

MARK SCHEME for the October/November 2012 series

9700 BIOLOGY

9700/33

Paper 3 (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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

| | | | |
|---------------|---|-----------------|--------------|
| Page 2 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

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) |
| <u>underline</u> | 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 |
| ACE | Analysis, Conclusions and Evaluation (skills) |
| MMO | Manipulations, Measurement and Observation (skills) |
| PDO | Presentation of Data and Observations (skills) |

| | | | |
|--------|--|----------|-------|
| Page 3 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | | | |
|------------------|-----|---|---|--|
| 1 (a) (i) | | | | [1] |
| MMO decision 1 | | size or diameter or length or width or surface area (bod) or volume (bod) or colour or whole or same shape; | | |
| | | Do not give mark if <ul style="list-style-type: none"> any other variable than seeds Ignore <ul style="list-style-type: none"> number mass same type or species or age | | |
| (ii) | | | | [1] |
| MMO decision 1 | | (any one temperature) °or <u>degree(s) C</u> AND any whole number 80 to and including 100 ; | | |
| (iii) | | | | [3] |
| MMO decisions 3 | mp1 | <u>(0).3 AND (0).2 AND (0).1;</u> | | |
| | | Not required are <ul style="list-style-type: none"> units zero | Do not give mark if <ul style="list-style-type: none"> incorrect units e.g. mol dm⁻³ | |
| | mp2 | <u>cm³ or ml(s) shown at least once for R AND (0.3)7.5 and (0.2) 5 and (0.1)2.5;</u> Do not give mark if <ul style="list-style-type: none"> on on units e.g. cm or cm² | | |
| | mp3 | values of (R and W) for ALL tubes must add up to <u>10</u> (minimum two tubes); | | |
| (iv) | | | | [1] |
| MMO decision 1 | | <u>cm³ or ml(s) once</u> | AND (volume of R) | AND (<u>one</u> volume of Benedict's) any one whole number 2 to 10 that is 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10; |

| | | | |
|--------|--|----------|-------|
| Page 4 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| (v) | | [4] |
|------------------|-----|--|
| PDO recording 2 | mp1 | <p>table with all cells drawn</p> <p>AND heading (top row or column to left of recorded data) <u>percent</u>(age) or <u>% conc</u>(entration) (of)<u>R</u> or <u>reducing sugars</u> ;</p> <p>Do not give mark if</p> <ul style="list-style-type: none"> • % in cells of headed column • other units e.g. mol dm⁻³ • more than one row in one cell for multiple trials |
| | mp2 | <p>(heading for any column/row including mean) only time (with) <u>s</u> or <u>sec(onds)</u>;</p> <p>Do not give mark if</p> <ul style="list-style-type: none"> • units in cells of this column/row • min(utes) • headings for volumes or method information or in cells e.g. volumes and concentrations in same cell |
| MMO collection 2 | mp3 | <p>(mark first column/row of recorded results) records at least three results with <u>whole numbers only</u> that is any whole number less than 180 or records ' > or more than 180';</p> <p>Must have</p> <ul style="list-style-type: none"> • <u>whole</u> numbers between 3 and 180 or ' > or more than 180' <p>Do not give mark if</p> <ul style="list-style-type: none"> • '< or less than 180' • e.g. 0:45 or 50:45 |
| | mp4 | <p>(mark first column/row of recorded time for recording correct pattern) recorded time for <u>0.4%</u> is the shorter/lower value than lowest concentration;</p> <p>Must have</p> <ul style="list-style-type: none"> • units for time recorded somewhere e.g. seconds with tenths or min:sec • minimum two recorded times including 'more than 180' <p>Do not give mark if</p> <ul style="list-style-type: none"> • no units for time anywhere |

