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 2018**

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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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, only the lenses specified above should be 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 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 suitable eye protection 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

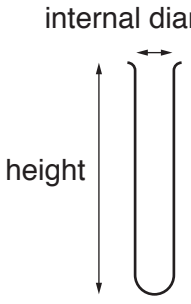
F flammable

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.

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Confidential Instructions

For both questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without needles)
- solutions supplied in suitable beakers or containers for removal of the solutions using syringes
- 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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Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
Milk in a beaker or container, labelled **M**, provided at room temperature (see **Preparation of materials**)	at least 40 cm^3	
Diluted milk in a beaker or container, labelled **U**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
[C][MH] 5% potassium hydroxide solution in a beaker or container, labelled **K**, with a pipette, plastic or with teat, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
0.15% copper sulfate solution in a beaker or container, labelled **C**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 100 cm^3	
1.0 mol dm^{-3} hydrochloric acid in a beaker or container, labelled **A**, provided at room temperature	at least 30 cm^3	
10 cm^3 syringes, with the means to wash them out	2	
2 cm^3 or 3 cm^3 syringes, with the means to wash them out	2	
1 cm^3 syringe, labelled **C**, with the means to wash it out	1	
Test-tubes, small, maximum capacity 25 cm^3	7	
Test-tube rack(s), to hold 7 test-tubes **or** test-tube rack, to hold 5 small test-tubes plus a container to hold 2 small test-tubes	1	
Bung, to fit small test-tube	1	
Spotting tile	1	
Black card or paper, approximately 20 cm × 10 cm	1	
Glass rod	1	
Pipette, plastic or with teat	1	
Container, capacity approximately 200 cm^3, with tap water, labelled **For washing**	1	
Container, capacity approximately 200 cm^3, labelled **For waste**	1	
Paper towels	10	
Glass marker pen (permanent)	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

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Preparation of materials

All the materials may be prepared the day before the examination and kept in a covered container in a refrigerator.
All the materials should be at room temperature before the start of the examination.

(i) **M**, milk

This is prepared by putting 10 g of dried milk into 160 cm^3 of distilled water. Mix well and make up to 200 cm^3.

Although this is a 5.0% concentration, a different concentration is intentionally stated in the Question Paper.

(ii) **U**, diluted milk

This is prepared by putting 70 cm^3 of **M** into 30 cm^3 of distilled water. Mix well.

[C][MH] **(iii)** **K**, 5% potassium hydroxide solution

This is prepared by putting 5 g of potassium hydroxide **[C][MH]** into 80 cm^3 of distilled water. Make up to 100 cm^3 with distilled water.

(iv) **C**, 0.15% copper sulfate solution

This is prepared by putting 0.15 g of copper sulfate **[C][MH][N]** in 80 cm^3 of distilled water. Make up to 100 cm^3 with distilled water.

Question 2

Each candidate will require:

(i) Microscope with an eyepiece graticule fitted into the eyepiece lens (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.

(ii) 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**.

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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)(ii)**, **1(a)(iii)**, **1(b)(i)** and **1(b)(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.

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 plus £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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This form should be completed and sent with the scripts

SUPERVISOR'S REPORT

May/June 2018

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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.

All other cases of individual hardship, e.g. illness or disability, should be reported directly to Cambridge on the normal 'Special Consideration Form' as detailed in the Cambridge Handbook.

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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 Supervisor)

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 packet, it is essential that **each packet** 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)(ii)**, **1(a)(iii)**, **1(b)(i)** and **1(b)(ii)**

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BIOLOGY **9700/32**

Paper 3 Advanced Practical Skills 2 **May/June 2018**

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- 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, only the lenses specified above should be 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 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 suitable eye protection 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

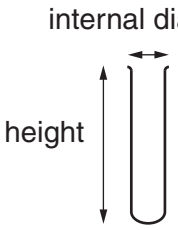
F flammable

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.

