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

BIOLOGY **9700/31**

Advanced Practical Skills 1 **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.

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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

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.

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Confidential Instructions

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

Each candidate will require

Question 1

Fresh E, S, C, W and iodine 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.
Fresh test-tubes and syringes are needed for each candidate.

Summary of solutions and reagents

labelled	contents	hazard	concentration / %	volume / cm^3
E	bacterial amylase	[H] irritant	1	at least 10
S	starch solution	none	1	at least 50
C	copper sulfate solution	[H] irritant [H] harmful	0.03	at least 20
W	distilled water	none	–	at least 100
iodine	iodine in potassium iodide solution	[H] irritant	10	at least 50

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

Preparation of solutions and reagents

[H] (i) **E**, at least 10 cm^3 of 1% bacterial amylase solution (supplied by Cambridge) in a beaker or container, labelled **E**.

This is prepared by putting 1 cm^3 of bacterial amylase in a beaker and making up to 100 cm^3 with distilled water.
This is sufficient for 9 candidates.

(ii) **S**, at least 50 cm^3 of 1% starch solution in a beaker or container, labelled **S**.

This is prepared by putting 1 g of starch into about 25 cm^3 of warm distilled water in a beaker or container and mix to a paste. Make up to 100 cm^3 with boiling distilled water, mix well and then allow to cool.
This is sufficient for 2 candidates.

[H] (iii) **C**, at least 20 cm^3 of 0.03 % copper sulfate solution in a beaker or container, labelled **C**.

This is prepared by dissolving 3.0 g of copper sulfate into 50 cm^3 of distilled water in a beaker or container and making up to 100 cm^3 with distilled water.
This makes a 3% copper sulfate solution.

Put 1 cm^3 of this 3% copper sulfate solution in a beaker or container and make up to 100 cm^3 with distilled water.
This makes the 0.03% copper sulfate solution required by candidates.

This is sufficient for 5 candidates.

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

[H] (v) **iodine**, at least 50 cm^3 iodine in potassium iodide solution in a bottle or container with a pipette (teat), labelled **iodine**.

Apparatus for each candidate

Apparatus	Quantity	✓
10 cm^3 syringe with the means to wash it out (fresh/clean for each candidate)	1	
2 cm^3 or 5 cm^3 syringe with the means to wash it out (fresh/clean for each candidate)	1	
2 cm^3 or 5 cm^3 syringe, labelled **For copper sulfate**	1	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Petri dishes or small containers to hold 20 cm^3 volume	4	
Test-tubes (fresh/clean for each candidate)	5	
Test-tube rack	1	
Spotting tile or white tile (with space for 12 separate drops and labels)	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. 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. × 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**.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Bacterial amylase solution

(iii) Slide **J1**

(iv) 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 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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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**.

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[Turn over

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**.

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

BIOLOGY **9700/32**

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.

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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

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.

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Confidential Instructions

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

Each candidate will require

Question 1

Fresh G, W, S1, S2 and Benedict's 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
G	glucose solution	none	4	at least 30
S1	glucose solution	none	1.5	at least 15
S2	glucose solution	none	0.1	at least 15
W	distilled water	none	–	at least 100
Benedict's solution	Benedict's solution	[H] harmful irritant	–	at least 50

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

Preparation of solutions and reagents

(i) **G**, at least 30 cm^3 of 4% glucose solution in a small beaker or container, labelled **G**.

This is prepared by dissolving 4 g of glucose in a beaker or container with 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.
This is sufficient for 3 candidates.

(ii) **S1**, at least 15 cm^3 of 1.5% glucose solution in a small beaker or container, labelled **S1**.

This is prepared by dissolving 1.5 g of glucose in a beaker or container with 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.
This is sufficient for 6 candidates.

(iii) **S2**, at least 15 cm^3 of 0.1% glucose solution in a small beaker or container, labelled **S2**.

This is prepared by dissolving 0.1 g of glucose in a beaker or container with 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.
This is sufficient for 6 candidates.

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

[H] (v) **Benedict's solution**, at least 50 cm^3 of Benedict's solution, in a small beaker or container (so that a 10 cm^3 syringe can be used), labelled **Benedict's solution**.

These solutions can be made up the day before the examination and stored in a refrigerator. However, these must be at room temperature for the examination.

