**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Advanced Subsidiary Level and GCE Advanced Level**

# MARK SCHEME for the May/June 2013 series

## 9700 BIOLOGY

**9700/33**      Paper 33 (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 May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

**CAMBRIDGE**
International Examinations

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) |

**1 (a)** [max 11]

Summary:

(MMO Decision) test for <u>glucose/reducing sugar</u> **before** <u>sucrose/non-reducing sugar;</u>

(MMO Decision) tests only solution(s) not identified;

(MMO Decision) appropriate volumes of Benedict's and sample;

| marking point | | test 1 | test 2 | test 3 |
|---|---|---|---|---|
| MMO decisions 3 | mp1 | | glucose/reducing sugar | sucrose/non-reducing sugar |
| | | glucose/reducing sugar | sucrose/non-reducing sugar | |
| | | glucose/reducing sugar | | sucrose/non-reducing sugar; |
| | mp2 | **S1**, **S2**, **S3** | **AND** any two of **S1**, **S2**, **S3** without test 1 | **AND** only one of **S1**, **S2**, **S3** without test 1 and 2; |
| | mp3 | check glucose/reducing sugar test | $cm^3$ **AND** Benedict's solution volume | equal to or more than volume (of test solution); |

| Page 4 | Mark Scheme | Syllabus | Paper |
|---|---|---|---|
| | GCE AS/A LEVEL – May/June 2013 | 9700 | 33 |

correct context of molecule tested and reagent shown by brackets.

<table>
<tr>
<td rowspan="2">MMO Decision on method</td>
<td>(starch)<br><i>idea of:</i><br>uses <u>iodine</u></td>
<td>(<u>glucose</u> )<br><br><u>Benedict's</u></td>
<td><b>AND</b><br><u>boil</u><br><br>or<br><br><b>or</b> boil/heat to <u>degrees</u> or <u>°C</u> <b>AND</b> any whole number 80 to and including 100 or range within 80 to 100 e.g. 80 to 100;</td>
<td>(sucrose )<br>add HC<i>l</i>/named acid <b>AND</b> boil <b>AND</b> neutralise with NaHCO₃ or named alkali;</td>
</tr>
<tr>
<td><b>Do not give mark if</b><br>• heat</td>
<td colspan="3"></td>
</tr>
<tr>
<td rowspan="2">MMO Collection records results</td>
<td>(starch+iodine)<br><br><u>only one</u> positive result<br><br>Blue/black or black</td>
<td colspan="2">(glucose + Benedict's)<br><br><u>only one</u> positive result<br><br>green or yellow or orange or red or brown or any combination;</td>
<td>(sucrose+Benedict's)<br>only for test 2 or test 3 where after glucose test<br><br><u>only one</u> positive result<br>green or yellow or orange or red or brown or any combination; <b>ignore</b> brick<br><br><b>Do not give mark if</b><br><br>• <b>S1</b> and <b>S3</b> tested</td>
</tr>
<tr>
<td colspan="3">The first test must have recorded results for <u>all three</u> solutions.</td>
</tr>
<tr>
<td>ACE interpretation 1</td>
<td>(starch + iodine)<br><br>(<b>S</b>)<u><b>2</b></u> and <u>starch</u>;</td>
<td colspan="2">(glucose/ reducing sugar+Benedicts)<br><br>(<b>S</b>)<u><b>3</b></u> and <u>glucose</u>;</td>
<td>(sucrose+Benedicts)<br><br><u>only for test 2 if test 1 is glucose</u><br>(<b>S</b>)<u><b>1</b></u> and <u>sucrose</u>;</td>
</tr>
</table>

| **(b) (i)** | | | | [1] |
|---|---|---|---|---|
| ACE interpretation 1 | 1 | glucose; | | |

**(ii)** [4]

| | mp1 | table with all cells drawn | **AND** heading (top row or left column of recorded observations) solution (tested) or mixture or sample; |
|---|---|---|---|
| PDO recording 2 | | | |
| | mp2 | (heading for any column/row) (observation of or change in) observation(s) or colour ; | |
| | | **allow** recorded just a description of result e.g. yellow solution or no change | |
| MMO collection 2 | mp3 | recorded only for **S1**/sucrose **AND S2**/starch any results; | |
| | | | **Do not give mark if** • recorded **S3** anywhere |
| | mp4 | (result for) just **S2**/starch | (glucose/Benedict's/reducing sugar test) green/ yellow/orange/red/brown or any mixture of these colours; **If no reducing sugar test then** (with iodine/starch test) yellow, orange, red, brown or any mixture of these colours |
| | | **Must have** • colour recorded | **Do not give mark if** • no change or positive or ticks unless key for colour |