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Confidential Instructions

For both questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without needles)
- solutions supplied in suitable beakers or containers for removal of the solutions using syringes
- 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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Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
[MH] 1.0 mol dm^{-3} hydrochloric acid in a beaker or container, labelled **H**, provided at room temperature	at least 100 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 60 cm^3	
A block of agar, containing 0.01 mol dm^{-3} sodium hydroxide and universal indicator, on a white tile, labelled **A** (see **Preparation of materials**)	1	
10 cm^3 syringes, with the means to wash them out	2	
Beakers or containers, capacity 75 cm^3 to 100 cm^3	6	
Container, capacity approximately 200 cm^3, with tap water, labelled **For washing**	1	
Container, capacity approximately 200 cm^3, labelled **For waste**	1	
Ruler in mm	1	
Blunt forceps	1	
Sharp blade or scalpel or knife	1	
White card, approximately 10 cm × 10 cm	1	
Paper towels	8	
Glass marker pen (permanent)	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

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Preparation of materials

The agar, **A**, may be prepared the day before the examination.
It is essential that the agar does not dry out after it has set. To prevent drying out the containers may be wrapped in a plastic bag or similar.
All the materials should be at room temperature before the start of the examination.

(i) **A**, one block of agar, containing 0.01 mol dm^{-3} sodium hydroxide solution and universal indicator

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

0.01 mol dm^{-3} sodium hydroxide solution is prepared by dissolving 0.2 g of sodium hydroxide **[C]** in 100 cm^3 distilled water and making up to 500 cm^3 with distilled water.

Add 15 g of agar ('technical' **not** 'nutrient') to 500 cm^3 of 0.01 mol dm^{-3} sodium hydroxide solution and boil to dissolve the agar. Remove from the heat.

Add 5 cm^3 of universal indicator **[F]** to 500 cm^3 of the hot agar to produce a blue-green colour.

Pour the agar, to a depth of 0.5 cm, into shallow, flat containers. These containers should be at least 1 cm in depth and must be placed on a horizontal flat surface so that the agar sets to an even depth. Keep the agar in cool conditions to set firmly.

Just before the examination, cut the agar into blocks measuring at least 6 cm × 4 cm × 0.5 cm. Cut enough blocks so that each candidate has 1 block at least 6 cm × 4 cm × 0.5 cm, on a white tile, labelled **A**, covered by a damp paper towel.

Question 2

Each candidate will require:

(i) Microscope with an eyepiece graticule fitted into the eyepiece lens (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.

(ii) Slide **M1**

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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.

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MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **M1**

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

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Signed .....

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)(vi)**

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BIOLOGY **9700/33**

Paper 3 Advanced Practical Skills 1 **May/June 2018**

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- 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, only the lenses specified above should be fitted in the microscopes to be used in the examination. Any lenses which are **not** ×10 or ×40 should be removed or replaced.

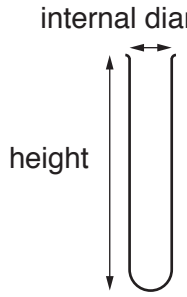
Each candidate must have uninterrupted use of the microscope for at least one hour.

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HH	health hazard	**T**	acutely toxic
F	flammable	**O**	oxidising
N	hazardous to the aquatic environment		



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.

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Confidential Instructions

For both questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without needles)
- solutions supplied in suitable beakers or containers for removal of the solutions using syringes
- 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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Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
5% sucrose solution, in a beaker or container, labelled **S5**, provided at room temperature (see **Preparation of materials**)	at least 60 cm^3	
3.5% sucrose solution, in a beaker or container, labelled **U**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 100 cm^3	
1.0 mol dm^{-3} hydrochloric acid in a beaker or container, labelled **H**, provided at room temperature	at least 50 cm^3	
Sodium hydrogencarbonate (bicarbonate) powder in a Petri dish or suitable shallow dish, labelled **A**, with a spatula	approximately 10 g	
[MH][N] Benedict's solution (qualitative) in a beaker or container, labelled **Benedict's**, provided at room temperature	at least 20 cm^3	
10 cm^3 syringes, with the means to wash them out	2	
2 cm^3 or 3 cm^3 or 5 cm^3 syringes, with the means to wash them out	2	
Beakers or containers, maximum capacity 100 cm^3	4	
Test-tubes, maximum capacity 25 cm^3, suitable for heating	5	
Test-tube rack, to hold 5 test-tubes	1	
Test-tube holder, to hold hot test-tubes	1	
Beaker, capacity approximately 400 cm^3, with water at 40 °C – 50 °C, suitable for heating as a water-bath and large enough to hold 5 test-tubes and labelled **hot water**. The Supervisor may use a thermostatically controlled water-bath to provide the hot water for candidates.	1	
Bunsen burner, bench mat, gauze and tripod to support water-bath	1	
Thermometer, –10 °C to 110 °C	1	
Container, capacity approximately 200 cm^3, with tap water, labelled **For washing**	1	
Container, capacity approximately 200 cm^3, labelled **For waste**	1	
Paper towels	8	
Glass marker pen (permanent)	1	
Glass rod	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

