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

BIOLOGY **9700/31**

Advanced Practical Skills 1 **October/November 2012**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given, including the identity of material on microscope slides where appropriate, does not reach the candidates either directly or indirectly.

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If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: International@cie.org.uk
by phone: +44 1223 553554
by fax: +44 1223 553558
stating the Centre number, the nature of the query and the syllabus number quoted above.

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

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Instructions for preparing apparatus

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the Biology teacher to test the apparatus appropriately. **No access to the question paper is permitted in advance of the examination.**

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

Candidates must be provided with a microscope with:

- 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 55 minutes.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with the COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant.

C = corrosive substance

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

T = toxic substance

N = harmful to environment

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Confidential Instructions

Each candidate will require:

For both Questions

- mm ruler.

Question 1

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

Summary of solutions, reagents and materials:

labelled	contents	hazard	volume / cm^3
Benedict's solution	Benedict's solution	[H] harmful irritant	30
G	1% glucose solution	none	25
P	plant tissue extract	none	20
W	distilled water	none	100

labelled	contents	hazard	details	quantity
V	Visking tubing in a beaker or container with 100 cm^3 distilled water	none	15 cm in length	1

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

Preparation of solutions, reagents and plant extract:

[H] **(i)** **Benedict's solution**, at least 30 cm^3 of Benedict's solution in a small beaker or container (so that a syringe can be used) labelled **Benedict's**.

This should be qualitative Benedict's solution as provided by your supplier or made up by the technician. Please note it is important to use hydrated copper sulfate crystals ($CuSO_4.5H_2O$) when making up the Benedict's solution.

(ii) **G**, at least 25 cm^3 of 1% glucose solution in a beaker or container, labelled **G**.

This is prepared by dissolving 1 g of glucose in 80 cm^3 of distilled water and making up to 100 cm^3 with distilled water.
This is sufficient for 3 candidates.

(iii) **P**, at least 20 cm^3 of plant tissue extract in a beaker or container, labelled **P**.

The plant material you must use is sweet potato (*Ipomoea sp.*).
The extract is prepared by cutting approximately 150 g of fresh sweet potato (washed but not peeled) into small pieces. Add 150 cm^3 of distilled water. Then use a food processor or mixer to produce 'a liquid with small bits'.
Alternatively, the sweet potato can be boiled for 20 minutes and then 'a liquid with small bits' can be produced with a fork or masher.

This can be produced in advance and either frozen days before the examination or stored overnight in a refrigerator. It must be a liquid with small bits at room temperature when presented to the candidates.

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

(v) **V**, 15 cm length of Visking tubing (a 22 mm flat, dry diameter will fit inside a large test-tube when filled with liquid) submerged in 100 cm^3 distilled water, in a beaker or container labelled **V.**

Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	1	
2 cm^3 or 3 cm^3 or 5 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	2	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or containers to hold 20 cm^3 volume	6	
Test-tubes – suitable for heating	6	
Test-tubes – large for Visking tubing	1	
Test-tube rack(s) or container(s) to hold 6 test-tubes and 1 large test-tube	1	
Test-tube holder to hold hot test-tubes	1	
Water-bath equipment Bunsen burner, tripod, gauze, bench mat, at least a 400 cm^3 beaker with water suitable for a water-bath, matches and a thermometer –10 °C to 110 °C	1	
Ruler in mm	1	
Blunt forceps	1	
Stop-clock, stopwatch or sight of a clock with a **second hand**	1	
Glass marker pen	1	
Safety goggles/glasses	1	

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a spare question paper) which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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Question 2

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

(ii) Microscope with:
- 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.

On receipt of the slides, please check that they are labelled **J1** and that all the slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

The number of slides supplied by Cambridge will be equal to half the candidate entry. Therefore, half of the candidates should start on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) 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. They must **not** be included in the packet of scripts.

Or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. They must **not** be included in the packet of scripts.

Slides and boxes will be charged at the rate of £3 per slide and £1 per box.
If the items are not returned or purchased by the deadline stated on the order form they will be charged at £3.50 per slide plus £1 per box.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form in these Confidential Instructions. For Centres where more than one script packet is used, there must be a copy of the completed Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script packet.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November Session 2012

The Supervisor or Teacher responsible for the subject should provide the following information.