| | | | |
|--------|--|----------|-------|
| Page 5 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | | | |
|----------------------|-----|---|---|-----|
| (vi) | | Do not give mark if no results for R or results all more than 180 or S. | | [1] |
| ACE interpretation 1 | | <u>correct estimate</u> with their <u>time</u> results | AND uses only one of following values <ul style="list-style-type: none"> • one value of 0.1, 0.2 , 0.3 ,0.4 • between 0.1 and 0.2 • between 0.2 and 0.3 • between 0.3 and 0.4 • less than 0.1 • more than 0.4 • or their own concentrations; | |
| | | Do not give mark if <ul style="list-style-type: none"> • calculate or estimate between two of their concentration values • description or colour only in results | | |
| (vii) | | Do not give mp 1 if no result for seeds ecf for mp 2 | | [2] |
| ACE conclusion 2 | mp1 | (should be) yes if result is positive for reducing sugar; | | |
| | | Can have <ul style="list-style-type: none"> • <i>no if their result for S is negative for reducing sugar</i> | | |
| | mp2 | positive result described for seed sample either time or colour change | AND so <u>reducing sugars</u> OR sucrose broken down; | |
| | | OR negative result no colour change or stayed blue | AND so no <u>reducing sugars</u> OR sucrose not broken down; | |

| | | | |
|--------|--|----------|-------|
| Page 6 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | |
|---|-----|--|
| (b) | | [3] |
| | | MUST mention seeds (in solution/sucrose) in correct context to access marks. Do not give mark if <ul style="list-style-type: none"> change more than one variable |
| ACE improvements 3 | mp1 | (independent) 5 or more temperatures or described OR gives examples of 5 or more (units NOT required); |
| | | Do not give mark if <ul style="list-style-type: none"> change more than one variable in context of Benedict's test |
| | mp2 | (how to keep temperature standardised in context of different temperatures only) use thermostat(ically-controlled) water-bath; |
| | | Do not give mark if <ul style="list-style-type: none"> ref. to temperature controlled room e.g. air conditioned or thermostat controlled room |
| | mp3 | (standardisation of variables only in context of changing temperature) same number or example of number or mass or example of mass of seeds Ignore amount OR same volume or example of volume with units of sucrose OR concentration or example of concentration of sucrose solution OR (seeds NOT Benedict's) same time in water-bath; |
| | | Do not give mark if <ul style="list-style-type: none"> not idea that changing temperature |
| (c) (i) | | [4] |
| If draw a chart then max 1 for O | | |
| PDO layout 4 | O | x-axis <u>pH(p.h. PH Ph)</u> AND y-axis <u>conc(entration of) reducing sugar(s)_(l) mmol(e) hr⁻¹;</u> |
| | S | scale on x-axis <u>1.0 to 2 cm with 4 at origin labelled each 2cm</u> except 8 need not be labelled AND y-axis <u>10 to 2 cm labelled each 2 cm;</u> except origin and 60 need not be labelled |
| | P | correct plotting of <ul style="list-style-type: none"> five points Check first four points for bark and last point for leaves; |

| | | | |
|---------------|---|-----------------|--------------|
| Page 7 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | | | |
|--|---|---|---|---|
| | L | plots joined with <u>ruled</u> lines exactly point to point or <u>curve through set of 5 points</u> | AND (quality) <u>smooth line for bark less than 1 mm thick use grid</u> | AND for each line a label leaves and bark or uses key; |
|--|---|---|---|---|

Additional guidance:

| | |
|---|--|
| O | |
| S | Must have label of value of origin if zero not at origin |
| P | plots (crosses or centre of dot) must be nearer than halfway line – up or down or either side OR if meant to be within two lines then must not be on line above or below or either side |
| | <p>Can have</p> <p>ecf if origin not zero but use scales as given ecf if scale correct but not labelled every 2 cm ecf if reverse axes and scale is <u>x-axis 20 to 2 cm and y-axis to 1 to 2 cm</u> ecf if scale of pH 2 to 2 cm on x-axis or y-axis</p> <p>Do not give mark if</p> <ul style="list-style-type: none"> any blobs or dots alone any cross or dot too large |
| L | <p>Do not give mark if</p> <ul style="list-style-type: none"> any feathery or gap in line or dashed line any irregular thickness any extrapolation |

(ii)