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Preparation of materials

All materials may be prepared the day before the examination and kept in covered containers in a refrigerator.
All materials should be at room temperature before the start of the examination.

(i) **S5**, 5% sucrose solution

This is prepared by sprinkling 5 g of sucrose, a little at a time, onto the surface of 80 cm^3 of warm distilled water stirring continuously as you sprinkle. Make up to 100 cm^3 with distilled water.

(ii) **U**, 3.5% sucrose solution

This is prepared by sprinkling 3.5 g of sucrose, a little at a time, onto the surface of 80 cm^3 of warm distilled water stirring continuously as you sprinkle. Make up to 100 cm^3 with distilled water.

Question 2

Each candidate will require:

(i) Microscope with an eyepiece graticule fitted into the eyepiece lens (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.

(ii) 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.

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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.

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MATERIALS TO BE SUPPLIED by CAMBRIDGE

- Slide **K1**

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

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- 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 plus £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 2018

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 directly to Cambridge on the 'Special Consideration Form' as detailed in the Cambridge Handbook.

3 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)(ii)** and **1(a)(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 Supervisor)

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 packet, it is essential that **each packet** 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)(ii)** and **(a)(iii)**

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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 2018**

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.

8194390644

If you have any queries regarding these Confidential Instructions, please contact Cambridge stating the Centre number, the nature of the query and the syllabus number quoted above.

email info@cie.org.uk
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This document consists of **10** printed pages and **2** blank pages.

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[Turn over

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, only the lenses specified above should be 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 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 suitable eye protection 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

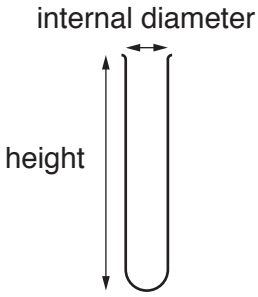
F flammable

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.

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Confidential Instructions

For both questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without needles)
- solutions supplied in suitable beakers or containers for removal of the solutions using syringes
- 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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Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
[F][MH][HH] 15% ethanol in a beaker or container, labelled **E**, provided at room temperature (see **Preparation of materials**)	at least 50 cm^3	
[F][MH][HH] 10% ethanol in a beaker or container, labelled **U**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
20% glucose solution in a beaker or container, labelled **G**, provided at room temperature (see **Preparation of materials**)	at least 100 cm^3	
Distilled water, in a beaker or container, labelled **W**, provided at room temperature	at least 100 cm^3	
Beaker, labelled **Y**, holding 6 test-tubes with 1 g of dried yeast in each test-tube. The test-tubes should be large, capacity 30 cm^3 to 50 cm^3	1 beaker + 6 test-tubes	
Universal Indicator paper, 5 cm lengths in a shallow container, labelled **P**, provided with a pH colour chart	at least 3 lengths	
10 cm^3 syringes, with the means to wash them out	3	
Beakers or containers, capacity 75 cm^3 to 100 cm^3	5	
Test-tube rack(s), to hold 6 large test-tubes **or** test-tube rack, to hold 5 test-tubes plus a container to hold 1 large test-tube	1	
Beaker, capacity approximately 400 cm^3, with water between 50 °C and 60 °C, labelled **Hot water** The Supervisor may use a thermostatically controlled water-bath to provide additional hot water if requested by candidates	1	
Beaker, capacity approximately 400 cm^3, with cold water below 30 °C, labelled **Cold water**	1	
Beaker or container, capacity 400 cm^3, labelled **Water-bath**, to act as a water-bath and be large enough to hold 6 large test-tubes	1	
Thermometer, –10 °C to 110 °C	1	
Container, capacity approximately 200 cm^3, with tap water labelled **For washing**	1	
Container, capacity approximately 400 cm^3, labelled **For waste**	1	
White tile	1	
Paper towels	8	
Glass marker pen (permanent)	1	
Glass rod	1	
Scissors	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

