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

BIOLOGY **9700/31**

Advanced Practical Skills 1 **October/November 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.

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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.

This document consists of **8** printed 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, Security of Question Papers and Examination Materials, as well as 3.4.1, Practical Examinations in Science Syllabuses.

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Confidential Instructions

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

Each candidate will require:

Question 1

- Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe. More of the solutions should be available if requested by candidates.
- Fresh **E**, **S**, **P** and **W** are needed for each candidate.
- All solutions and reagents should be disposed of according to local safety regulations.

Summary of solutions and reagents:

labelled	contents	hazard	percentage concentration	volume / cm^3
E	urease solution	[H] irritant	10	at least 25
S	urea solution	[H] irritant	0.1	at least 25
P	phenolphthalein indicator solution	[H] irritant	0.1	at least 20
W	distilled water	none	–	at least 100

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

Preparation of solutions and reagents:

[H] (i) **E**, at least 25 cm^3 of urease solution in a beaker or container, labelled **E**.
Stir the stock solution before providing a fresh sample for each candidate.

This is prepared by dissolving 3 crushed tablets of urease (tablets supplied by Cambridge) in a beaker with 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.

100 cm^3 of **E** is sufficient for 4 candidates.

[S] (ii) **S**, at least 25 cm^3 of 0.1% urea solution in a beaker or container, labelled **S**.

This is prepared by dissolving 0.1 g of urea (supplied by Cambridge) in 80 cm^3 of distilled water in a beaker or container and mixing thoroughly. Make up to 100 cm^3 with distilled water.

100 cm^3 of **S** is sufficient for 4 candidates.

[H] (iii) **P**, at least 20 cm^3 of 0.1% phenolphthalein indicator made up as below, in a beaker or container, labelled **P**.

This is prepared by dissolving 0.1 g of phenolphthalein in 60 cm^3 of ethanol (industrial methylated spirits) in a beaker or container and mixing well. Make up to 100 cm^3 with distilled water.

100 cm^3 of **P** is sufficient for 5 candidates.

(iv) **W**, at least 100 cm^3 of distilled water in a beaker or container, labelled **W**.

100 cm^3 of **W** is sufficient for 1 candidate.

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Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out	2	
1 cm^3 or 2 cm^3 syringe with the means to wash it out	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or Petri dishes or containers to hold 20 cm^3 volume	5	
Test-tubes	5	
Test-tube rack or container to hold 5 test-tubes	1	
White card or paper or tile	1	
Glass rod	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. 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**.

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Question 2

(i) Slide **J1** (supplied by Cambridge).

(ii) 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 (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen. **Centres are advised to keep these for future use as they will not be supplied in 2012.**

On receipt of the slides, please check that they are labelled **J1** and that all the 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 on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Urea powder

(iii) Urease tablets

(iv) Slide **J1**

(v) Eyepiece graticule – if the Centre has its own eyepiece graticules these can be used.

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 packet 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 packet 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.

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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 packet is used, there must be a copy of the completed 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 and should always be completed by every Centre.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November 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 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 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**.

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[Turn over

Results for Question 1:

Temperature of examination room = ...°C

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. Separate paper can be used for this.

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**.

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

BIOLOGY **9700/33**

Advanced Practical Skills 1 **October/November 2011**

CONFIDENTIAL INSTRUCTIONS

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- 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.

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Confidential Instructions

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

Each candidate will require:

Question 1

- Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe. More of the solutions should be available if requested by candidates.
- Fresh **K**, **C**, **M**, **U** and **W** are needed for each candidate.
- All solutions and reagents should be disposed of according to local safety regulations.

Summary of solutions and reagents:

labelled	contents	hazard	percentage concentration	volume / cm^3
K	potassium hydroxide solution	[H] harmful irritant [C] corrosive	5	at least 20
C	copper sulfate solution	[H] harmful	0.15	at least 20
M	milk	none	50	at least 20
U	milk	none	20	at least 10
W	distilled water	none	–	at least 120

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

Preparation of solutions and reagents:

[H] [C] (i) **K**, at least 20 cm^3 of 5% potassium hydroxide solution in a beaker or container, labelled **K**. This is prepared by dissolving 5.0 g of potassium hydroxide into 80 cm^3 distilled water and making up to 100 cm^3 with distilled water.
You are advised to wear safety glasses or goggles especially when using the potassium hydroxide, **K**. If potassium hydroxide, **K**, comes into contact with your skin then wash off with plenty of cold water.

100 cm^3 of **K** is sufficient for 5 candidates.