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

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

(a) difficulties arising from faulty specimens or microscopes;

(b) accidents to apparatus or materials;

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

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

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

3. During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The invigilator should **not** carry out **Question 1**.

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Results for Question 1:

Temperature of examination room = ...°C

4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. Separate paper can be used for this.

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

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

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

BIOLOGY **9700/33**

Advanced Practical Skills 1 **October/November 2012**

CONFIDENTIAL INSTRUCTIONS

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International Examinations

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Instructions for preparing apparatus

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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 55 minutes.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

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Confidential Instructions

Each candidate will require:

For both Questions

- mm ruler.

Question 1

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

Summary of solutions and reagents:

labelled	contents	hazard	volume / cm^3
R	0.4% glucose solution	none	30
S	1.0 mol dm^{-3} sucrose solution and 0.4% glucose solution	none	15
W	distilled water	none	100
Benedict's	Benedict's solution	[H] harmful irritant	60

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

Preparation of solutions and reagents:

(i) **R**, at least 30 cm^3 of 0.4% glucose solution, in a beaker or container, labelled **R**.

This is prepared by putting 4 g of glucose, a little at a time, into 80 cm^3 of distilled water, mixing continuously. Make up to 100 cm^3 with distilled water. This makes 4% glucose solution.

Put 10 cm^3 of this 4% glucose solution, in a beaker or container, and make up to 100 cm^3 with distilled water.
This makes a 0.4% glucose solution required by candidates for **R**.

This is sufficient for 3 candidates.

(ii) **S**, at least 15 cm^3 of 1.0 mol dm^{-3} sucrose solution and 0.4% glucose solution in a beaker or container, labelled **S**.
Please note:
the Question Paper intentionally states that the contents of S is only sucrose solution.

This is prepared by mixing equal volumes of 1.0 mol dm^{-3} sucrose solution and 0.4% glucose solution:

- 1.0 mol dm^{-3} sucrose solution is prepared by putting 85.6 g of sucrose in 100 cm^3 of warm distilled water in a beaker or container. Make up to 250 cm^3 with distilled water.
- 0.4% glucose solution is prepared by putting 4 g of glucose, a little at a time, into 80 cm^3 of distilled water, mixing continuously. Make up to 100 cm^3 with distilled water. This makes 4% glucose solution as in **(i)**.

Put 25 cm^3 of this 4% glucose solution, in a beaker or container, and make up to 250 cm^3 with distilled water. This makes the 0.4% glucose solution.

- Mixing 250 cm^3 of the sucrose solution with 250 cm^3 of the 0.4% glucose solution makes 500 cm^3 of **S**.

This is sufficient for 30 candidates.

[H] **(iii)** **Benedict's solution**, at least 60 cm^3 of Benedict's solution, in a beaker or container, labelled **Benedict's**.
This should be qualitative Benedict's solution as provided by your supplier or made up by the technician. Please note it is important to use hydrated copper sulfate crystals ($CuSO_4.5H_2O$) when making up the Benedict's solution.

This is sufficient for 1 candidate.

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

Materials:

Between 20 and 25 dried mung bean seeds, in a small Petri dish or flat container, labelled 'seeds'.

This is sufficient for 1 candidate.

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Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	2	
2 cm^3 or 3 cm^3 or 5 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	2	
Small Petri dish or flat container	1	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or containers to hold 20 cm^3 volume	5	
Test-tubes	5	
Test-tubes – large	1	
Test-tube rack(s) or container(s) to hold 5 test-tubes and 1 large test-tube	1	
Test-tube holder to hold hot test-tubes	1	
Water-bath equipment Bunsen burner, tripod, gauze, bench mat, at least a 400 cm^3 beaker with water suitable for a water-bath, matches and a thermometer –10 °C to 110 °C	1	
White card or tile	1	
Glass rod	1	
Blunt forceps	1	
Stop-clock, stopwatch or sight of a clock with a **second hand**	1	
Glass marker pen	1	
Safety goggles/glasses	1	

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a spare question paper) which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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Question 2

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

(ii) 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.

On receipt of the slides, please check that they are labelled **K1** and that all the slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

The number of slides supplied by Cambridge will be equal to half the candidate entry.
Therefore, half of the candidates should start on **Question** 1 and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Slide **K1**

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Or

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A Level

October/November Session 2012

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(b) accidents to apparatus or materials;

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

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[Turn over

*Results for question **1***.