[1]

| | | |
|-------------------------|--|--|
| ACE interpretation 1 | (activity/concentration of reducing sugars) increases/rises to (pH) <u>5.3</u> | AND decreases to (pH) <u>7.8</u> ; or rises by <u>2.5</u> |
| | | |

(iii)

[1]

| | |
|---------------------|---|
| ACE conclusion 1 | In correct context idea of (enzyme) denatured or denaturation; |
|---------------------|---|

[Total: 22]

| | | | |
|--------|--|----------|-------|
| Page 8 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | | | | |
|----------------|------------------|---|--|---|--|
| 2 (a) (i) [5] | | | | | |
| PDO layout 1 | mp1 | <p>Do not give mark if drawn over the print of question or <u>any</u> shading anywhere or <u>any</u> ruled or compass lines or break in outline which does not have a line to seal open ends</p> | <p>AND Do not give mark if smaller than 60 mm across widest point</p> | <p>AND (clear, sharp, unbroken lines); Do not give mark if</p> <ul style="list-style-type: none"> less than 3 enclosed area <p>the outermost enclosed area has</p> <ul style="list-style-type: none"> <u>any</u> part of line 1mm or thicker (use grid) <u>any</u> feathery or dashed or gap in line <u>any</u> 'tails' or overlaps | |
| | MMO collection 3 | mp2 | no cells drawn AND whole section drawn; | | |
| | | mp3 | <p>(epidermal layer and endodermis) both layers drawn as paired lines with a gap between the layers;</p> <p>Do not give mark if</p> <ul style="list-style-type: none"> regular enclosed areas e.g. ovals or circles between innermost paired lines | | |
| mp4 | | <p>line separating pith from endodermis layer is continuous and wavy OR for epidermis three lines (two layers) for most of layer;</p> | | | |
| MMO decision 1 | mp5 | labels <u>cortex</u> with label line touching; | | | |
| | | <p>Do not give mark if</p> <ul style="list-style-type: none"> any label which is biologically incorrect e.g. animal or cell structure <u>any label</u> written within drawn area | | | |
| (ii) [4] | | | | | |
| PDO layout 1 | mp1 | <p>Do not give mark if drawn over the print of question or <u>any</u> shading anywhere or <u>any</u> ruled or compass lines</p> | <p>AND Do not give mark if smaller than 40 mm across widest cell;</p> | <p>AND (clear, sharp, unbroken lines) outer boundary lines of any cells Do not give mark if</p> <ul style="list-style-type: none"> less than 5 cell outlines <p>any of outermost lines have</p> <ul style="list-style-type: none"> <u>any</u> line 1 mm or thicker (use grid) <u>any</u> feathery or dashed or gap in line <u>any</u> 'tails' or overlaps | |
| | | | | | |

| | | | |
|----------------------|-----|--|--|
| MMO collection 2 | mp2 | <u>only five</u> complete cells drawn | AND each cell must touch another cell at least at one point to form one group ; |
| | | | Do not give mark if <ul style="list-style-type: none"> any ruled or compass lines |
| | mp3 | at least one intercellular space at least 3 mm across at widest point OR at least three cells with rounded shape with no straight sharp corners in correct context; | |
| | | Can have <ul style="list-style-type: none"> drawn vacuoles/nucleus | Do not give mark if or more cells raw EM organelles e.g. mitochondria raw incorrect cell structure e.g. sieve plates, ll cells drawn separate |
| PDO recording 1 | mp4 | all cells with cell walls drawn as double lines all the way round (inner line can touch but not cross outer line-overlap) AND (between any two adjacent cells middle lamella drawn) so three lines less than 4 mm across at widest point; | |
| (b) (i) | | | [3] |
| MMO decision 1 | mp1 | Step 1 Ignore first box second box <u>must be</u> whole number 3 to 92 | AND EITHER answer <u>must be</u> (0).00X(.....) where X is a number 1 to 9 OR expressed in standard form e.g. $\times 10^{-3}$; Do not give mark if fraction |
| PDO display 1 | mp2 | (either box in Step 2) 1000 or 10^3 | AND any answer from step 1 in other box; |
| | | ecf any answer to step 1 | |
| ACE interpretation 1 | mp3 | <u>μm</u> or <u>mm</u> AND <u>answer from step 1 $\times 1000$</u> ; | |
| | | | |