[H] (ii) **C**, at least 20 cm^3 of 0.15% copper sulfate solution in a beaker or container, labelled **C**. This is prepared by dissolving 0.15 g of copper sulfate pentahydrate ($CuSO_4.5H_2O$) in 80 cm^3 distilled water and making up to 100 cm^3 with distilled water. You must not use anhydrous copper sulfate.

100 cm^3 of **C** is sufficient for 5 candidates.

(iii) **M**, at least 20 cm^3 of milk in a beaker or container, labelled **M**.

This is prepared by dissolving 50 g of dried skimmed milk powder in 80 cm^3 distilled water and making up to 100 cm^3 with distilled water. Stir thoroughly.
(100 g of the dried skimmed milk powder should contain at least 34 g of protein, e.g. “Marvel” contains 36 g of protein.)

M will be a thick liquid.

100 cm^3 of **M** is sufficient for 5 candidates.

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(iv) **U**, at least 10 cm^3 of milk in a beaker or container, labelled **U**.

This is prepared by dissolving 20 g of dried skimmed milk powder in 80 cm^3 distilled water and making up to 100 cm^3 with distilled water. Stir thoroughly.

100 cm^3 of **U** is sufficient for 10 candidates.

(v) **W**, at least 120 cm^3 of distilled water in a beaker or container, labelled **W**.

120 cm^3 of **W** is sufficient for 1 candidate.

Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe – must have two	2	
2 cm^3, 3 cm^3 or 5 cm^3 syringe – must have two	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or containers to hold 20 cm^3 volume	5	
Test-tubes	7	
Test-tube rack(s) or container(s) to hold 7 test-tubes	1	
Glass rod	1	
White card or paper or tile	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. 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**.

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Question 2

(i) Slide **K1** (supplied by Cambridge).

(ii) 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 (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen. **Centres are advised to keep these for future use as they will not be supplied in 2012.**

On receipt of the slides, please check that they are labelled **K1** and that all the 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 on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Slide **K1**

(iii) Eyepiece graticule – if the Centre has its own eyepiece graticules these may be used.

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

Immediately after the examination the microscope slides **must** be:

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Or

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REPORT ON PRACTICAL BIOLOGY

A Level

October/November Session 2011

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[Turn over

*Results for question **1***.

Temperature of examination room = ... °C

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. Use separate paper for this.

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 .....

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

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 2011**

CONFIDENTIAL INSTRUCTIONS

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International Examinations

[Turn over

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Candidates must be provided with a microscope with:

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

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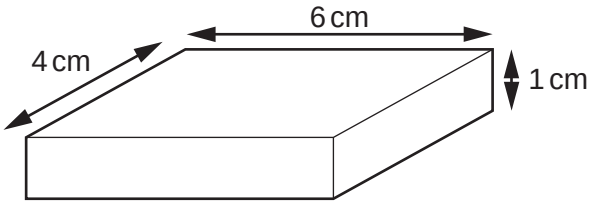
Each candidate will require:

Question 1

- Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe.
- More of solution **H** and agar blocks should be available if requested by candidates.
- Fresh **H** and **A** is needed for each candidate.
- All solutions and reagents should be disposed of according to local safety regulations.

Summary of solutions and reagents:

labelled	contents	hazard	concentration / mol dm^{-3}	volume / cm^3
H	hydrochloric acid	[H] irritant	0.25	60 or enough to give a depth of 1.5 cm in the shallow container provided

labelled	contents	hazard	details	quantity
A	agar block	[C] corrosive [H] irritant	one block at least 6 cm × 4 cm of 1 cm depth  containing 0.01 mol dm^{-3} sodium hydroxide and an indicator, see instructions.	1

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

Preparation of solutions and reagents

[H] (i) **H**, at least 60 cm^3 or enough to give a depth of 1.5 cm in the shallow container provided, of dilute hydrochloric acid (0.25 mol dm^{-3}) in a beaker or container, labelled **H**.

[H], [C] (ii) **A**, one block of agar, containing 0.01 mol dm^{-3} sodium hydroxide and universal indicator, on a white tile or chopping board, labelled **A**.

You are reminded that this contains sodium hydroxide so do not touch the reagents or the agar blocks.

0.01 mol dm^{-3} sodium hydroxide is prepared by dissolving 0.2 g of sodium hydroxide in 100 cm^3 distilled water and making up to 500 cm^3 with distilled water. Add 15 g of agar ('technical' **not** 'nutrient') to 500 cm^3 of 0.01 mol dm^{-3} sodium hydroxide and boil to dissolve the agar. Remove from the heat.
5 cm^3 of universal indicator is added to 500 cm^3 of the hot agar to produce a blue-green colour.