Temperature of examination room = ... °C

4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. Use separate paper for this.

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

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

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General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 2012**

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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, 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 55 minutes.

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H = harmful or irritating substance

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Confidential Instructions

Each candidate will require:

For both Questions

- mm ruler.

Question 1

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

Summary of solutions and reagents:

labelled	contents	hazard	volume / cm^3
E	0.5% protease solution	none	20
W	distilled water	none	50
S	0.25% milk (see instructions)	none	50

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

Preparation of solutions:

(i) **E**, at least 20 cm^3 of 0.5 % protease solution in a beaker or container, labelled **E.**

This is prepared by putting 0.5 g of protease (supplied by Cambridge) in a beaker or container and making up to 100 cm^3 with distilled water, mixing well.

This is sufficient quantity for 5 candidates.

Please note – this makes 0.5 % **E** but candidates will be intentionally informed that it is 1 % **E**.

The Supervisor should test the activity of the enzyme by putting 1 cm^3 of **E** and 3 cm^3 of **S** in a test-tube at a temperature of between 35 °C and 40 °C. The mixture should go clear between 10–20 seconds. If the time is longer than 20 seconds, repeat with 1 % **E** (note: at 1% concentration, **E** is an irritant).

(ii) **W**, at least 50 cm^3 of distilled water in a beaker or container, labelled **W**.

(iii) **S**, at least 50 cm^3 of 0.25% dried milk solution in a beaker or container, labelled **S.**

This is prepared by dissolving 1 g of dried milk powder in 50 cm^3 of distilled water, stirring and then making up to 100 cm^3 with distilled water. This makes a 1% milk solution.
0.25 % milk solution is prepared as below:
Mixing 25 cm^3 of the 1% milk solution with 75 cm^3 of distilled water makes 100 cm^3 of 0.25% of **S**.
This is sufficient quantity for 2 candidates.

Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	2	
2 cm^3 or 3 cm^3 or 5 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	1	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beaker or container to maintain a water-bath between 35 °C and 40 °C and to hold 6 test-tubes	1	
Water at about 50 °C in a beaker or container, labelled **hot water** The **Supervisor** may use a thermostatically-controlled water-bath to provide additional hot water if requested by candidates.	1	
Water at room temperature in a beaker or container, labelled **cold water**	1	
Thermometer –10 °C to 110 °C	1	
Beakers or containers to hold 20 cm^3 volume	5	
Test-tubes	6	
Test-tube rack or container to hold 6 test-tubes	1	
Test-tube holder to hold test-tubes	1	
Black card, approximately 15 cm × 20 cm	1	
Glass rod	1	
Scissors	1	
Stop-clock, stopwatch or sight of a clock with a **second hand**	1	
Glass marker pen	1	
Safety goggles/glasses	1	

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a spare question paper) which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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Question 2

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

(ii) 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.

On receipt of the slides, please check that they are labelled **M1** and that all the slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

The number of slides supplied by Cambridge will be equal to half the candidate entry. Therefore, half of the candidates should start on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Protease enzyme

(iii) Slide **M1**

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

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

- returned to Cambridge in the containers in which they were received, using the self-adhesive label. They must **not** be included in the packet of scripts.

Or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. They must **not** be included in the packet of scripts.

Slides and boxes will be charged at the rate of £3 per slide and £1 per box.
If the items are not returned or purchased by the deadline stated on the order form they will be charged at £3.50 per slide plus £1 per box.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form in these Confidential Instructions. For Centres where more than one script packet is used, there must be a copy of the completed Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script packet.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November Session 2012

The Supervisor or Teacher responsible for the subject should provide the following information.

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

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

(a) difficulties arising from faulty specimens or microscopes;

(b) accidents to apparatus or materials;

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

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

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

3. During the examination, the Supervisor should, **out of sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report, which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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[Turn over

*Results of Question **1***.

Temperature of examination room = ... °C

4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. Use separate paper for this.

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

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

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

BIOLOGY **9700/35**

Advanced Practical Skills 1 **October/November 2012**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given, including the identity of material on microscope slides where appropriate, does not reach the candidates either directly or indirectly.

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If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: International@cie.org.uk
by phone: +44 1223 553554
by fax: +44 1223 553558
stating the Centre number, the nature of the query and the syllabus number quoted above.

