Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 2016**

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: info@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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CAMBRIDGE International Examinations

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.**

Candidates must be provided with a microscope with:

- Eyepiece lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
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- High-power objective lens, ×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.

To avoid confusion, Cambridge request that only the lenses specified above are fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

Each candidate must have sole, uninterrupted, use of the microscope for at least one hour.

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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The following codes are used where relevant.

C = corrosive

HH = health hazard

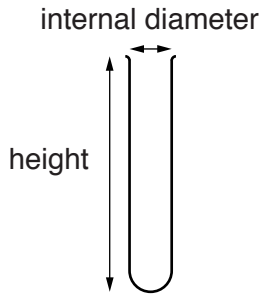
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N = hazardous to the aquatic environment

MH = moderate hazard

T = acutely toxic

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When small test-tubes are provided, it is expected that these are approximately 150 mm in height.

If other dimensions of apparatus are required, these will be specified in the Apparatus list.

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Confidential Instructions

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For both Questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker, or container, for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

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

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

Solutions should be disposed of in accordance with local safety regulations.

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[Turn over

Question 1

Each candidate will require:

apparatus and solutions for each candidate	quantity	✓
Visking tubing in a beaker or container (capacity approximately 250 cm^3), in at least 100 cm^3 of distilled water, labelled **V** *A few extra pieces should be available on request*	one at least 15 cm in length	
Paperclip	1	
20% glucose solution in a beaker or container, labelled **S**, provided at room temperature (see Preparation of solutions)	at least 25 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 250 cm^3	
0.3% glucose solution in a beaker or container, labelled **G**, provided at room temperature (see Preparation of solutions) *Please note that this is intentionally not the same as the concentration stated on the Question Paper*	at least 60 cm^3	
Benedict's solution in a beaker or container, labelled **Benedict's**	at least 50 cm^3	
10 cm^3 syringes with the means to wash them out	2	
Beaker or container, to hold approximately 100 cm^3, labelled **A**	1	
Beakers or containers, to hold approximately 50 cm^3	5	
Test-tubes, small	6	
Test-tube rack(s) to hold 6 test-tubes or a test-tube rack to hold 5 test-tubes plus a container to hold 1 test-tube	1	
Test-tube holder to hold hot test-tubes	1	
Bunsen burner, tripod, gauze, bench mat	1	
Beaker (capacity approximately 300 cm^3), with water at approximately 45 °C – 50 °C, suitable for a water-bath *The Supervisor may use a thermostatically controlled water-bath to provide the water at 45 °C – 50 °C for candidates*	1	
Thermometer, –10 °C to 110 °C	1	
Glass rod	1	
Container with tap water (approximately 200 cm^3), labelled **For washing**	1	
Container (capacity approximately 400 cm^3), labelled **For waste**	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

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It is advisable to wear suitable eye protection when handling chemicals.

Preparation of solutions

S and **G** can be prepared the day before the examination. They should be kept in covered containers in a refrigerator. They must be provided to candidates at room temperature.

(i) **S**, 20% glucose solution

This is prepared by sprinkling 20 g of anhydrous glucose, a little at a time, onto the surface of 80 cm^3 of distilled water, stirring continuously as you sprinkle. Make up to 100 cm^3 with distilled water.

(ii) **G**, 0.3% glucose solution

This is prepared by firstly making a 3% glucose solution.
Sprinkle 3 g of anhydrous glucose, a little at a time, onto the surface of 80 cm^3 of distilled water, stirring continuously as you sprinkle. Make up to 100 cm^3 with distilled water.

Then put 10 cm^3 of **this** glucose solution (3%) into a beaker or container and make up to 100 cm^3 with distilled water, this makes the 0.3% required by candidates.

The Question Paper states a different concentration for **G**. This is intentional to help candidates.

Question 2

Each candidate will require:

(i) Slide **J1**

On receipt of the slides, please check that they are labelled **J1** and that no slides are broken. The material is **confidential** (so **must not** be disclosed to candidates) and the slides should **not** be viewed in advance of the examination.

The number of slides supplied by Cambridge will be equal to half the candidate entry.

Therefore, half the candidates should start on **Question 2** and the other candidates should start on **Question 1**.

(ii) Microscope (as described on page 2)

For each candidate:
- the microscope **must** be set up on low power
- the slide must **not** be left on the stage of the microscope.

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SUPERVISOR'S REPORT

The Supervisor's Report is essential in order to allow the Examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

During the examination, the Supervisor or other competent biologist (not the Invigilator) should follow the steps in **Question 1** in order to obtain results for **1(a)(iii)** and **1(a)(v)**.