Pour the agar into shallow, flat containers that are at least 1 cm in depth. Keep the agar in cool conditions in order to set firmly. These containers must be placed on a horizontal flat surface so that the agar sets to an even depth of 1 cm.
It is **essential** that the agar does not dry out after it has set. To prevent drying out the containers may be wrapped in a plastic bag or similar.
Just before the examination, cut the agar into blocks measuring at least 6 cm × 4 cm × 1 cm. Cut enough blocks so that each candidate has 1 block at least 6 cm × 4 cm × 1 cm, on a white tile or chopping board, covered by a damp paper towel, labelled **A**.

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Apparatus for each candidate:

Apparatus	**Quantity**	✓
Container, labelled **For waste**	1	
Paper towels	8	
400 cm^3 beaker or clear container of similar size	1	
White tile or chopping board with agar block covered with damp paper towel	1	
Ruler in mm	1	
Sharp blade or scalpel or knife	1	
Blunt forceps	1	
Stop clock, stop watch or sight of a clock with a second hand	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. 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**.

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Question 2

(i) Slide **M1** (supplied by Cambridge)

(ii) 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 (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen. **Centres are advised to keep these for future use as they will not be supplied in 2012**.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Slide **M1**

(iii) Eyepiece graticule – if the Centre has its own eyepiece graticules these can be used.

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

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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 packet 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

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November 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**.

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[Turn over

*Results of Question **1***.

Temperature of examination room = ... °C

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. Use separate paper for this.

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**.

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

BIOLOGY **9700/35**

Advanced Practical Skills 1 **October/November 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.

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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.

This document consists of **8** printed 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, Security of Question Papers and Examination Materials, as well as 3.4.1, Practical Examinations in Science Syllabuses.

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.

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Confidential Instructions

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

Each candidate will require:

Question 1

- Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe. More of the solutions should be available if requested by candidates.
- Fresh **E**, **S**, Benedict's solution, **W** and **V** are needed for each candidate.
- All solutions and reagents should be disposed of according to local safety regulations.

Summary of solutions and reagents:

labelled	contents	hazard	concentration	volume / cm^3
E	invertase solution	[H] irritant	5%	at least 15
S	sucrose solution	none	1 mol dm^{-3}	at least 15
Benedict's solution	Benedict's solution	[H] harmful irritant	–	at least 60
W	distilled water	none	–	at least 200

labelled	contents	hazard	details	quantity
V	Visking (dialysis) tubing (or use animal intestines)	none	20 cm in length and with a diameter to fit a large test-tube and submerged in distilled water	1

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

Preparation of solutions and reagents:

[H] **(i)** **E**, at least 15 cm^3 of 5% invertase solution, in a small beaker or container, labelled **E**.
This is prepared by dissolving 5 cm^3 of invertase solution (supplied by Cambridge) in 80 cm^3 of distilled water and stirring thoroughly. Make up to 100 cm^3 with distilled water.

100 cm^3 of **E** is sufficient for 6 candidates.

(ii) **S**, at least 15 cm^3 of 1 mol dm^{-3} sucrose solution, in a beaker or container, labelled **S**.
This is prepared by dissolving 34 g of sucrose in 80 cm^3 of distilled water and stirring thoroughly. Make up to 100 cm^3 with distilled water.

100 cm^3 of **S** is sufficient for 6 candidates.

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

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[H] (iii) **Benedict's solution**, at least 60 cm^3 of Benedict's solution, in a beaker or container, labelled **Benedict's**.

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 copper sulfate pentahydrate ($CuSO_4.5H_2O$) crystals when making up the Benedict's solution. You must not use anhydrous copper sulfate.

60 cm^3 of **Benedict's solution** is sufficient for 1 candidate.

(iv) **W**, at least 200 cm^3 of distilled water in a beaker or container, labelled **W**.

200 cm^3 of **W** is sufficient for 1 candidate.

(v) **V**, at least 20 cm of Visking tubing with a diameter to fit a large test-tube submerged in distilled water, in a beaker or container, labelled **V**. Animal intestines are a suitable alternative to Visking tubing.
A few extra pieces should be available on request.

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Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out	1	
2 cm^3, 3 cm^3 or 5 cm^3 syringe with the means to wash it out	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Small containers to hold 30 cm^3 volume	5	
Beakers or containers which should have water with a temperature of at least 50 °C and be able to hold 5 large test-tubes. Label next to one beaker for **Benedict's test (step 2)** and the other beaker **for reaction (step 3)**	2	
Test-tubes – small, to hold more than 20 cm^3 and suitable for heating	5	
Test-tubes – large, to hold more than 40 cm^3	5	
Test-tube rack or container to hold 5 test-tubes	1	
Test-tube holder to hold hot test-tubes	1	
Water-bath equipment (note: candidates must set up their own water-bath) Bunsen burner, tripod, gauze, bench mat, matches and a thermometer –10 °C to 110 °C	1	
White card or paper or tile	1	
Blunt forceps	1	
Scissors	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. 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**.