**(b) (iii)** [1]

| | 1 | **S2** or starch | **AND** either *idea of* has glucose/ reducing sugar | **AND** (glucose/Benedict's/reducing sugar test) turned green/yellow/orange/red/brown or positive; |
|---|---|---|---|---|
| ACE conclusion 1 | | | **OR** *idea of* no starch or starch broken down or starch/did before hydrolysis | **AND** (as starch iodine/test) did not turn blue/black or negative or stays yellow/orange/red/brown or no change |

| **(c)** | | | [3] |
|---------|---|---|-----|
| | | **R** if change another variable, e.g. use **S1**, **S2** and **S3**.<br><br>**R** if change of temperature in context of Benedict's test, e.g. add Benedict's then change temperature | |
| **ACE improvements 2** | mp1 | (independent variable)<br>*idea of* at least 5 temperatures<br>or<br>examples (can have even if no units) (within range 5 to 100); | |
| | mp2 | (in context of temperature change)<br>Idea of (maintained) in thermostatic(ally-controlled) water-bath<br><br>or<br>describe use of heating and cooling or hot/cold water<br><div align="right">**AND** uses thermometer (to check temperature) ;</div> | |
| | | **A**<br>thermoregulatory<br>electr(on)ic or digital<br>incubator | ***Do not give mark if***<br>• air-conditioned or temperature-controlled rooms |

*AND* <u>one</u> of the following only in context of changing temperature:
*ignore* number with **S**
*A* any **S** or sucrose

***Do not give mark if*** glucose

| **ACE improvements max 1** | mp3 | *(standardise variables)*<br>keep volumes of E/enzyme **AND** S/substrate/starch/sucrose the same or any volume any volume between 2 cm$^3$ and 25 cm$^3$ (units once); |
|---------|------|----------|
| | mp4 | equilibrate E/enzyme and **S**/substrate/starch/sucrose separately described **AND** then mix; |
| | mp5 | (dependent variable)<br>*idea of* test with iodine or test for starch<br>or<br>*idea of* test with Benedict's or test for glucose/reducing sugar; |

<div align="right">[Total: 20]</div>

*PMT*

**2 (a) (i)** [2]

**Do not give** either mark if include units other than ep(g) u(nits)

| MMO collection 2 | mp1 | **L** | **M** | **N** | **P** |
|---|---|---|---|---|---|
| | | two of <u>2 or 2.5 or 3 or 3.5</u><br><br>any number can be used twice | | **AND** <u>any two of 6 or 6.5 or 7 or 7.5 or 8</u>;<br><br>any number can be used twice | |
| | | **Can have** ½ | | | |
| | mp2 | any four values which add up to 20; | | | |
| | | **Can have** 0.5 or ½ | | **Do not give mark if**<br>• any other decimals or fractions, e.g. 0.1 or 0.2 or ¼, etc. | |

| Page 8 | Mark Scheme | Syllabus | Paper |
|---|---|---|---|
| | GCE AS/A LEVEL – May/June 2013 | 9700 | 33 |

| | | (ii) | | | [3] |
|---|---|---|---|---|---|

| | | suitable plan diagram; | | |
|---|---|---|---|---|

| PDO layout 1 | mp1 | **Do not give mark if**<br>• any line outside the drawn line given<br>• any line off the grid<br>• any shading<br>• any ruled line | **AND** clear, sharp, unbroken lines<br>**Do not give mark if**<br>• less than <u>three</u> enclosed areas (**ignore** cells)<br>or any lines have<br>• any part of line 1 mm or thicker<br>• any feathery or broken or dashed line or gap<br>• any tail or overlap | |
|---|---|---|---|---|

| PDO recording 1 | mp2 | second layer from **R**/bottom must be convex shape at top edge (curves up) | **AND**<br>*(completed outline at base as)*<br>an enclosed area from <u>ends of lines</u> provided *(line)* | **AND**<br>*(line drawn from <u>right edge</u>)*<br>bulges out then curves in through three boxes below to right of **R** AND reaches <u>*to **R***</u>; |
|---|---|---|---|---|
| | | | **Do not give mark if**<br>• cells drawn<br>• more than four regions/enclosed areas<br>• if drawn outside grid | |

| MMO decision 1 | mp3 | (draws correct proportion and shape of layers)<br>measured along line from **J** to **R**,<br>length of first layer (near **J**) is less than half the length of the second layer from **R**; |
|---|---|---|
| | | |

| | | (iii) | [2] |
|---|---|---|---|

| PDO display 2 | mp1 | (inside the drawn outline)<br>shows counting of all the complete 1 cm by 1cm squares **AND** those squares which are half or more; | |
|---|---|---|---|
| | mp2 | number clearly linked to bundle<br>**AND** number clearly linked to xylem | **AND**<br>larger whole number to smaller whole number<br>or<br>as fraction larger number over smaller number; |
| | | **Must have**<br>• whole number <u>71 or lower</u><br>• to lowest denominator | **Do not give mark if**<br>• units in ratio<br>• xylem and phloem |