The Supervisor should use the same solutions as those provided to the candidates and **work out of the sight of the candidates**.

These results should be written in the Supervisor's Report, **not** on a spare Question Paper.

SEATING PLAN

Provide a **seating plan** of work benches, on separate paper, giving details of the places occupied by the candidates for **each question** using each candidate's number.

The Supervisor's Report and the candidates' seating plan should be enclosed with each packet of scripts.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **J1**

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. The slides 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. The order form 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.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

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SUPERVISOR'S REPORT

May/June 2016

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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;

(d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.

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4 Enclose a **seating plan** of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for **each question**.

Declaration (to be signed by the Principal or the Examinations Officer)

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

Signed .....

Name (in block capitals) .....

Centre number (of enclosed scripts) .....

Centre name .....

If scripts are despatched in more than one envelope, it is essential that **each envelope** includes a copy of the:

- relevant Supervisor's Report
- appropriate seating plan(s).

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[Turn over

Temperature of examination room .....°C

Results for **Question 1(a)(iii) and 1(a)(v)**

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BIOLOGY **9700/32**

Paper 3 Advanced Practical Skills 2 **May/June 2016**

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- High-power objective lens, ×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.

To avoid confusion, Cambridge request that only the lenses specified above are fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

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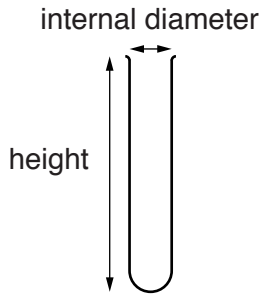
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When small test-tubes are provided, it is expected that these are approximately 150 mm in height.

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In advance of the examination:
it is essential to check the yeast to make sure that it will become active as instructed on page 5.

For both Questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker, or container, for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

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

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

Solutions should be disposed of in accordance with local safety regulations.

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[Turn over

Question 1

Each candidate will require:

apparatus and solutions for each candidate	quantity	✓
7% yeast cell suspension in a beaker or container, labelled **Y**, provided at a temperature between 35 °C and 45 °C (see instructions for preparation). This volume should not include any froth.	at least 100 cm^3	
10 cm^3 syringe with the means to wash it out	1	
Test-tube large enough to hold a volume between 40 cm^3 and 50 cm^3	5	
Test-tube rack or container to hold 5 large test-tubes	1	
Empty beaker (capacity approximately 300 cm^3), suitable for a water-bath	5	
Beaker or container with tap water between 65 °C and 70 °C, labelled **Hot** *The Supervisor may use a thermostatically controlled water-bath to provide the water between 65 °C and 70 °C for candidates*	1	
Beaker or container with tap water between 20 °C and 25 °C, labelled **Cold** *Iced water may be provided if room temperature is above 25 °C*	1	
Thermometer, –10 °C to 110 °C	1	
Glass rod	1	
Container with tap water (approximately 200 cm^3), labelled **For washing**	1	
Container (capacity approximately 600 cm^3), labelled **For waste**	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

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It is advisable to wear suitable eye protection when handling chemicals.

Preparation of solutions

(i) **Y**, 7.0% yeast cell suspension

This should be prepared one hour before the candidates start **Question 1**.
In a large container add 7.0 g of dried yeast (for baking) to 40 cm^3 of warm distilled water.
Stir and make up to 100 cm^3 with warm distilled water. This should be kept for approximately 30 minutes at a temperature between 35 °C and 40 °C.
Approximately 15 minutes before candidates start **Question 1**, sprinkle 20 g of glucose over the surface of the suspension. Stir thoroughly and keep at a temperature between 35 °C and 40 °C.
To help put the 100 cm^3 of **Y** into the beaker for the candidate, it is suggested that the yeast cell suspension is poured into a second beaker leaving the froth behind.

In advance of the examination check that the yeast will become active.

Some yeast will require more time, after the glucose is added, to become active (with froth on the top).

Do **not** use brewer's yeast as this does not always work actively enough in the time.

Question 2

Each candidate will require:

(i) Slide **M1**

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Name (in block capitals) .....

Centre number (of enclosed scripts) .....

Centre name .....

