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**BIOLOGY**

**9700/34**

Paper 3 Advanced Practical Skills 2

**October/November 2016**

**CONFIDENTIAL INSTRUCTIONS**

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

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

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This document consists of **10** printed pages and **2** blank pages.

### 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,  $\times 10$  (equal to 16 mm or  $\frac{2}{3}$ " )
- Low-power objective lens,  $\times 10$  (equal to 16 mm or  $\frac{2}{3}$ " )
- High-power objective lens,  $\times 40$  (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**  $\times 10$  or  $\times 40$  should be removed or replaced.

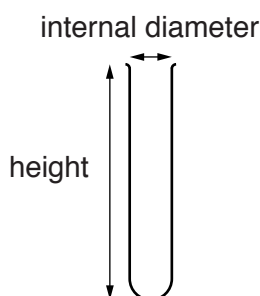
Each candidate must have uninterrupted use of the microscope for at least one hour.

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

<b>C</b> = corrosive	<b>MH</b> = moderate hazard
<b>HH</b> = health hazard	<b>T</b> = acutely toxic
<b>F</b> = flammable	<b>O</b> = oxidising
<b>N</b> = 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.

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** [info@cie.org.uk](mailto:info@cie.org.uk), by **fax** +44 1223 553558 or by **phone** +44 1223 553554.

**Confidential Instructions**

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

**In advance of the examination:**

- Prepare a copy of page 10 (**Protractors for measuring**) onto A4 sized paper for each candidate.
- Soak the pieces of potato the day before the examination.

See **Preparation of materials**

**For both Questions**

Each candidate will require:

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

More of the solutions and materials 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.**

### Question 1

Each candidate will require:

materials and apparatus for each candidate	quantity	✓
One sheet of four protractors (see <b>Preparation of materials</b> )	1	
6.0% sodium chloride solution in a beaker or container, labelled <b>S1</b> , provided at <b>room temperature</b> and covered to prevent evaporation. Two pieces of potato should be put into the solution the day before the examination (see <b>Preparation of materials</b> ).  <i>Please note this is intentionally not the same as the concentration stated on the Question Paper.</i>	approximately 100 cm <sup>3</sup> (must cover two pieces of potato)	
1.5% sodium chloride solution in a beaker or container, labelled <b>S2</b> , provided at <b>room temperature</b> and covered to prevent evaporation. Two pieces of potato should be put into the solution the day before the examination (see <b>Preparation of materials</b> ).  <i>Please note this is intentionally not the same as the concentration stated on the Question Paper.</i>	approximately 100 cm <sup>3</sup> (must cover two pieces of potato)	
3.0% sodium chloride solution in a beaker or container, labelled <b>S3</b> , provided at <b>room temperature</b> and covered to prevent evaporation. Two pieces of potato should be put into the solution the day before the examination (see <b>Preparation of materials</b> ).  <i>Please note this is intentionally not the same as the concentration stated on the Question Paper.</i>	approximately 100 cm <sup>3</sup> (must cover two pieces of potato)	
4.0% sodium chloride solution in a beaker or container, labelled <b>S4</b> , provided at <b>room temperature</b> and covered to prevent evaporation. Two pieces of potato should be put into the solution the day before the examination (see <b>Preparation of materials</b> ).  <i>Please note this is intentionally not the same as the concentration stated on the Question Paper.</i>	approximately 100 cm <sup>3</sup> (must cover two pieces of potato)	
Forceps (blunt)	1	
Knife or sharp blade or scalpel	1	
Mounted needle or seeker	1	
White tile or cutting surface	1	
Container (capacity approximately 200 cm <sup>3</sup> ), labelled <b>For waste</b>	1	
Paper towels	8	
Glass marker pen	1	
Suitable eye protection	1	

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

The plant tissue **must** be prepared the day before the examination and put into the solutions **S1**, **S2**, **S3** and **S4**.

The containers, with **S1**, **S2**, **S3** and **S4**, should be covered and put into a refrigerator overnight but removed to reach **room temperature** before the start of the examination.

Each candidate requires two pieces of the soaked plant tissue in each of the solutions **S1**, **S2**, **S3** and **S4**.

### Preparation of materials

- (i) **Protractors for measuring**, one sheet of 4 protractors  
This is prepared by photocopying the whole of page 10 and putting this sheet into a clear plastic wallet or laminating it.  
Spare copies should be available on request. Do **not** cut the sheet into separate individual protractors.