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

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Instructions for preparing apparatus

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the Biology teacher to test the apparatus appropriately. **No access to the question paper is permitted in advance of the examination.**

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

Candidates must be provided with a microscope with:

- 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 55 minutes.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with the COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant.

C = corrosive substance

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

T = toxic substance

N = harmful to environment

Centres are reminded that they are **not** permitted to open the question paper envelopes before the examination. Centres 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 international@cie.org.uk, by **fax** to +44 1223 553558 or by **phone** to +44 1223 553554.

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Confidential Instructions

Each candidate will require:

For both Questions

- mm ruler.

Question 1

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

Summary of solutions and reagents:

labelled	contents	hazard	volume / cm^3
H	3% (10 vols) hydrogen peroxide solution	[H] harmful irritant	at least 50
C	3% copper sulfate solution	[H][N] harmful irritant harmful to environment	at least 25
W	distilled water	none	at least 50
Y	1% yeast suspension	low	at least 20

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

Preparation of solutions and yeast suspension:

[H] **(i)** **H**, at least 50 cm^3 of 3% hydrogen peroxide solution in a beaker or container, labelled H. The beaker or container should be covered to prevent evaporation.

This is prepared by putting 50 cm^3 of 6% hydrogen peroxide solution into a beaker or container and making up to 100 cm^3 with distilled water.

[H][N] **(ii)** **C**, at least 25 cm^3 of 3% copper sulfate solution in a beaker or container, labelled **C**.

This is prepared by dissolving 3.0 g of hydrated copper sulfate ($CuSO_4.5H_2O$) into 50 cm^3 of distilled water in a beaker or container and making up to 100 cm^3 with distilled water.

This is sufficient for 4 candidates.

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(iii) **Y**, at least 20 cm^3 of yeast suspension in a beaker or container, labelled **Y**.

This is prepared by adding 1 g of dried (Baker's) yeast to 50 cm^3 of warm distilled water (approximately 30 °C) in a beaker or container and making up to 100 cm^3 with warm distilled water. Stir well.

Y should be prepared one hour before the examination and kept at room temperature.

Stir well before dispensing **Y** into the beakers or containers used by the candidates.

This is sufficient for 5 candidates.

(iv) **W**, at least 50 cm^3 of distilled water in a beaker or container, labelled **W**.

Apparatus for each candidate:

Apparatus	**Quantity**	✓
10 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	2	
2 cm^3 or 3 cm^3 or 5 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	1	
2 cm^3 or 3 cm^3 or 5 cm^3 syringe for copper sulfate, labelled '**C**' (with the means to wash it out) (note: needles are **not** required and should **not** be given to candidates)	1	
Container with tap water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Beakers or containers to hold 20 cm^3 volume	4	
Test-tubes to hold at least 20 cm^3	4	
Test-tube rack or container to hold 4 test-tubes	1	
Glass rod	1	
Thermometer –10 °C to 110 °C	1	
Ruler in mm	1	
Stop-clock, stopwatch or sight of a clock with a **second hand**	1	
Glass marker pen	1	
Safety goggles/glasses	1	

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a spare question paper) which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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Question 2

(i) Slide **L1** (supplied by Cambridge)
(ii) Microscope with:
- 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.

On receipt of the slides, please check that they are labelled **L1** and that all the slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

The number of slides supplied by Cambridge will be equal to half the candidate entry. Therefore, half of the candidates should start on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) 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. They must **not** be included in the packet of scripts.

Or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. They must **not** be included in the packet of scripts.

Slides and boxes will be charged at the rate of £3 per slide and £1 per box.
If the items are not returned or purchased by the deadline stated on the order form they will be charged at £3.50 per slide plus £1 per box.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form in these Confidential Instructions. For Centres where more than one script packet is used, there must be a copy of the completed Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script packet.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November Session 2012

The Supervisor or Teacher responsible for the subject should provide the following information.

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

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

(a) difficulties arising from faulty specimens or microscopes;

(b) accidents to apparatus or materials;

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

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

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3. During the examination, the Supervisor should, **out of sight of the candidates**, carry out **Question 1**, using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The invigilator should **not** carry out **Question 1**.

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*Results of **Question 1**:*

Temperature of examination room ..... °C

4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. Separate paper can be used for this.

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

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

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

BIOLOGY **9700/36**

Advanced Practical Skills 2 **October/November 2012**

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given, including the identity of material on microscope slides where appropriate, does not reach the candidates either directly or indirectly.