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[Turn over

Temperature of examination room .....°C

Results for **Question 1(a)(iii)**

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BIOLOGY **9700/33**

Paper 3 Advanced Practical Skills 1 **May/June 2016**

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To avoid confusion, Cambridge request that only the lenses specified above are fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

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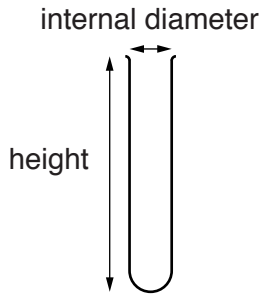
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In advance of the examination:
test the activity of the catalase in the plant extract solution as instructed on page 5.

For both Questions

Each candidate will require:
- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker, or container, for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

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

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

Solutions should be disposed of in accordance with local safety regulations.

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[Turn over

Question 1

Each candidate will require:

apparatus and solutions for each candidate	quantity	✓
1.5% hydrogen peroxide solution in a beaker or container, labelled **H**, provided at room temperature and covered to prevent evaporation (see instructions for preparation)	at least 100 cm^3	
Plant extract solution in a beaker or container (capacity 250 cm^3 to 300 cm^3 and suitable for heating), labelled **P**, provided at room temperature (see instructions for preparation)	at least 100 cm^3	
10 cm^3 syringe with the means to wash it out	1	
Petri dishes or similar flat, shallow containers to hold a volume of approximately 10 cm^3 to 15 cm^3	6	
Test-tube, large enough to hold a volume between 40 cm^3 and 50 cm^3 of solution	1	
Test-tube rack, to hold the large test-tube	1	
Bunsen burner, tripod, gauze, bench mat	1	
Thermometer, –10 °C to 110 °C	1	
Filter paper, sufficient for the candidate to cut at least 50 squares (1 cm × 1 cm)	1	
Scissors for cutting filter paper	1	
Forceps (blunt)	1	
Mounted needle or seeker	1	
Container with tap water (approximately 200 cm^3), labelled **For washing**	1	
Container (capacity approximately 200 cm^3), labelled **For waste**	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

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It is advisable to wear suitable eye protection when handling chemicals.

Preparation of solutions

(i) **H**, 1.5% hydrogen peroxide solution

It was found using this concentration that suitable results were obtained, see below.

The concentration can be obtained by putting 25 cm^3 of 6% (20 volumes) hydrogen peroxide solution in a beaker or container and making up to 100 cm^3 with distilled water.

H must be put out immediately before the examination and kept covered to maintain its activity.

(ii) **P**, plant extract solution

The plant extract can be prepared using approximately 100 g of peeled sweet potato. Other types of potato can be used but may be more variable.

Cut the sweet potato into small pieces and then liquidise with approximately 200 cm^3 of water (alternatively grind in a pestle and mortar).
Strain the mixture through muslin in a funnel or use a fine sieve to remove the small pieces. Keep the liquid plant extract, which may be coloured and cloudy. This should produce approximately 120 cm^3 of plant extract solution.

Test the activity of the catalase in P in advance of the examination:

- Using blunt forceps dip a piece of filter paper 1 cm × 1 cm into **P**.
- Fill a large test-tube with 1.5% hydrogen peroxide solution to within 2 cm of the top of the test-tube.
- Drop the square of filter paper into the hydrogen peroxide solution.
- Start timing and record when the square returns to the surface.

The time should be between 8 and 20 seconds.
If it is less than 8 seconds, decrease the concentration of plant extract by diluting the extract.
If it is more than 20 seconds, increase the mass of the plant material used for the extract.

Question 2

Each candidate will require:

(i) Slide **K1**

On receipt of the slides, please check that they are labelled **K1** and that no slides are broken. The material is **confidential** (so **must not** be disclosed to candidates) and the slides should not be viewed in advance of the examination.

The number of slides supplied by Cambridge will be equal to half the candidate entry.

Therefore, half the candidates should start on **Question 2** and the other candidates should start on **Question 1**.

(ii) Microscope (as described on page 2)

For each candidate:

- the microscope **must** be set up on low power
- the slide must **not** be left on the stage of the microscope.

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SUPERVISOR'S REPORT

The Supervisor's Report is essential in order to allow the Examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

During the examination, the Supervisor or other competent biologist (not the Invigilator) should follow the steps in **Question 1**, in order to obtain results for **1(b)(iii)**.

The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**.

These results should be written in the Supervisor's Report, **not** on a spare Question Paper.

SEATING PLAN

Provide a **seating plan** of work benches, on separate paper, giving details of the places occupied by the candidates for **each question** using each candidate's number.

The Supervisor's Report and the candidates' seating plan should be enclosed with each packet of scripts.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **K1**

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. The slides 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. The order form 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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This form should be completed and sent with the scripts.