- (ii) **S1**, 6.0% sodium chloride solution

This is prepared by putting 6 g of sodium chloride into 25 cm<sup>3</sup> of distilled water in a beaker and making up to 100 cm<sup>3</sup> with distilled water, stirring well.

- (iii) **S2**, 1.5% sodium chloride solution

This is prepared by putting 1.5 g of sodium chloride into 25 cm<sup>3</sup> of distilled water in a beaker and making up to 100 cm<sup>3</sup> with distilled water, stirring well.

- (iv) **S3**, 3.0% sodium chloride solution

This is prepared by putting 3 g of sodium chloride into 25 cm<sup>3</sup> of distilled water in a beaker and making up to 100 cm<sup>3</sup> with distilled water, stirring well.

- (v) **S4**, 4.0% sodium chloride solution

This is prepared by putting 4 g of sodium chloride into 25 cm<sup>3</sup> of distilled water in a beaker and making up to 100 cm<sup>3</sup> with distilled water, stirring well.

- (vi) **Pieces of plant tissue**

8 pieces of plant tissue are required for each candidate, two pieces for each of the concentrations of sodium chloride solution **S1**, **S2**, **S3** and **S4**.  
A candidate can request further samples of plant tissue.

You may use any variety of the white (or Irish) potato, *Solanum tuberosum*. The potatoes should be as fresh as possible to avoid the effects of storage.

### To prepare the potato

- Remove the outer skin.
- Cut slices of potato 1 cm thick and 6–9 cm long, e.g. with a large kitchen knife.
- Cut each slice into strips with the same cross-sectional area, 1 cm × 0.5 cm. Do **not** use cork borers as this may compress the tissues.
- Cut these strips to **different** lengths at least 6 cm long but no longer than 9 cm. There must be enough for 8 strips per candidate plus some spares.
- Put equal numbers of strips into each of the solutions **S1**, **S2**, **S3** and **S4** so that all the strips are submerged in the sodium chloride solution. Cover and put in the refrigerator.

Before the start of the examination, for each candidate, put **S1**, **S2**, **S3** and **S4** into labelled beakers or containers. Remove two strips of potato, of **different** lengths, from each concentration and put into the beaker containing the **appropriate** concentration of sodium chloride solution. Make sure both strips are submerged in the liquid. Cover the beakers or containers.

## Question 2

Each candidate will require:

(i) Slide L1

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

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

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

(ii) Microscope (as described on page 2)

For each candidate:

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

## 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)(iv)** and **1(a)(vi)**.

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 for this examination

- Slide L1

**RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE**

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

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

or

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

Slides and boxes will be charged at the rate of £3 per slide and £1 per box.

If the items are not returned or purchased by the deadline stated on the order form, they will be charged at £3.50 per slide plus £1 per box.





