solution, labelled **Benedict's solution**. The usual formulation used in the centre for reducing sugar testing will be suitable. This can be made up well in advance of the examination.

(iv) A beaker containing 50 cm^3 of distilled water, labelled **distilled water**.

(v) 5 cm^3 syringe and means of washing it.

(vi) Test-tube rack with six test-tubes and means of washing them.

(vii) Water-bath or means of heating water e.g. beaker, Bunsen or other burner, tripod and gauze.

(viii) Glass marker pen or wax pencil or small labels and pencil.

(ix) Measuring cylinder or means of measuring volumes of solutions.

(x) Transparent ruler with mm scale.

(xi) Sight of a clock with a second hand or stop-clock or stop-watch.

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Question 2

Each candidate will require:

(i) A microscope slide, labelled **R1** (from Cambridge).

(ii) A stage micrometer scale supplied by Cambridge, attached to a microscope slide with self-adhesive transparent tape as described in the instructions supplied with the scale.

(iii) A microscope with:

- 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 (from Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen.

MATERIALS TO BE SUPPLIED BY CIE

(i) Question papers.

(ii) Slide **R1** (question 2, shared between two candidates).

(iii) Two graticule scales and instructions for their use, one as an eyepiece graticule, the other as a stage micrometer.

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