SUPERVISOR'S REPORT

May/June 2016

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 Cambridge on the 'Special Consideration Form' as detailed in the Handbook for Centres.

3 During the examination, the Supervisor or a competent biologist should follow the steps in **Question 1** in order to obtain results for **1(b)(iii)**. The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**. These results should be written on page 8, 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.

4 Enclose a **seating plan** of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for **each question**.

Declaration (to be signed by the Principal or the Examinations Officer)

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

Signed .....

Name (in block capitals) .....

Centre number (of enclosed scripts) .....

Centre name .....

If scripts are despatched in more than one envelope, it is essential that **each envelope** includes a copy of the

- relevant Supervisor's Report
- appropriate seating plan(s).

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[Turn over

Temperature of examination room .....°C

Result for **Question 1(b)(iii)**

Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/34**

Paper 3 Advanced Practical Skills 2 **May/June 2016**

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: info@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 **9** printed pages and **3** blank pages.

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CAMBRIDGE International Examinations

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.**

Candidates must be provided with a microscope with:

- Eyepiece lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- Low-power objective lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- High-power objective lens, ×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.

To avoid confusion, Cambridge request that only the lenses specified above are fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

Each candidate must have sole, uninterrupted, use of the microscope for at least one hour.

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

HH = health hazard

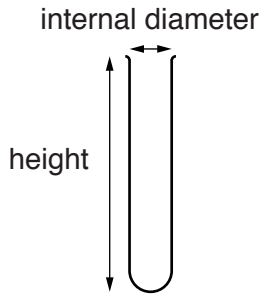
F = flammable

N = hazardous to the aquatic environment

MH = moderate hazard

T = acutely toxic

O = oxidising



When small test-tubes are provided, it is expected that these are approximately 150 mm in height.

If other dimensions of apparatus are required, these will be specified in the Apparatus list.

Centres are reminded that they are **not** permitted to open the Question Paper envelopes before the examination. Centres should also refer to the Handbook for Centres.

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

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Confidential Instructions

No access to the Question Paper is permitted in advance of the examination.

In advance of the examination:
test the activity of the enzyme as instructed on page 5.

For both Questions

Each candidate will require:
- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker, or container, for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

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

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

Solutions should be disposed of in accordance with local safety regulations.

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[Turn over

Question 1

Each candidate will require:

apparatus and solutions for each candidate	quantity	✓
Tap water to a depth of approximately 3 cm, in a test-tube, labelled **Z**	1	
[HH] 1.0% amylase solution in a beaker or container, labelled **E**, provided at room temperature (see instructions for preparation)	at least 10 cm^3	
1.0% starch solution in a beaker or container, labelled **S**, provided at room temperature (see instructions for preparation)	at least 40 cm^3	
[MH] 1 mol dm^{-3} sulfuric acid in a beaker or container, labelled **A**, provided at room temperature	at least 20 cm^3	
0.01% potassium manganate(VII) solution in a beaker or container, labelled **P**, provided at room temperature (see instructions for preparation)	at least 20 cm^3	
[N] Iodine solution in a beaker or container, labelled **iodine**, provided at room temperature and kept out of direct sunlight (see instructions for preparation), with a dropping pipette or means to remove it	at least 30 cm^3	
10 cm^3 syringes with the means to wash them out	2	
3 cm^3 or 5 cm^3 syringes with the means to wash them out	2	
Beaker or container, capacity sufficient to hold approximately 100 cm^3 solution	1	
Test-tubes, small	4	
Test-tube rack to hold 5 test-tubes	1	
Glass rod	1	
Spotting tile or white tile	1	
Thermometer, –10 °C to 110 °C	1	
White card, approximately 10 cm by 10 cm	1	
Container with tap water (approximately 200 cm^3), labelled **For washing**	1	
Container, (capacity approximately 200 cm^3), labelled **For waste**	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

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It is advisable to wear suitable eye protection when handling chemicals.

Preparation of solutions

[HH] (i) **E**, 1.0% amylase solution

This is prepared by putting 1 cm^3 of amylase solution (supplied by Cambridge) into a beaker and making up to 100 cm^3 with distilled water and mixing well.

E must be prepared immediately before the examination and be at room temperature.

(ii) **S**, 1.0% starch solution

This is prepared by putting 1 g of starch into 25 cm^3 of warm distilled water in a beaker and mixing to a paste, making up to 100 cm^3 with boiling distilled water. Mix well and allow to cool.