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If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: International@cie.org.uk
by phone: +44 1223 553554
by fax: +44 1223 553558
stating the Centre number, the nature of the query and the syllabus number quoted above.

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

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Instructions for preparing apparatus

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the Biology teacher to test the apparatus appropriately. **No access to the question paper is permitted in advance of the examination.**

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

Candidates must be provided with a microscope with:

- 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 55 minutes.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with the COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant.

C = corrosive substance

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

T = toxic substance

N = harmful to environment

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University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

Confidential Instructions

Each candidate will require:

For both Questions

- mm ruler.

Question 1

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

Summary of solutions and reagents:

labelled	contents	hazard	volume / cm^3
	0.01% iodine in potassium iodide solution	[H] harmful irritant	dependent upon quantity of agar
E	2.0% amylase solution	[H] harmful irritant	40
W	distilled water	none	at least 50

labelled	contents	hazard	details	quantity
S	stained agar block	[H] harmful irritant	at least 30 mm × 30 mm × 5 mm containing 0.2% starch and stained with 0.01% iodine solution	1
U	unstained agar block	none	at least 30 mm × 30 mm × 5 mm containing 0.2% starch	1

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

Preparation of solutions, reagent and agar blocks:

Candidates do not need the iodine solution as it is used to stain the agar as described in **(iii)** on page 4.

[H] **(i)** Iodine, 100 cm^3 of a 0.01% iodine solution in a beaker or container.

This is prepared by putting 2.0 g of potassium iodide in a beaker or container. Add 2 cm^3 of distilled water to moisten the potassium iodide. Add 1.0 g of iodine (if necessary, crush to small pieces) to the moist potassium iodide, add 15 cm^3 of distilled water and stir well.

When no more iodine dissolves, add another 15 cm^3 of distilled water and stir well. Repeat with two more volumes of 15 cm^3 of distilled water and then make up to a total volume of 100 cm^3.

It is not essential that all the iodine dissolves. This gives a red-brown coloured (approximately 1.0%) iodine solution.

You **MUST** dilute the iodine to 0.01% and this will form a **yellow** solution.

Prepare a 0.01% solution by taking 1 cm^3 of the **1.0%** iodine solution and making up to 100 cm^3 with distilled water.

Prepare the 0.01% iodine solution **no more than one hour before** the examination. Keep the solution away from direct sunlight, for example in a brown glass bottle.

This is sufficient to stain either 10 circular blocks of agar approximately 7 cm diameter (Petri dishes) or its equivalent.

(ii) **U**, one block of agar, containing 0.2% starch labelled **U**, on a white tile or chopping board, covered with a damp paper towel to prevent evaporation.

The agar blocks may be prepared the day before as long as they are not allowed to dry out. 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.

This is prepared by dissolving 0.2 g of starch in a small volume of distilled water and mixed to make a paste. Make up to 100 cm^3 with hot distilled water. It will be necessary to heat the starch solution to dissolve the starch. Gently bring the starch solution to the boil, stirring continuously.

When the starch is dissolved, sprinkle 2 g of **technical** agar powder, a little at a time, onto the starch solution, stirring continuously until dissolved. Let the mixture cool to about 60 °C.

Pour the agar into shallow, flat containers (at least 10 mm in depth) to a depth of 5 mm in each container. The depth may be marked on a mounted needle or wooden splint for easy reference to ensure a 5 mm depth.

Keep the agar in cool conditions to set firmly. These containers must be placed on a horizontal flat surface so that the agar sets to an even depth of 5 mm.

Just before the examination, cut the agar into blocks measuring at least 30 mm × 30 mm × 5 mm. Cut enough blocks so that each candidate has 1 block at least 30 mm × 30 mm × 5 mm, on a white tile or chopping board, covered by a damp paper towel, labelled **U**.

This is sufficient for 6 candidates.

[H] **(iii)** You are reminded that S contains iodine solution so do not touch the reagents or the agar blocks.

S, one block of agar, containing 0.2% starch and stained with 0.01% iodine solution, labelled **S**, on a white tile or chopping board, covered with a damp paper towel to prevent evaporation.

The unstained agar blocks can be prepared the day before as in (ii).

