Cambridge International AS & A Level

**Cambridge Assessment International Education**
Cambridge International Advanced Subsidiary and Advanced Level

**BIOLOGY** **9700/32**

Paper 3 Advanced Practical Skills 2 **May/June 2019**

CONFIDENTIAL INSTRUCTIONS

*0855572129*

**This document gives details of how to prepare for and administer the practical exam.**

**The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.**

**The supervisor must complete the report at the end of this document and return it with the scripts.**

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**[Turn over**

# General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

## Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

The following hazard codes are used in these confidential instructions, where relevant:

| | | | |
|---|---|---|---|
| **C** | corrosive | **MH** | moderate hazard |
| **HH** | health hazard | **T** | acutely toxic |
| **F** | flammable | **O** | oxidising |
| **N** | hazardous to the aquatic environment | | |

Hazard data sheets relating to substances used in this exam should be available from your chemical supplier.

## Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

## During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

## After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
    - the scripts of the candidates specified on the barcode label provided
    - the supervisor's results relevant to these candidates
    - the supervisor's reports relevant to these candidates
    - seating plans for each practical session, referring to each candidate by candidate number
    - the attendance register.

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## Specific information for this practical exam

During the exam, the supervisor or other competent biologist (**not** the invigilator) should obtain the results needed for the supervisor's report by following the relevant steps in the question paper. The results should be recorded in the supervisor's report.

### Organisation of the exam

- Half the candidates should start on Question 1 and the other candidates should start on Question 2.
- For Question 2, each candidate must have uninterrupted use of a microscope for at least 55 minutes.

### Materials to be supplied by Cambridge International

- Slide **M1**

  On receipt of the slides, check that they are labelled **M1** and that no slides are broken. The slides must **not** be viewed in advance of the exam. The material on the slides is confidential and must **not** be disclosed to candidates.

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

### Return of slides to Cambridge International

Immediately after the exam, the slides must be:

- returned to Cambridge International in the boxes in which they were received, using the self-adhesive label supplied. 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 International. The order form must **not** be included in the packet of scripts. Slides and boxes will be charged at the rate of £3.25 per slide plus £1 per box.

If the slides are not returned or purchased by the deadline stated on the order form, the charge will be £3.75 per slide plus £1 per box.

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**Materials and apparatus for Question 1**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| 1.0 mol $dm^{-3}$ hydrochloric acid in a beaker or container, labelled **H**, provided at room temperature | at least 20 $cm^3$ | |
| Benedict's solution (qualitative) in a beaker or container, labelled **Benedict's**, provided at room temperature | at least 30 $cm^3$ | |
| 10% sucrose solution in a beaker, labelled **S**, provided at room temperature (see **Preparation of materials**) | at least 50 $cm^3$ | |
| Sodium hydrogencarbonate (bicarbonate) powder in a Petri dish or suitable shallow dish, labelled **A** | at least 10 g | |
| 3% sucrose solution in a beaker, labelled **U** (see **Preparation of materials**), provided at room temperature | at least 10 $cm^3$ | |
| Distilled water in a beaker or container, labelled **W**, provided at room temperature | at least 50 $cm^3$ | |
| 5 $cm^3$ syringes, with the means to wash them out | 2 | |
| 2 $cm^3$ or 3 $cm^3$ syringe, with the means to wash it out | 1 | |
| Beakers or containers, capacity 50–100 $cm^3$ | 5 | |
| Test-tubes, small, capacity 20–30 $cm^3$, suitable for heating | 6 | |
| Test-tube rack(s), to hold 6 test-tubes | 1 | |
| Test-tube holder, to hold hot test tubes | 1 | |
| Bunsen burner, bench mat, gauze and tripod to support water-bath | 1 | |
| Beaker, capacity approximately 400 $cm^3$, with approximately 200 $cm^3$ of tap water at 40—50° C, suitable for heating as a water-bath and large enough to hold 6 test-tubes, labelled **water-bath**.<br>The Supervisor may use a thermostatically controlled water-bath to provide hot water for candidates. | 1 | |
| Beaker, capacity approximately 400 $cm^3$, with approximately 150 $cm^3$ of cold tap water, labelled **For cooling** | 1 | |
| Spatula | 1 | |
| Container with approximately 200 $cm^3$ of tap water, labelled **For washing** | 1 | |
| Container, capacity approximately 200 $cm^3$, labelled **For waste** | 1 | |
| Paper towels | 8 | |
| Glass marker pen (permanent) | 1 | |
| Stop-clock or timer showing seconds | 1 | |
| Suitable eye protection | 1 | |