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Apparatus for each candidate

Apparatus	Quantity	✓
10 cm^3 syringe or one with the means to wash it out	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	4	
Beakers or containers to hold 20 cm^3 volume	5	
Test-tubes – large suitable for heating	7	
Test-tube holder to handle hot test-tubes	1	
Test-tube rack or containers to hold at least seven 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

There are no requirements for this question.

Question 3

(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 3**.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Slide **L1**

(iii) 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 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

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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:

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(b) accidents to apparatus or materials;

(c) assistance provided in case of colour-blindness;

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[Turn over

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 .....

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General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/33**

Advanced Practical Skills 1 **May/June 2011**

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Instructions for preparing apparatus

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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. × 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.

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Confidential Instructions

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

Each candidate will require

Question 1

Fresh E, W, U and red litmus paper are needed for each candidate.
More of the solutions and red litmus paper 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.

labelled	contents	hazard	concentration / %	volume / cm^3
E	urease solution	[H] irritant	10	at least 25
W	distilled water	none	–	at least 100
U	urea solution	[H] irritant	10	at least 25

labelled	contents	hazard	details	quantity
red litmus paper	–	–	total length of about 5 cm	1 strip

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 10 % urease solution in a beaker or container, labelled **E**.

This is prepared by dissolving 3 crushed tablets of urease (tablets supplied by Cambridge) in a beaker with 50 cm^3 of distilled water and making up to 100 cm^3 with distilled water.
This is sufficient for 4 candidates.

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

[H] (iii) **U**, at least 25 cm^3 of 10% urea solution in a beaker or container, labelled **U**.

This is prepared by putting 10 g of urea (supplied by Cambridge) into about 80 cm^3 of distilled water in a beaker or container and mix well. Make up to 100 cm^3 with distilled water.
This is sufficient for 4 candidates.

Before the examination, test the activity of the enzyme by mixing 2 cm^3 of urea with 2 cm^3 of urease in a test-tube. Add a small piece of red litmus paper to the mixture and time how long it takes for the paper to change to blue. If this is longer than 5 minutes then increase the concentration of the urea to 15 g in 100 cm^3 of distilled water. If the 15% urea solution is used candidates do not need to be informed of the change.

(iv) One 5 cm strip of red litmus paper. More strips should be available.

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Apparatus for each candidate

Apparatus	Quantity	✓
10 cm^3 syringe or one with the means to wash it out	2	
5 cm^3 syringe with the means to wash it out	1	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	4	
Petri dishes or shallow containers to hold 20 cm^3 volume	5	
Test-tubes	6	
Test-tube rack or containers to hold at least six test-tubes	1	
Glass rod	1	
White tile or paper or card	1	
Ruler in mm	1	
Scissors to cut litmus paper	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

(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 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**.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Urea powder

(iii) Urease tablets

(iv) Slide **K1**

(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 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

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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**.

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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 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 .....

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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 **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.

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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.** 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. × 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 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

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 cm^3 of tap water in a beaker or container, labelled **S1**.

(ii) **S2**, at least 20 cm^3 of 0.1% starch solution in a beaker or container, labelled **S2**.

This is prepared by putting 1 g of starch into about 5 cm^3 of warm distilled water in a beaker or container and mix to a paste. Make up to 100 cm^3 with boiling distilled water, mix and then allow to cool.
Put 10 cm^3 of this 1.0% starch solution in a beaker or container and make up to 100 cm^3 with distilled water.
This makes a 0.1% starch solution required by candidates.
This makes sufficient for 4 candidates.

(iii) **S3**, at least 20 cm^3 of 2% sucrose solution in a beaker or container, labelled **S3**.

This is prepared by dissolving 2 g of sucrose in 50 cm^3 of distilled water in a beaker or container. Make up to 100 cm^3 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.

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(iv) **S4**, at least 20 cm^3 of a mixture of 10 cm^3 of 0.1% starch made up as for **S2** and 10 cm^3 of 2% glucose solution in a beaker or container, labelled **S4**.

2% glucose solution is prepared by dissolving 2 g of glucose in 50 cm^3 of distilled water into a beaker or container and mix well. Make up to 100 cm^3 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 cm^3 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 cm^3 provided in a bottle with a pipette (teat), labelled **iodine**.

[H](vii) **Hydrochloric acid**, at least 20 cm^3 of 1 mol dm^{-3} HC*l*, 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	

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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: • 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.

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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

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REPORT ON PRACTICAL BIOLOGY

A Level

May/June Session 2011

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1. Was any difficulty experienced in providing the necessary materials? If so, give brief details.

