

**MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers**

9700 BIOLOGY

9700/35

Paper 31 (Advanced Practical Skills 1), maximum raw mark 40

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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| | | |
|---------------|---------------------------------------|-----------------|
| Page 2 | Mark Scheme: Teachers' version | Syllabus |
| | GCE AS/A LEVEL – May/June 2012 | 9700 |

Mark scheme abbreviations:

- ;** separates marking points
- /** alternative answers for the same point
- R** reject
- A** accept (for answers correctly cued by the question, or by extra guidance)
- AW** alternative wording (where responses vary more than usual)
- underline** actual word given must be used by candidate (grammatical variants excepted)
- max** indicates the maximum number of marks that can be given
- ora** or reverse argument
- mp** marking point (with relevant number)
- ecf** error carried forward
- I** ignore
- AVP** Alternative valid point (examples given as guidance)

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|----------------------|-------------|--|---|
| 1 (a) (i) | | | |
| ACE interpretation 1 | | The sample of plant tissue soaked in the highest concentration of sodium chloride solution will have the most bend at the start and when placed in water the bend will change the most ; | |
| (a) (ii) | | | [1] |
| MMO decision 1 | | length one of 50 or 55 or 60 or 65 or 70 or 75 or 80 or 85 or 90 | AND units mm; |
| (a) (iii) | | | [1] |
| MMO decision 1 | | <i>Idea of use same pressure</i> or repeat readings or use more than one piece of plant material; | |
| (a) (iv) | | | [1] |
| MMO decision 1 | | <i>evenly spaced whole minutes not less than 3 minutes until no further change in bend or until 10 minutes;</i> | |
| (b) (i) | | | [7] |
| PDO recording 2 | mp 1 | table with all cells drawn | AND heading (top or left) sample or plant tissue(s) or solution or conc(entration) ; |
| | mp 2 | (heading) <u>angle of bend degree(s) or °;</u> | |
| | | | Do not give mark if • units in cells of column below heading |
| MMO collection 3 | mp 3 | <u>at 0 time</u> records angles for P1, P2, P3, P4 ; | |
| | mp 4 | highest number in P1 at first time recorded; | |
| | mp 5 | In P3 angles of bend decrease when comparing first time and last time; | |

| | | | |
|-----------------------------|--|---|--|
| MMO decisions 2 | mp 6 | shows all angles to same precision i.e. whole or degrees; | |
| | mp 7 | shows replicate; | |
| (b) (ii) | | | [2] |
| ACE interpretation 1 | mp 1 | correct with their results for first time measurement (usually 0) for P1, P2, P3 ; | |
| | | | |
| ACE conclusion 1 | mp 2 | (using first recorded result) P4 recorded in correct position (below 0.25 or as lowest angle of bend); | |
| | | Do not give mark if <ul style="list-style-type: none"> if write a concentration for P4 | |
| (b) (iii) | | | [1] |
| ACE conclusion 1 | | higher or less negative <u>water potential</u> outside or <u>water potential</u> gradient steeper in 1 mol | AND water enters (quicker) by <u>osmosis</u> ; |
| (b) (iv) | | | [max 2] |
| ACE interpretation MAX 2 | | cause of error | WITH idea of error |
| | mp 1 | (dependent variable) pressure | inaccurate / varies / not same; |
| | mp 2 | material | difficult to hold and measure; |
| mp 3 | (standardised variables) lengths or widths or size or cross sectional area | | different / varies / not same; |

| | | |
|---|-------------|--|
| (b) (v) | | |
| ACE interpretation 1 | | <u>+/- 1 degree or °;</u> |
| <p>(b) (vi) note: <i>reliable: to have results which are as repeatable as possible</i> [max 3] <i>accuracy: change method of measuring to obtain results as close as possible to the true value</i></p> | | |
| ACE improvements MAX 3 | | control of any standardised variable s |
| | mp 1 | same type or source of plant material or same part of root; |
| | mp 2 | use cork borer or microtome/machine or Vernier calipers; |
| | mp 3 | test each solution separately; |
| | mp 4 | volume of water using measuring cylinder or syringe or graduated pipette; |
| | mp 5 | ref. to improvement of protractor e.g. stabiliser or support for bottom of sample; |
| | mp 6 | repeat or replicate or obtain average or mean; |
| [Total 20] | | |