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**Preparation of materials**

| |
|---|
| All materials can be prepared the day before the examination.<br><br>Each solution should be kept in a covered container in a refrigerator.<br><br>All the materials should be at room temperature before the start of the examination. |

- **S**, 10% sucrose solution

  This is prepared by sprinkling 10 g of sucrose into 80 $cm^3$ of warm distilled water and mixing well. Make up to 100 $cm^3$ with distilled water.

- **U**, 3% sucrose solution

  This is prepared by sprinkling 3 g of sucrose into 80 $cm^3$ of warm distilled water and mixing well. Make up to 100 $cm^3$ with distilled water.

**Materials and apparatus for Question 2**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| Microscope with:<br>● an eyepiece lens, ×10 magnification<br>● a low-power objective lens, ×10 magnification<br>● a high-power objective lens, ×40 magnification<br>● an eyepiece graticule fitted into the eyepiece lens | 1 between 2 | |
| Slide **M1** | 1 between 2 | |

**Preparation of materials**

- Microscope

  Any lenses which are **not** ×10 or ×40 should be removed or replaced.
  The eyepiece graticule must be visible and in focus at the same time as the specimen.

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

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## Supervisor's report

| Syllabus and component number | 9 | 7 | 0 | 0 | / | 3 | 2 |
|---|---|---|---|---|---|---|---|
| Centre number | | | | | | | |

Centre name .....

Time of the practical session .....

Laboratory name/number .....

**Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).**

You must include:

- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

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Temperature of exam room ..... °C

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

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

**Declaration**

1 Each packet that I am returning to Cambridge International contains the following items:

- ☐ the scripts of the candidates specified on the barcode label provided
- ☐ the supervisor's results relevant to these candidates
- ☐ the supervisor's reports relevant to these candidates
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- ☐ the attendance register

2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.

3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.

4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed ..... (supervisor)

Name (in block capitals) .....

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Cambridge International Advanced Subsidiary and Advanced Level

**BIOLOGY** **9700/33**

Paper 3 Advanced Practical Skills 1 **May/June 2019**

CONFIDENTIAL INSTRUCTIONS

*4873557671*

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**Materials and apparatus for Question 1**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| **[MH]** 5% potassium hydroxide solution in a beaker or container, labelled **P**, provided at room temperature (see **Preparation of materials**) | at least 25 $cm^3$ | |
| 0.15% copper sulfate solution in a beaker or container, labelled **C**, provided at room temperature (see **Preparation of materials**) | at least 25 $cm^3$ | |
| 30% milk solution in a beaker or container, labelled **M**, provided at room temperature (see **Preparation of materials**) | at least 25 $cm^3$ | |
| 10% milk solution in a beaker or container, labelled **X**, provided at room temperature (see **Preparation of materials**) | at least 10 $cm^3$ | |
| Distilled water in a beaker or container, labelled **W**, provided at room temperature | at least 100 $cm^3$ | |
| 10 $cm^3$ syringe, labelled **M,** with the means to wash it out | 1 | |
| 10 $cm^3$ syringe, with the means to wash it out | 1 | |
| 2 $cm^3$ or 3 $cm^3$ syringes, with the means to wash them out | 2 | |
| Beakers or containers, capacity 50–100 $cm^3$ | 5 | |
| Test-tubes, small, capacity 20–30 $cm^3$ | 7 | |
| Test-tube rack(s) to hold 7 small test-tubes | 1 | |
| Glass rod | 1 | |
| White card, approximately 10 cm × 10 cm | 1 | |
| Container with approximately 200 $cm^3$ tap water, labelled **For washing** | 1 | |
| Container, capacity approximately 200 $cm^3$, labelled **For waste** | 1 | |
| Paper towels | 8 | |
| Glass marker pen (permanent) | 1 | |
| Stop-clock or timer showing seconds | 1 | |
| Suitable eye protection | | |

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**Preparation of materials**

Solutions **P** and **C** may be prepared the day before the examination and kept in covered containers in a refrigerator.