| | | | |
|---------|--|----------|-------|
| Page 10 | Mark Scheme | Syllabus | Paper |
| | GCE AS/A LEVEL – October/November 2012 | 9700 | 33 |

| | | | | | |
|---|---|--|---|---|--|
| (ii) | | [2] | | | |
| MMO collection 1 | mp1 | measures correctly in eyepiece graticule units; measures total length <u>57 or 58 or 59 or 60 or 61 or 62</u> (epg units) | | | |
| | | Do not give mark if <ul style="list-style-type: none"> • m or mm or cm or m or stage micrometer units • hoice of measuring e.g. mm and epгу | | | |
| PDO display 1 | mp2 | (shows multiplication by answer from (b)(i)) any one value (multiplied by) <u>X</u> by <u>answer from (b)(i) step 2</u> ; | | | |
| | | <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">Can have <ul style="list-style-type: none"> • alternative signs • or * or value (b)(i) </td> <td style="width: 50%; vertical-align: top;">Do not give mark if <ul style="list-style-type: none"> • division shown </td> </tr> </table> | Can have <ul style="list-style-type: none"> • alternative signs • or * or value (b)(i) | Do not give mark if <ul style="list-style-type: none"> • division shown | |
| Can have <ul style="list-style-type: none"> • alternative signs • or * or value (b)(i) | Do not give mark if <ul style="list-style-type: none"> • division shown | | | | |
| (c) | | [4] | | | |
| PDO recording 1 | mp1 | organise as a table with only three columns or rows separated by lines (no cells needed) Ignore number column | | | |
| | | <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">AND headings in any order only <u>K1/slide</u> and <u>Fig 2.4</u></td> <td style="width: 33%;">AND third column/row contains list of tissues;</td> </tr> </table> <p>(features) <u>K1/slide.</u> <u>Fig 2.4</u> (K1 or Fig 2.4 either way round and other column to left, right or in middle) ,</p> <div style="text-align: center;"> <table style="margin: auto; border: none;"> <tr> <td style="border: none;"> </td> <td style="border: none;"> </td> </tr> </table> </div> | AND headings in any order only <u>K1/slide</u> and <u>Fig 2.4</u> | AND third column/row contains list of tissues; | |
| AND headings in any order only <u>K1/slide</u> and <u>Fig 2.4</u> | AND third column/row contains list of tissues; | | | | |
| | | | | | |

| | | | | | | |
|-----------------------|-----------------------------|--|--|--|--|--|
| ACE interpretations 3 | max 1 | | feature | K1 | Fig. 2.4 | |
| | | mp2 | (vascular bundles or tissue shape) | absent or not visible/seen or cross shape or not in ring or irregular | present or visible/distinct or ring or regular; | |
| | | | (position) | inner or inside or near endodermis/pericycle | outer or towards outside or near epidermis; | |
| | | | (quantity of vascular tissue bundles/xylem/phloem) | Idea of less or small(er) or few(er), narrow(er) | Idea of more or large(r) or wide(r); | |
| | | cambium | no(one) or absent or has not | yes or present or has; | | |
| | max 2 | mp3 | pith or middle or centre | any difference for central area either way round e.g. present vs absent or small(er) vs large(r) or not hollow vs hollow; | | |
| | | mp4 | endodermis or pericycle or stele | yes or present or has | no(one) or absent or has not; | |
| | | mp5 | cortex | large(r) or wider or more | small(er) or narrower; | |
| | | mp6 | epidermis | thin(ner) or narrow(er) or one cell | thick(er) or wide(r) or large(r) or more than one cell | |
| | | | thickened layer/collenchyma/sclerenchyma | no(one) or absent or has not | has or present or yes; | |
| mp7 | hairs (root) or (trichomes) | yes or present or has or many hairs or rough | no(one) or absent or has not or smooth; | | | |
| | | | | | [Total: 18] | |