No more than one hour before the start of the two hour examination:

- flood the surface of the agar with the **0.01%** iodine solution
- leave the iodine solution on the surface of the agar until it has stained just the surface of the agar a **light blue.** This should take approximately 5–10 minutes and no more than 20 minutes
- pour off the excess iodine.

Keep the stained agar **away from direct sunlight** and cover with damp paper towels.

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Just before the examination, cut the agar into blocks measuring at least 30 mm × 30 mm × 5 mm. Cut enough blocks so that each candidate has 1 block at least 30 mm × 30 mm × 5 mm, on a white tile or chopping board, covered by a damp paper towel, labelled **S**.

This is sufficient for 6 candidates.

[H] **(iv)** **E**, at least 40 cm^3 of 2% amylase solution in a beaker or container, labelled **E**.

This is prepared by adding 2 cm^3 of amylase (supplied by Cambridge) to 98 cm^3 of distilled water.

This needs to be made up no more than one hour before the start of the two hour examination.

This is sufficient for 2 candidates.

(v) **W**, at least 50 cm^3 of distilled water in a beaker or container, labelled **W**.

Apparatus for each candidate:

Apparatus	**Quantity**	✓
5 cm^3 syringe with the means to wash it out (note: needles are **not** required and should **not** be given to candidates)	1	
Container with distilled water, labelled **For washing**	1	
Container, labelled **For waste**	1	
Paper towels	8	
Test-tubes – with a diameter of at least 1 cm	6	
Test-tube rack or container to hold six test-tubes	1	
Beaker or container – clear – containing enough hot water (between 55 °C and 60 °C) to be used as a water-bath for 6 test-tubes	1	
Thermometer –10 °C to 110 °C	1	
White tile /chopping board	1	
Ruler in mm	1	
Scalpel or sharp blade	1	
Blunt forceps	1	
Mounted needle	1	
Stop-clock, stopwatch or sight of a clock **with a second hand**	1	
Glass marker pen	1	
Safety goggles/glasses	1	
Black card – approximately 15 cm by 15 cm	1	

During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1** using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a separate question paper) which should be enclosed with the candidates' scripts. If the scripts are in several packets please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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Question 2

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

(ii) Microscope with:
- 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.

On receipt of the slides, please check that they are labelled **N1** and that all the slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

Each candidate must have sole, uninterrupted use of the microscope for 55 minutes.

The number of slides supplied by Cambridge will be equal to half the candidate entry. Therefore, half of the candidates should start on **Question 1** and the other half should start on **Question 2**.

MATERIALS TO BE SUPPLIED BY CAMBRIDGE

(i) Question papers

(ii) Amylase (bacterial)

(iii) Slide **N1**

On receipt of the amylase, confirm the activity of the amylase by mixing 2 cm^3 of 2% amylase solution (see instructions) with 1% starch solution and test with iodine solution. There should be no colour change after 5 minutes. If amylase is not active, contact Cambridge.

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

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

- returned to Cambridge in the containers in which they were received, using the self-adhesive label. They must **not** be included in the packet of scripts.

Or

- purchased using the order form enclosed with the slides, which should be completed and returned to Cambridge. They must **not** be included in the packet of scripts.

Slides and boxes will be charged at the rate of £3 per slide and £1 per box.
If the items are not returned or purchased by the deadline stated on the order form they will be charged at £3.50 per slide plus £1 per box.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form in these Confidential Instructions. For Centres where more than one script packet is used, there must be a copy of the completed Report Form in each script packet.

These report forms are vital in order to allow the examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script packet.

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

REPORT ON PRACTICAL BIOLOGY

A Level

October/November Session 2012

The Supervisor or Teacher responsible for the subject should provide the following information.

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

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

(a) difficulties arising from faulty specimens or microscopes;

(b) accidents to apparatus or materials;

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

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

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

3. During the examination, the Supervisor should, **out of the sight of the candidates**, carry out **Question 1**, using the same solutions and reagents as the candidates. These results should be written in the Supervisor's Report (**not** on a spare Question paper), which should be enclosed with the candidates' scripts. If the scripts are in several packets, please ensure that a copy of the Supervisor's Report is enclosed with each packet of scripts. The Invigilator should **not** carry out **Question 1**.

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[Turn over

*Results of Question **1***

Temperature of examination room = ...°C

4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers of the places occupied by the candidates for each session. Separate paper can be used for this.

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

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

If scripts are required by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

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