Solutions **P** and **C** should be at room temperature before the start of the examination.

**[MH]** ● **P**, 5% potassium hydroxide solution

This is prepared by putting 5 g of potassium hydroxide **[C][MH]** into 80 $cm^3$ of distilled water in a beaker and making up to 100 $cm^3$ with distilled water. Mix well.

● **C**, 0.15% copper sulfate solution

This is prepared by putting 0.3 g of copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) **[C][MH][N]** in 80 $cm^3$ of distilled water and making up to 100 $cm^3$ with distilled water. Mix well. This is the stock solution of 0.3%.

0.15% copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$), **C**, is prepared by putting 50 $cm^3$ of the stock solution into a beaker and making up to 100 $cm^3$ with distilled water.

● **M**, 30% milk solution

This must be prepared on the day of the examination. This is prepared by putting 30 g of dried skimmed milk powder into a small volume of distilled water. Mix to make a paste.

Make up to 100 $cm^3$ with distilled water. Mix well until all the milk powder is dissolved.

The dried milk powder should be freshly opened. It is important that you shake the contents before opening the milk powder. 100 g of the dried skimmed milk powder should contain at least 34 g of protein, e.g. “Marvel” contains 36 g of protein.

*[Note: The Question Paper intentionally states a different concentration for **M**]*

● **X**, 10% milk solution

This must be prepared on the day of the examination. This is prepared by putting 10 g of dried skimmed milk powder in 80 $cm^3$ distilled water and making up to 100 $cm^3$ with distilled water. Mix well until all the milk powder is dissolved.

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## Materials and apparatus for Question 2

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| Microscope with:<br>● an eyepiece lens, ×10 magnification<br>● a low-power objective lens, ×10 magnification<br>● a high-power objective lens, ×40 magnification<br>● an eyepiece graticule fitted into the eyepiece lens | 1 between 2 | |
| Slide **K1** | 1 between 2 | |

## Preparation of materials

- Microscope

  Any lenses which are **not** ×10 or ×40 should be removed or replaced.
  The eyepiece graticule must be visible and in focus at the same time as the specimen.

  For each candidate:
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## Supervisor's report

| Syllabus and component number | 9 | 7 | 0 | 0 | / | 3 | 3 |
|---|---|---|---|---|---|---|---|
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Temperature of exam room ..... °C

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

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

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Signed ..... (supervisor)

Name (in block capitals) .....

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Cambridge International Advanced Subsidiary and Advanced Level

**BIOLOGY** **9700/34**

Paper 3 Advanced Practical Skills 2 **May/June 2019**

CONFIDENTIAL INSTRUCTIONS

*4622649669*

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| **HH** | health hazard | **T** | acutely toxic |
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### Organisation of the exam

- Half the candidates should start on Question 1 and the other candidates should start on Question 2.
- For Question 1, each candidate must have uninterrupted use of a microscope for at least 55 minutes.

### Materials to be supplied by Cambridge International

- None

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**Materials and apparatus for Question 1**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| Piece of onion tissue covered by 1.00 mol $dm^{-3}$ sodium chloride solution in a beaker or container, labelled **S4**, provided at room temperature (see **Preparation of materials**) | at least 50 $cm^3$ | |
| Piece of onion tissue covered by 0.50 mol $dm^{-3}$ sodium chloride solution in a beaker or container, labelled **S1**, provided at room temperature (see **Preparation of materials**) | at least 50 $cm^3$ | |
| Piece of onion tissue covered by 0.25 mol $dm^{-3}$ sodium chloride solution in a beaker or container, labelled **S3**, provided at room temperature (see **Preparation of materials**) | at least 50 $cm^3$ | |
| Piece of onion tissue covered by distilled water in a beaker or container, labelled **S2**, provided at room temperature (see **Preparation of materials**) | at least 50 $cm^3$ | |
| Microscope with:<br>● an eyepiece lens, ×10 magnification<br>● a low-power objective lens, ×10 magnification<br>● a high-power objective lens, ×40 magnification<br>● an eyepiece graticule fitted into the eyepiece lens | 1<br>between<br>2 | |
| Microscope slides | 4 | |
| Coverslips | 4 | |
| Forceps (blunt) | 1 | |
| Pipette, plastic or glass with teat | 1 | |
| Scalpel or sharp blade | 1 | |
| Seeker or mounted needle | 1 | |
| White tile or surface for cutting | 1 | |
| Container with approximately 300 $cm^3$ of tap water, labelled **For washing** | 1 | |
| Container, capacity approximately 300 $cm^3$, labelled **For waste** | 1 | |
| Paper towels | 8 | |
| Glass marker pen (permanent) | 1 | |
| Suitable eye protection | 1 | |