Test the activity of E in advance of the examination

- Put 5 cm^3 of 1.0% starch solution into a beaker and add 3 cm^3 of 1.0% amylase solution.
- Test the mixture after 10 minutes with iodine solution which should not change colour.

[MH](iii) **A**, 1.0 mol dm^{-3} sulfuric acid

This is prepared from (98%) sulfuric acid, by adding 55 cm^3 of this sulfuric acid to 500 cm^3 of distilled water and making up to 1 dm^3 with distilled water.

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

(iv) **P**, 0.01% potassium manganate(VII) solution

This is prepared by putting 1.0 g of potassium manganate(VII) into a beaker and making up to 100 cm^3 with distilled water. This makes a 1.0% solution.

Then put 1 cm^3 of this 1.0% solution into a beaker and make up to 100 cm^3 with distilled water.

This solution must be made up immediately before the start of the examination and kept out of sunlight.

[N] (v) **iodine**, iodine solution (0.01 mol dm^{-3})

This is prepared by firstly making a 0.1 mol dm^{-3} iodine solution.
Put 8 g of potassium iodide into a beaker or container. Moisten the potassium iodide with a few drops of water. Add 2.54 g of iodine to the potassium iodide and stir well. Make up to 100 cm^3 adding small volumes of distilled water and stir well. Continue to stir until the iodine has dissolved.

Then put 10 cm^3 of **this** iodine solution (0.1 mol dm^{-3}) into a beaker or container and make up to 100 cm^3 with distilled water, this makes the 0.01 mol dm^{-3} required for candidates.

This solution must be made up immediately before the start of the examination and kept out of sunlight.

Question 2

Each candidate will require:

(i) Slide **N1**

On receipt of the slides, please check that they are labelled **N1** and that no slides are broken. The material is **confidential** (so **must not** be disclosed to candidates) and the slides should **not** be viewed in advance of the examination.

The number of slides supplied by Cambridge will be equal to half the candidate entry.

Therefore, half the candidates should start on **Question 2** and the other candidates should start on **Question 1**.

(ii) Microscope (as described on page 2)

For each candidate:
- the microscope **must** be set up on low power
- the slide must **not** be left on the stage of the microscope.

SUPERVISOR'S REPORT

The Supervisor's Report is essential in order to allow the Examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

During the examination, the Supervisor or other competent biologist (not the Invigilator) should follow the steps in **Question 1**, in order to obtain results for **1(c)(ii)**.

The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**.

These results should be written in the Supervisor's Report, **not** on a spare Question Paper.

SEATING PLAN

Provide a **seating plan** of work benches, on separate paper, giving details of the places occupied by the candidates for **each question** using each candidate's number.

The Supervisor's Report and the candidates' seating plan should be enclosed with each packet of scripts.

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MATERIALS TO BE SUPPLIED by CAMBRIDGE

- Amylase (fungal)
- Slide **N1**

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. The slides 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. The order form 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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This form should be completed and sent with the scripts.

SUPERVISOR'S REPORT

May/June 2016

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;

(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 Cambridge on the 'Special Consideration Form' as detailed in the Handbook for Centres.

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4 Enclose a **seating plan** of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for **each question**.

Declaration (to be signed by the Principal or the Examinations Officer)

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

Signed .....

Name (in block capitals) .....

Centre number (of enclosed scripts) .....

Centre name .....

If scripts are despatched in more than one envelope, it is essential that **each envelope** includes a copy of the:

- relevant Supervisor's Report
- appropriate seating plan(s).

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[Turn over

Temperature of examination room .....°C

Results for **Question 1(c)(ii)**

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Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2016**

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: info@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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CAMBRIDGE International Examinations

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.**

Candidates must be provided with a microscope with:

- Eyepiece lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- Low-power objective lens, ×10 (equal to 16 mm or $\frac{2}{3}''$)
- High-power objective lens, ×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.

To avoid confusion, Cambridge request that only the lenses specified above are fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

Each candidate must have sole, uninterrupted, use of the microscope for at least one hour.

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

HH = health hazard

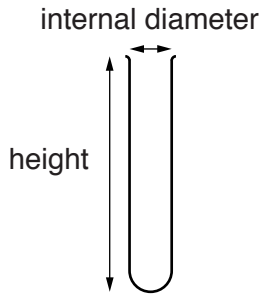
F = flammable

N = hazardous to the aquatic environment

MH = moderate hazard

T = acutely toxic

O = oxidising



When small test-tubes are provided, it is expected that these are approximately 150 mm in height.