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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) .....

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General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/35**

Advanced Practical Skills 1 **May/June 2011**

CONFIDENTIAL INSTRUCTIONS

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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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Confidential Instructions

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

Each candidate will require

Question 1

Fresh E, W, P and water for washing both plant material and apparatus 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
E	ethanol	[F] flammable	25	at least 40
W	distilled water	none	–	at least 100

labelled	contents	hazard	details	quantity
P	plant tissue	none	see instructions	3
methylene blue	used to stain plant tissue	stains	0.01	–

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

Preparation of solutions and reagents

[F] **(i)** **E**, at least 40 cm^3 of 25.0% ethanol in a beaker or container with a suitable cover to prevent evaporation, labelled **E**.

This is made by taking 25 cm^3 of 99% ethanol and making it up to 100 cm^3 with distilled water. The actual concentration of the ethanol is 25% but the concentration is intentionally stated on the examination paper as 10%.

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

(iii) **P**, three pieces of plant tissue in a beaker or container, with enough tap water to cover the plant tissue, labelled **P**.

Plant tissue must be prepared the day before the examination.
Suitable plant tissue is white potato (e.g. Irish) or sweet potato or cassava.
The plant tissue should be as fresh as possible. The plant tissue should not have been stored or refrigerated for a long period of time.

The outer skin should be removed.

Each piece should have the same cross-sectional area, 0.5 cm × 0.5 cm and be at least 5 cm in length.

Slices of plant tissue can be cut with a large kitchen knife and strips produced using a scalpel. Please do not use cork borers as this may compress the tissues.

The test-tubes provided must be large enough to allow the pieces to fit.

Put the prepared plant tissue into a shallow tray so that the pieces do not overlap and cover with 0.01% methylene blue solution.

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This is prepared by dissolving 0.1 g of methylene blue in 80 cm^3 of distilled water in a beaker or container and making up to 100 cm^3 with distilled water. This makes 0.1% methylene blue solution.

Put 10 cm^3 of this 0.1% methylene blue solution into a beaker or container and make up to 100 cm^3 with distilled water. This makes 0.01% methylene blue solution.

If any methylene blue comes into contact with your skin wash off immediately with water.

Before the examination wash the pieces of plant tissue and put them into a beaker or container with tap water. Rinse the plant tissue by pouring out the water and then adding fresh tap water. Repeat four times. Add enough tap water to cover the plant tissue ready to put out for the candidate in a container, labelled **P**.

Apparatus for each candidate

Apparatus	Quantity	✓
10 cm^3 syringes or one with the means to wash it out	2	
Container with tap water, labelled **For washing plant tissue**	1	
Container with tap water, labelled **For washing apparatus**	1	
Container, labelled **For waste**	1	
Paper towels	4	
Beakers or containers, to hold 20 cm^3	5	
Test-tubes	6	
Bung or cork to fit test-tubes	1	
Test-tube rack or container to hold 6 test-tubes	1	
Ruler, mm	1	
White tile or cutting board	1	
Scalpel or sharp blade	1	
Blunt forceps	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**.

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Question 2

Summary of solutions and reagents

labelled	contents	hazard	concentration / %	volume / cm^3
iodine	iodine in potassium iodide solution	[H] irritant	–	at least 25

labelled	contents	hazard	details	quantity
banana	banana	none	green/unripe **(ripe bananas are not suitable)**	One 2 cm to 3 cm slice wrapped in a damp paper towel. See instructions.

[H] **(i)** **Iodine**, iodine in potassium iodide solution in a bottle or container, with a pipette (teat), labelled **iodine**.

(ii) Just **before** the start of **Question 2**, the Invigilator cuts the unpeeled banana, across its width, into at least 2 cm width slices and puts one slice onto a damp paper towel for each candidate.

Apparatus for each candidate

Apparatus	Quantity	✓
clean microscope slides	2	
glass cover slips e.g. 2 cm × 1 cm	2	
mounted needle or seeker or other means to position cover slip on slide	1	
white tile	1	
container, labelled **For waste**	1	
paper towels	2	
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 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.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

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

note: no slide is required.

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REPORT FORM

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REPORT ON PRACTICAL BIOLOGY

A Level

May/June Session 2011

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2. Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:

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(b) accidents to apparatus or materials;

(c) assistance provided in case of colour-blindness;

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[Turn over

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 .....

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