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**Preparation of materials**

The sodium chloride solutions may be prepared the day before the examination and kept covered to prevent evaporation.

Onion tissue may be prepared the day before the examination or **at least one hour** before the start of the examination and put into the sodium chloride solutions.

These should be put into a refrigerator in covered containers overnight but removed to reach room temperature before the start of the examination.

- **S4**, 1.00 mol $dm^{-3}$ sodium chloride solution

  This is prepared by putting 11.7 g of sodium chloride in 100 $cm^3$ of distilled water and making up to 200 $cm^3$ with distilled water.

  This solution is needed to soak the pieces of onion and is also used as a stock solution to make **S1** and **S3**.

- **S1**, 0.50 mol $dm^{-3}$ sodium chloride solution

  This is prepared by adding 50 $cm^3$ of distilled water to 50 $cm^3$ of the 1.00 mol $dm^{-3}$ sodium chloride solution.

  This solution is needed to soak the pieces of onion.

- **S3**, 0.25 mol $dm^{-3}$ sodium chloride solution

  This is prepared by adding 75 $cm^3$ of distilled water to 25 $cm^3$ of the 1.00 mol $dm^{-3}$ sodium chloride solution.

  This solution is needed to soak the pieces of onion.

- **S2**, distilled water

- **Pieces of onion tissue**

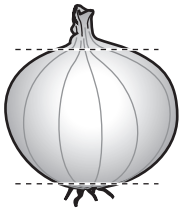
  - Candidates should **not** be given red onion. Onions with white flesh should be used, either with dry brown scales (yellow onion) or with dry white scales (white onion).
  - The onions must be as fresh as possible to avoid the effects of storage.
  - The pieces of onion must be prepared at least one hour before the start of the examination and left in the sodium chloride solutions with the containers covered to prevent evaporation. Alternatively, they may be prepared the day before the examination as stated above.
  - The pieces of onion are prepared as described on page 6.

- **Microscope**

  Any lenses which are **not** ×10 or ×40 should be removed or replaced.
  The eyepiece graticule must be visible and in focus at the same time as the specimen.

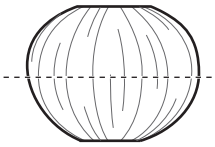
  For each candidate:
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  - slides must **not** be on the stage of the microscope.

Preparation of pieces of onion:

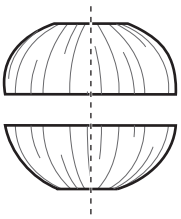


cut off top and bottom

remove dry scale leaves



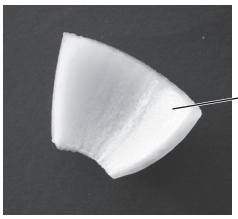
cut across



cut into pieces



separate pieces of onion with fingers or forceps and throw away any pieces too small to remove epidermis (but leave epidermis attached to the pieces given to candidates)



piece of onion with epidermis attached

- The inner epidermis may start to separate or may have become separated from the rest of the onion tissue and may be floating.
- Put the number of pieces of onion required for all candidates, with some spares, into large containers with enough of each solution to submerge the onion pieces.
- Cover the containers.
- Before the examination, ensure that each solution containing the piece of onion for each candidate is at room temperature.