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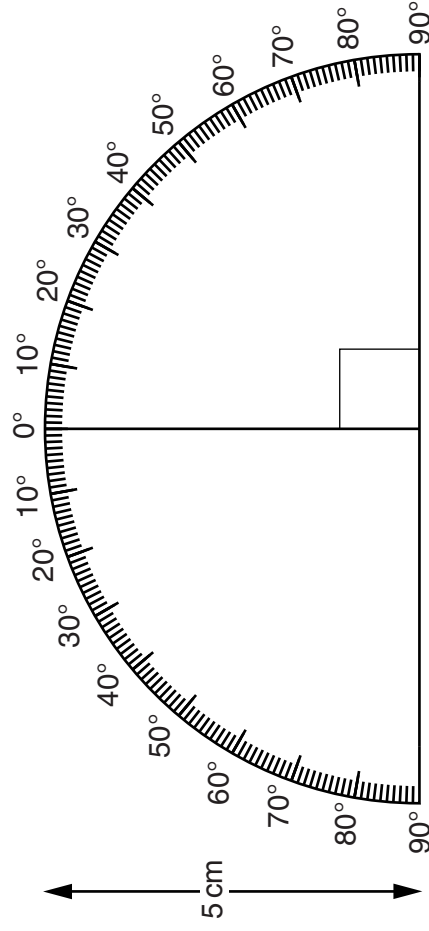
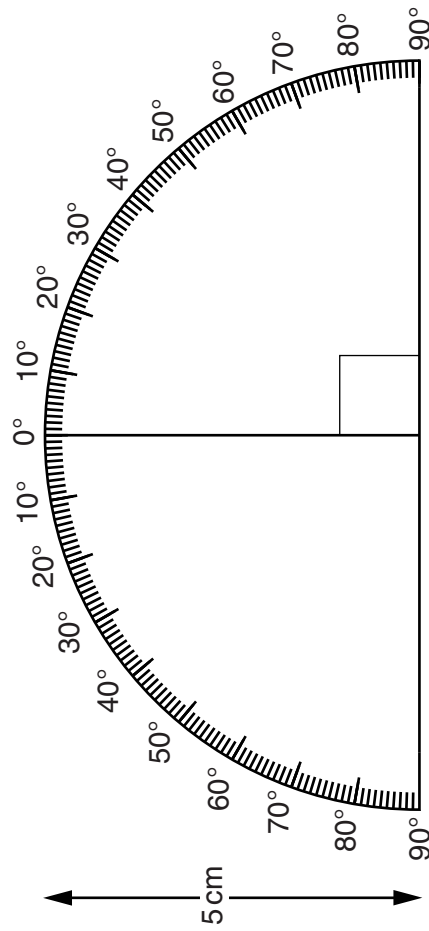
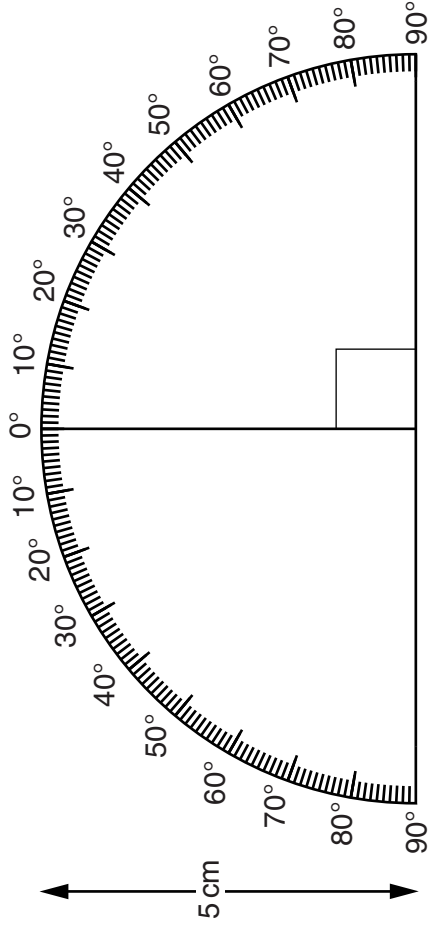
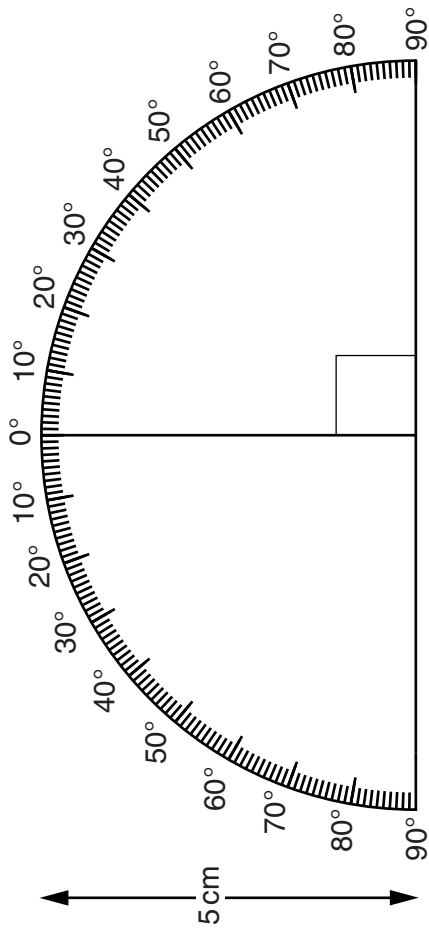
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**Protractors for measuring**



**This form should be completed and sent with the scripts.**

### **SUPERVISOR'S REPORT**

**October/November 2016**

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

- 1 Was any difficulty experienced in providing the necessary materials? If so, give brief details.
  
- 2 Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:
  - (a) difficulties arising from faulty specimens or microscopes;
  - (b) accidents to apparatus or materials;
  - (c) assistance provided in case of colour blindness;
  - (d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.

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

- 3 During the examination, the Supervisor or a competent biologist should follow the steps in **Question 1** in order to obtain results for **1(a)(iv)** and **1(a)(vi)**. 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 Principal or the Examinations Officer)

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

Signed .....

Name (in block capitals) .....

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

Centre name .....

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

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

Temperature of examination room ..... °C

Results for **Question 1(a)(iv)** and **1(a)(vi)**