If other dimensions of apparatus are required, these will be specified in the Apparatus list.

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Confidential Instructions

No access to the Question Paper is permitted in advance of the examination.

For both Questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without a needle)
- solutions supplied in a suitable beaker, or container, for removal of the solution using a syringe
- fresh solutions, materials and rinsing water where appropriate.

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

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

Solutions should be disposed of in accordance with local safety regulations.

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[Turn over

Question 1

Each candidate will require:

apparatus and solutions for each candidate	quantity	✓
1% glucose solution in a beaker or container, labelled **G**, provided at room temperature (see instructions for preparation)	at least 50 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 70 cm^3	
0.1% glucose solution in a beaker or container, labelled **P**, provided at room temperature (see instructions for preparation)	at least 10 cm^3	
Benedict's solution in a beaker or container, labelled **Benedict's**	at least 50 cm^3	
10 cm^3 syringes with the means to wash them out	3	
Beakers or containers, to hold 50 cm^3	5	
Test-tubes – large enough to hold more than 25 cm^3 but no more than 50 cm^3	6	
Test-tube rack to hold 6 large test-tubes or test-tube rack to hold 5 large test-tubes plus a container to hold one large test-tube	1	
Test-tube holder to hold hot test-tubes	1	
Bunsen burner, tripod, gauze, bench mat	1	
Beaker (capacity approximately 300 cm^3), with water (at approximately 40–45 °C), suitable for a water-bath *The Supervisor may use a thermostatically controlled water-bath to provide the water at 40–45 °C for candidates*	1	
Thermometer, –10 °C to 110 °C	1	
Container with tap water (approximately 200 cm^3), labelled **For washing**	1	
Container (capacity approximately 400 cm^3), labelled **For waste**	1	
Paper towels	8	
Glass marker pen	1	
Stopclock or timer showing seconds	1	
Suitable eye protection	1	

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It is advisable to wear suitable eye protection when handling chemicals.

Preparation of solutions

G and **P** can be prepared the day before the examination. They should be put into covered containers and placed in a refrigerator. They should be at room temperature for the examination.

(i) **G**, 1% glucose solution

This is prepared by sprinkling 1.0 g of glucose in 100 cm^3 of warm distilled water and mixing well.

(ii) **P**, 0.1% glucose solution

This is prepared by putting 10 cm^3 of the 1% glucose solution into a beaker and making up to 100 cm^3 with distilled water.

Question 2

Each candidate will require:

(i) Slide **L1**

On receipt of the slides, please check that they are labelled **L1** and that no slides are broken. The material is **confidential** (so **must not** be disclosed to candidates) and the slides should **not** be viewed in advance of the examination.

The number of slides supplied by Cambridge will be equal to half the candidate entry.

Therefore, half the candidates should start on **Question 2** and the other candidates should start on **Question 1**.

(ii) Microscope (as described on page 2)

For each candidate:
- the microscope **must** be set up on low power
- the slide must **not** be left on the stage of the microscope.

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SUPERVISOR'S REPORT

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During the examination, the Supervisor or other competent biologist (not the Invigilator) should follow the steps in **Question 1**, in order to obtain results for **1(a)(iii)** and **1(a)(v)**.

The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**.

These results should be written in the Supervisor's Report, **not** on a spare Question Paper.

SEATING PLAN

Provide a **seating plan** of work benches, on separate paper, giving details of the places occupied by the candidates for **each question** using each candidate's number.

The Supervisor's Report and the candidates' seating plan should be enclosed with each packet of scripts.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **L1**

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. The slides 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. The order form 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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This form should be completed and sent with the scripts.

SUPERVISOR'S REPORT

May/June 2016

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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 or a competent biologist should follow the steps in **Question 1** in order to obtain results for **1(a)(iii) and 1(a)(v)**. The Supervisor should use the same solutions as those provided to the candidates and work **out of the sight of the candidates**. These results should be written on page 8, 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.

4 Enclose a **seating plan** of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for **each question**.

Declaration (to be signed by the Principal or the Examinations Officer)

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

Signed .....

Name (in block capitals) .....

Centre number (of enclosed scripts) .....

Centre name .....

If scripts are despatched in more than one envelope, it is essential that **each envelope** includes a copy of the:

- relevant Supervisor's Report
- appropriate seating plan(s).

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[Turn over

Temperature of examination room .....°C

Results for **Questions 1(a)(iii) and 1(a)(v)**

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