| 2 (a) | | | | | |
|------------------|------|---|--|---|--|
| PDO layout 1 | mp 1 | no shading | AND largest cell larger than 30 mm | AND clear, sharp, unbroken lines for any outer boundary lines drawn; Do not give mark if <ul style="list-style-type: none"> less than two outer walls any ruled lines any line 1 mm or thicker any feathery or broken / dashed or gap in line any 'tail' or overlap with an enclosed area drawn over the print of question | |
| MMO collection 3 | mp 2 | only 4 cells drawn | | AND shows two from each slide; | |
| | mp 3 | (detail of observable feature) starch grains uneven sizes or drawn as irregular area inside cell; | | | Do not give mark if <ul style="list-style-type: none"> any ruled lines |
| | mp 4 | cell walls drawn as double lines with middle lamella between each pair of cells; | | | |
| PDO recording 1 | mp 5 | annotation with label line or outside drawn area for difference; S1 starch grains AND (iodine) black vs S2 (methylene blue) clear / white or S1 starch grains visible / see more vs S2 starch grains not visible / see few or (iodine) single mass vs (methylene blue) separate grains | | | |
| MMO decision 1 | mp 6 | labels with a ruled label line one starch grain only; | | | |

(b) (i)

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|---------------------|------|--|--|---|
| PDO layout 1 | mp 1 | no shading | AND larger than 60 mm across widest point | AND clear, sharp, unbroken lines for outermost two lines only ; Do not give mark if <ul style="list-style-type: none"> less than four hand drawn enclosed areas (not cells) any line 1mm or thicker any ruled lines any feathery or broken / dashed or gap in line any 'tails' or overlaps drawn over the print of question |
| | | | | |
| MMO collection 2 | mp 2 | no cells drawn | | AND whole section; |
| | mp 3 | triangular region shown for thickened cells; | | |
| PDO recording 1 | mp 4 | (outer ring) drawn with two continuous lines | | AND drawn enclosed area in centre space ; |
| MMO decision 2 | mp 5 | (except outer layer and centre space) at least three additional enclosed areas; | | |
| | mp 6 | correct label, with label line to <u>enclosed</u> area, xylem; | | |
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| (b) (ii) | | | |
| PDO display 2 | mp 1 | shows addition of at least three lengths and widths measurements | AND shows division by number of measurements for both length and width; |
| | mp 2 | shows larger whole number to smaller whole number; | |
| | | | Do not give mark if <ul style="list-style-type: none"> • units in ratio • if not to smallest common denominator |
| (c) (i) | | | [4] |
| PDO layout 4 | mp 1 | x-axis <u>time (t) hours or hr(s)</u> | AND y-axis <u>concentration of sugars (l) mmol;</u> |
| | mp 2 | scale as x-axis <u>5 to 2 cm labelled each 2 cm</u> except origin 25 | AND y-axis <u>0.10 to 2 cm labelled each 2 cm;</u> |
| | mp 3 | correct plotting; | |
| | mp 4 | <u>two lines with five plots</u> with <u>ruled</u> lines point to point | AND (quality) <u>smooth line less than 1 mm thick;</u> |
| | | | Do not give mark if any extrapolation |

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|--|-----------------------|---|---|---|--|-----------------------|--------------------|--|--|-----------------------|---|
| (c) (ii) | | | | | | | | | | | |
| ACE interpretation 1 | mp 1 | <i>Idea of</i> concentration of sugars decreases for 8 hrs or in dark and then increases; | | | | | | | | | |
| | | | | | | | | | | | |
| ACE conclusion 1 | mp 2 | <i>(explains decrease and increase)</i> | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"><i>in context of decrease or in dark / no light / night</i></td> <td style="text-align: center;"><i>in context of increase or in light / sun / day</i></td> <td></td> </tr> <tr> <td style="text-align: center;"><i>sugars used up</i></td> <td style="text-align: center;"><i>sugars made</i></td> <td></td> </tr> <tr> <td style="text-align: center;"><i>only respiration or no photosynthesis</i></td> <td style="text-align: center;"><i>photosynthesis</i></td> <td style="text-align: center;">;</td> </tr> </table> | <i>in context of decrease or in dark / no light / night</i> | <i>in context of increase or in light / sun / day</i> | | <i>sugars used up</i> | <i>sugars made</i> | | <i>only respiration or no photosynthesis</i> | <i>photosynthesis</i> | ; |
| | | <i>in context of decrease or in dark / no light / night</i> | <i>in context of increase or in light / sun / day</i> | | | | | | | | |
| | | <i>sugars used up</i> | <i>sugars made</i> | | | | | | | | |
| <i>only respiration or no photosynthesis</i> | <i>photosynthesis</i> | ; | | | | | | | | | |
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| [Total: 20] | | | | | | | | | | | |