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Question 2

(i) Slide **L1** (supplied by Cambridge)
(ii) 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 (supplied by Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen. **Centres are advised to keep these for future use as they will not be supplied in 2012.**

On receipt of the slides, please check that they are labelled **L1** and that all the 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 on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Invertase solution

(iii) Slide **L1**

(iv) Eyepiece graticule – if the Centre has its own eyepiece graticules these may be used.

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 packet 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 packet 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 packet is used, there must be a copy of the completed Report Form in each script packet.

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REPORT ON PRACTICAL BIOLOGY

A Level

October/November 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.

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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**.

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*Results of Question **1***

Temperature of examination room = ...°C

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. Separate paper can be used for this.

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**.

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

BIOLOGY **9700/36**

Advanced Practical Skills 2 **October/November 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.

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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.

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

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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

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Confidential Instructions

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

Each candidate will require:

Question 1

- Solutions and reagents provided to the candidates should be supplied in a suitable beaker, or container, for removal of the solution using a syringe. More of the solutions should be available if requested by candidates.
- Fresh **E**, **S**, **U**, Benedict's solution and **W** are needed for each candidate.
- All solutions and reagents should be disposed of according to local safety regulations.

Summary of solutions and reagents:

labelled	contents	hazard	percentage concentration	volume / cm^3
E	invertase solution	[H] irritant	5	at least 25
S	sucrose solution	none	10	at least 25
U	sucrose solution	none	3	at least 10
Benedict's solution	Benedict's solution	[H] harmful irritant	–	at least 60
W	distilled water	none	–	at least 150

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

Preparation of solutions and reagents:

[H] **(i)** **E**, at least 25 cm^3 of 5% invertase solution, in a small beaker or container, labelled **E**. This is prepared by dissolving 5 cm^3 of invertase solution (supplied by Cambridge) in 80 cm^3 of distilled water and stirring thoroughly. Make up to 100 cm^3 with distilled water.

100 cm^3 of **E** is sufficient for 4 candidates.

(ii) **S**, at least 25 cm^3 of 10% sucrose solution, in a beaker or container, labelled **S**.

This is prepared by dissolving 10 g of sucrose in 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.

100 cm^3 of **S** is sufficient for 4 candidates.

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

(iii) **U**, at least 10 cm^3 of 3% sucrose solution, in a beaker or container, labelled **U**. This is prepared by dissolving 3 g of sucrose in 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.

100 cm^3 of **U** is sufficient for 10 candidates.

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[H] (iv) **Benedict's solution**, at least 60 cm^3 of Benedict's solution, in a beaker or container, labelled **Benedict's**.

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 copper sulfate pentahydrate ($CuSO_4.5H_2O$) crystals when making up the Benedict's solution. You must not use anhydrous copper sulfate.

60 cm^3 of **Benedict's solution** is sufficient for 1 candidate.

(v) **W**, at least 150 cm^3 of distilled water in a beaker or container, labelled **W**.

Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out	2	
2 cm^3, 3 cm^3 or 5 cm^3 syringe with the means to wash it out	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or containers to hold 20 cm^3 volume	5	
Beakers or containers which should have water with a temperature of at least 50 °C and be able to hold 7 test-tubes. Label next to one beaker **for Benedict's test (step 2)** and the other beaker **for reaction (step 7)**	2	
Test-tubes	7	
Test-tube rack(s) or container(s) to hold 7 test-tubes	1	
Test-tube holder to hold hot test-tubes	1	
Water-bath equipment (note: candidates must set up their own water-bath) Bunsen burner, tripod, gauze, bench mat, matches and a thermometer –10 °C to 110 °C	1	
White card or paper or tile	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. 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**.

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Question 2

(i) Slide **N1** (supplied by Cambridge).

(ii) 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 (supplied from Cambridge) fitted within the eyepiece and visible in focus at the same time as the specimen. **Centres are advised to keep these for future use as they will not be supplied in 2012.**

On receipt of the slides, please check that they are labelled **N1** and that all the 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 on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Invertase solution

(iii) Slide **N1**

(iv) Eyepiece graticule – if the Centre has its own eyepiece graticules these may be used.

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 packet 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 packet 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 packet is used, there must be a copy of the completed Report Form in each script packet.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November 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 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. 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**.

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[Turn over

*Results of Question **1***

Temperature of examination room = ...°C

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. Separate paper can be used for this.

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**.

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