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**Materials and apparatus for Question 2**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| Beaker, capacity approximately 100 $cm^3$, labelled **P1**, containing 30–40 $cm^3$ of tap water (but **not** on any marked volume on the beaker) | 1 | |
| Beaker, capacity approximately 100 $cm^3$, labelled **P2**, containing 50–60 $cm^3$ of tap water (but **not** on any marked volume on the beaker) | 1 | |
| Beaker, capacity approximately 100 $cm^3$, labelled **P3**, containing 60–70 $cm^3$ of tap water (but **not** on any marked volume on the beaker) | 1 | |
| Beaker, capacity approximately 100 $cm^3$ | 1 | |
| Measuring cylinder, capacity 100 $cm^3$ | 1 | |
| 5 $cm^3$ syringe | 1 | |
| 1 $cm^3$ or 2 $cm^3$ or 3 $cm^3$ syringe | 1 | |
| Paper towels | 8 | |
| Suitable eye protection | 1 | |

**Note**: the level of water in **P1**, **P2** and **P3** must **not** lie on any marked volume on the beakers and the volume of water **must** be in the stated range.

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## Supervisor's report

| Syllabus and component number | 9 | 7 | 0 | 0 | / | 3 | 4 |
|---|---|---|---|---|---|---|---|
| Centre number | | | | | | | |

Centre name .....

Time of the practical session .....

Laboratory name/number .....

**Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).**

You must include:

- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

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**[Turn over**

Temperature of exam room ..... °C

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

**Declaration**

1 Each packet that I am returning to Cambridge International contains the following items:

- ☐ the scripts of the candidates specified on the barcode label provided
- ☐ the supervisor's results relevant to these candidates
- ☐ the supervisor's reports relevant to these candidates
- ☐ seating plans for each practical session, referring to each candidate by candidate number
- ☐ the attendance register

2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.

3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.

4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed ..... (supervisor)

Name (in block capitals) .....

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Cambridge International AS & A Level

**Cambridge Assessment International Education**
Cambridge International Advanced Subsidiary and Advanced Level

**BIOLOGY** **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2019**

CONFIDENTIAL INSTRUCTIONS

*7214163640*

**This document gives details of how to prepare for and administer the practical exam.**

**The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.**

**The supervisor must complete the report at the end of this document and return it with the scripts.**

If you have any queries regarding these confidential instructions, contact Cambridge International stating the centre number, the syllabus and component number and the nature of the query.

email info@cambridgeinternational.org
phone +44 1223 553554
fax +44 1223 553558

This document consists of **8** printed pages.

DC (CE) 156832/3
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Cambridge Assessment International Education

**[Turn over**

# General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

## Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

The following hazard codes are used in these confidential instructions, where relevant:

| | | | |
|---|---|---|---|
| **C** | corrosive | **MH** | moderate hazard |
| **HH** | health hazard | **T** | acutely toxic |
| **F** | flammable | **O** | oxidising |
| **N** | hazardous to the aquatic environment | | |

Hazard data sheets relating to substances used in this exam should be available from your chemical supplier.

## Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

## During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

## After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
    - the scripts of the candidates specified on the barcode label provided
    - the supervisor's results relevant to these candidates
    - the supervisor's reports relevant to these candidates
    - seating plans for each practical session, referring to each candidate by candidate number
    - the attendance register.

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## Specific information for this practical exam

During the exam, the supervisor or other competent biologist (**not** the invigilator) should obtain the results needed for the supervisor's report by following the relevant steps in the question paper. The results should be recorded in the supervisor's report.

### Organisation of the exam

- Half the candidates should start on Question 1 and the other candidates should start on Question 2.
- For Question 2, each candidate must have uninterrupted use of a microscope for at least 55 minutes.

### Materials to be supplied by Cambridge International

- Slide **L1**

  On receipt of the slides, check that they are labelled **L1** and that no slides are broken. The slides must **not** be viewed in advance of the exam. The material on the slides is confidential and must **not** be disclosed to candidates.

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

### Return of slides to Cambridge International

Immediately after the exam, the slides must be:

- returned to Cambridge International in the boxes in which they were received, using the self-adhesive label supplied. 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 International. The order form must **not** be included in the packet of scripts. Slides and boxes will be charged at the rate of £3.25 per slide plus £1 per box.