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Preparation of materials

Solution **G** may be prepared the day before the examination and kept in a covered container in a refrigerator. All the materials should be at room temperature before the start of the examination.

[F][MH][HH] **(i)** **E**, 15% ethanol

This is prepared by putting 15 cm^3 of 99% ethanol into 50 cm^3 distilled water. Make up to 100 cm^3 with distilled water.

[F][MH][HH] **(ii)** **U**, 10% ethanol

This is prepared by putting 10 cm^3 of 99% ethanol into 50 cm^3 distilled water. Make up to 100 cm^3 with distilled water.

There should be no naked flames in the room where the examination is carried out.

(iii) **G**, 20% glucose solution

This is prepared by sprinkling 20 g of glucose into 50 cm^3 of distilled water, stirring well. Make up to 100 cm^3 with distilled water.

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[Turn over

Question 2

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
7% yeast in 2% sucrose solution in a beaker or container, labelled **Y**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
[HH][MH][N] Methylene blue solution in a beaker or container, labelled **M**, provided at room temperature and kept out of direct sunlight. This **must** be prepared as in **Preparation of materials**.	at least 10 cm^3	
Iodine solution in a beaker or container, labelled **I**, provided at room temperature and kept out of direct sunlight. This **must** be prepared as in **Preparation of materials**.	at least 10 cm^3	
Microscope with an eyepiece graticule fitted into the eyepiece lens (as described on page 2) • the microscope **must** be set up on low power • the slide must **not** be left on the stage of the microscope	1	
Microscope slides and coverslips	3	
Seeker or mounted needle	1	
Pipette, plastic or glass with teat with the means to wash them out	2	
Container, capacity approximately 100 cm^3, with tap water, labelled **For washing**	1	
Container, capacity approximately 100 cm^3, labelled **For waste**	1	
Paper towels	8	
Glass marker pen (permanent)	1	

Preparation of materials

(i) **Y**, 7% yeast suspension in 2% sucrose solution

2% sucrose solution
This is prepared by sprinkling 2 g of sucrose, 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.

7% yeast suspension in 2% sucrose solution
This should be prepared 30 minutes before the candidates start **Question 2**.
In a large container add 7 g of dried yeast to 40 cm^3 of warm 2% sucrose solution.
Stir and make up to 100 cm^3 with warm sucrose solution. This should be kept for approximately 30 minutes at a temperature between 35 °C and 40 °C.

To help put the 20 cm^3 of **Y** into the beaker for each candidate, it is suggested that the yeast suspension is poured into a second beaker, leaving the froth behind.

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[HH][MH][N] **(ii)** **M**, 0.1% methylene blue solution

Put 0.1 g of methylene blue **[HH][MH][N]** into 80 cm^3 of distilled water in a beaker. Make up to 100 cm^3 with distilled water.

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

(iii) **I**, 0.01 mol dm^{-3} iodine solution

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 distilled water. Add 2.5 g of iodine to the potassium iodide and stir well. Make up to 100 cm^3 adding small volumes of distilled water and stirring 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 just before the start of the examination and kept out of direct sunlight.

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[Turn over

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)(ii)** and **1(a)(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

There are no materials to be supplied by Cambridge.

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

There are no materials to return to Cambridge.

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SUPERVISOR'S REPORT

May/June 2018

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 directly to Cambridge on the normal 'Special Consideration Form' as detailed in the Cambridge Handbook.