If the slides are not returned or purchased by the deadline stated on the order form, the charge will be £3.75 per slide plus £1 per box.

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**Materials and apparatus for Question 1**

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| **[MH]** 5% potassium hydroxide solution in a beaker or container, labelled **K**, 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 $cm^3$ | |
| 1% albumen solution in a beaker or container, labelled **P**, provided at room temperature (see **Preparation of materials**) | at least 30 $cm^3$ | |
| 0.25% albumen solution in a beaker or container, labelled **U**, provided at room temperature (see **Preparation of materials**) | at least 10 $cm^3$ | |
| Distilled water in a beaker or container, labelled **W**, provided at room temperature | at least 100 $cm^3$ | |
| 5 $cm^3$ or 10 $cm^3$ syringe, with the means to wash it out | 1 | |
| 2 $cm^3$ or 3 $cm^3$ syringes, with the means to wash them out | 2 | |
| Beakers or containers, capacity 50–100 $cm^3$ | 5 | |
| Test-tubes, small, capacity 20–30 $cm^3$ | 7 | |
| Test-tube rack(s) to hold 7 small test-tubes | 1 | |
| Glass rod | 1 | |
| White card or white paper approximately 10 cm × 10 cm or white tile | 1 | |
| Container with approximately 200 $cm^3$ of tap water, labelled **For washing** | 1 | |
| Container, capacity approximately 300 $cm^3$, labelled **For waste** | 1 | |
| Paper towels | 8 | |
| Glass marker pen (permanent) | 1 | |
| Stop-clock or timer showing seconds | 1 | |
| Suitable eye protection | 1 | |

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**Preparation of materials**

Solutions **K** and **C** may be prepared the day before the examination and kept in a covered container in a refrigerator.

Solutions **K** and **C** should be at room temperature before the start of the examination.

**[MH]** ● **K**, 5.0% potassium hydroxide solution

This is prepared by putting 5 g of potassium hydroxide **[MH]** in 80 $cm^3$ of distilled water in a beaker and making up to 100 $cm^3$ with distilled water. Mix well.

● **C**, 0.15% copper sulfate solution

This is prepared by putting 0.3 g of copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) **[MH]** in 80 $cm^3$ of distilled water and making up to 100 $cm^3$ with distilled water. Mix well. This is the stock solution of 0.3%.

0.15% copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$), **C**, is prepared by putting 50 $cm^3$ of the stock solution into a beaker and making up to 100 $cm^3$ with distilled water.

● **P**, 1.0% albumen solution

This must be prepared on the day of the examination.
This is prepared by putting 1 g of albumen into a small volume of distilled water and mixing to make a paste. Make up to 100 $cm^3$ with distilled water. Mix well.

● **U**, 0.25% albumen solution

This must be prepared on the day of the examination.
This is prepared by making a 1% albumen solution as described for **P**. Then add 75 $cm^3$ of distilled water to 25 $cm^3$ of the 1% albumen solution. Mix well.

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**[Turn over**

## Materials and apparatus for Question 2

Each candidate will need:

| materials and apparatus for each candidate | quantity | ✓ |
|---|---|---|
| Microscope with:<br>● an eyepiece lens, ×10 magnification<br>● a low-power objective lens, ×10 magnification<br>● a high-power objective lens, ×40 magnification<br>● an eyepiece graticule fitted into the eyepiece lens | 1 between 2 | |
| Slide **L1** | 1 between 2 | |

## Preparation of materials

- Microscope

  Any lenses which are **not** ×10 or ×40 should be removed or replaced.
  The eyepiece graticule must be visible and in focus at the same time as the specimen.

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

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## Supervisor's report

| Syllabus and component number | 9 | 7 | 0 | 0 | / | 3 | 5 |
|---|---|---|---|---|---|---|---|
| Centre number | | | | | | | |

Centre name .....

Time of the practical session .....

Laboratory name/number .....

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Temperature of exam room ..... °C

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

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

**Declaration**

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Signed ..... (supervisor)

Name (in block capitals) .....

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