3 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)(ii)** and **1(a)(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 12, 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 Supervisor)

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 packet, it is essential that **each packet** 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)(ii)** and **1(a)(iii)**

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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 2018**

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 queries regarding these Confidential Instructions, please contact Cambridge stating the Centre number, the nature of the query and the syllabus number quoted above.

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[Turn over

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, only the lenses specified above should be 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 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 suitable eye protection 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

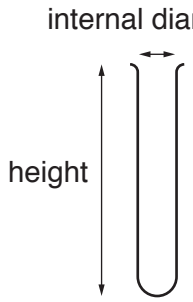
F flammable

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.

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Confidential Instructions

For both questions

Each candidate will require:

- ruler, marked in mm
- clean and dry apparatus, e.g. glassware and syringes (without needles)
- solutions supplied in suitable beakers or containers for removal of the solutions using syringes
- 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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Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
10% sucrose solution in a beaker or container, labelled **S**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
Distilled water in a beaker or container, labelled **W**, provided at room temperature	at least 50 cm^3	
0.01% potassium manganate(VII) solution in a beaker or container, labelled **P**, provided at room temperature (see **Preparation of materials**)	at least 20 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	
[MH] [HH] [C] 1% invertase solution in a beaker or container, labelled **E**, provided at room temperature (see **Preparation of materials**)	at least 20 cm^3	
Distilled water in a small test-tube, labelled **Z**	at least 4 cm^3	
5 cm^3 syringes, with the means to wash them out	2	
2 cm^3 syringe, with the means to wash it out	1	
2 cm^3 syringe, labelled **E**, with the means to wash it out	1	
Beakers, capacity 50–100 cm^3	5	
Test-tubes, small, capacity 20 cm^3 to 30 cm^3	5	
Test-tube rack, to hold 6 small test-tubes	1	
Beaker, capacity approximately 400 cm^3, with water at 45–50 °C, labelled **Hot water** The Supervisor may use a thermostatically controlled water-bath to provide additional hot water if requested by candidates	1	
Beaker, capacity approximately 400 cm^3, with cold water below 30 °C, labelled **Cold water**	1	
Beaker or container, capacity approximately 400 cm^3, labelled **Water-bath**, to act as a water-bath and large enough to hold 5 test-tubes	1	
Thermometer, –10 °C to 110 °C	1	
Container, capacity approximately 200 cm^3, with tap water labelled **For washing**	1	
Container, capacity approximately 200 cm^3, labelled **For waste**	1	
White card, approximately 10 cm × 10 cm	1	
Paper towels	8	
Glass marker pen (permanent)	1	
Stop-clock or timer showing seconds	1	
Suitable eye protection	1	

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

Solutions **S** and **P** may be prepared the day before the examination and kept in a covered container in a refrigerator. Solutions **S** and **P** should be at room temperature before the start of the examination.

Preparation of materials

(i) **S**, 10% sucrose solution

This is prepared by sprinkling 10 g of sucrose, a little at a time, onto the surface of 80 cm^3 of warm distilled water, stirring continuously as you sprinkle. Make up to 100 cm^3 with distilled water.

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

This is prepared by dissolving 1 g of potassium manganate(VII) **[O] [MH] [N]** in 100 cm^3 of distilled water. Then take 1 cm^3 of this solution and add to 99 cm^3 of distilled water.

[MH][HH][C] **(iii)** **E**, 1% invertase solution

This is prepared by adding 1 cm^3 of invertase solution (supplied by Cambridge) to 99 cm^3 of distilled water. Mix well.

Question 2

Each candidate will require:

(i) Microscope with an eyepiece graticule fitted into the eyepiece lens (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.

(ii) 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**.

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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)(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.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

- Slide **L1**
- Invertase solution

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 plus £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 2018

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 Cambridge Handbook.

3 During the examination the Supervisor or a competent biologist (not the invigilator) should follow the steps in **Question 1** in order to obtain results for **1(a)(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 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 Supervisor)

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 packet, it is essential that **each packet** 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)(ii)**