| **(b)** | | | | [3] |
|---|---|---|---|---|
| | | suitable plan diagram; | | |
| **PDO layout 1** | mp1 | **Do not give mark if**<br>• any shading<br>• drawn over the print of the question<br>• any ruled lines (ignore sector boundaries) | **Do not give mark if**<br>• less than 60 mm from epidermis to base of centre vascular bundle | ***AND*** *clear, sharp, unbroken lines*<br>**Do not give mark if**<br>• less than 2 lines and less than 4 enclosed areas<br>• open-ended break in epidermis lines<br>or any lines<br>• any part of line 1 mm or thicker (use grid)<br>• any feathery or broken or dashed line or gap |
| | | | | |
| **MMO collection 1** | mp2 | <u>no</u> cells | **AND** drawn only a sector<br>• epidermis<br>• at least three small vascular bundles under epidermis<br>• at least one large vascular bundle nearer centre<br>• at least one other observable feature, e.g. air space or triangular feature or stoma/ta gap(s) or break(s) in epidermis; | |
| | | | **Do not give mark if**<br>• drawn whole stem<br>• drawn two opposite epidermal layers<br>• if 6 or more enclosed areas within any one region in any one vascular bundle | |
| **MMO decision 1** | mp3 | draws at least three vascular bundles each with at least three enclosed areas (regions)*;* | | |
| | | | **Do not give mark if** drawn just a band across | |

| Page 10 | Mark Scheme | Syllabus | Paper |
|---|---|---|---|
| | GCE AS/A LEVEL – May/June 2013 | 9700 | 33 |

| **(c)** | | | | [max 4] |
|---|---|---|---|---|

| | **do not give mark if** ref. to cell structures, e.g. (cell) wall or vacuoles or nuclei or membrane | | | |
|---|---|---|---|---|

| PDO recording 1 | mp1 | organise as a table with columns and rows | **AND** heading <u>feature</u> ; |
|---|---|---|---|
| | | | |

| ACE interpretation max 3 | max 3 | | feature | description of **K1** (Fig 2.1) |
|---|---|---|---|---|
| | | mp1 | epidermis | smooth or no bumps or regular; |
| | | mp2 | thickening/collenchyma sclerenchyma/ or triangles/red cells | triangular or present or has or yes present or has or yes; |
| | | mp3 | vascular bundles size | different sizes or small and large; |
| | | | (position) | idea of scattered or 'ring and others' or 'near/close to epidermis and in middle' or random; |
| | | | (shape or sheath/cells around vascular bundle) | oval shape or present or has or yes; |
| | | | (number) | more or large(r); |
| | | | (xylem (vessels/cells) **N**) | idea of large(r) or big(ger); |
| | | mp4 | air spaces or gaps or holes **R** vacuoles | large(r)or present or has or yes; |
| | | mp5 | stomata or guard cells or gaps or holes or grooves or ridges | present or has or yes; |
| | | mp6 | cuticle or idea of extra outer layer | present or has or yes; |
| | **ignore** <br> • 3-D descriptions, e.g. rugby ball shape <br> • tick or cross without a key <br> • diagrams <br> • ref. to size except where shown | | | if no organisation then give mark only if description in same sentence as feature |

© Cambridge International Examinations 2013

| **Page 11** | **Mark Scheme** | **Syllabus** | **Paper** |
|---|---|---|---|
| | **GCE AS/A LEVEL – May/June 2013** | **9700** | **33** |

| | **(d) (i)** | | [4] |
|---|---|---|---|

| | | if draw a chart then only mp1 for orientation. | |
|---|---|---|---|
| **PDO layout 4** | mp1 | *x*-axis<br>time of day (/) h(s) or hr(s) or hour(s) | **AND** *y*-axis<br>flow rate in xylem (tissue /) mg min$^{-1}$ or mg/min[(1)];<br><br>**R** mg/min$^{-1}$ |
| | mp2 | scale as *x*-axis<br><br>5:00 or 5.00 to 2 cm labelled each 2 cm (**ignore** origin and 24:00 and 25:00) | **AND** *y*-axis<br><br>(0).1(00) to 2 cm labelled each 2 cm (**ignore** 0.0(00) at origin and 0.5(00)); |
| | mp3 | correct plotting of<br>• five points<br>• as small cross (lines less than 4 mm each) or dot(in circle) or cross in circle to within half a square; | |
| | mp4 | five plots with ruled lines exactly point to point | **AND** (quality)<br>smooth line less than 1 mm thick; |

| **Additional guidance:** | | |
|---|---|---|
| mp1 | | **Do not give mark if**<br>change units for either axis |
| mp2 | **ecf** if no labels for axes or if reverse axes then scale is the same for time and flow rate<br><br>**Can award mark if** origin on *y*-axis is not zero as long as labelled with correct value e.g. 0.1(00) | **Do not give mark if**<br>• awkward scale |
| mp3 | plots (crosses or centre of dot) must be nearer than halfway line | |
| | **Can have**<br>• **ecf** if *x*-axis and *y*-axis reversed<br>• **ecf** if lose scale for simply the labelling e.g. 5, 10, etc. | **Do not give mark if**<br>• awkward scale<br>• blobs or dots alone<br>• blob in circle is bigger than circle on grid<br>• cross too large with any part of cross outside the square on the grid |
| mp4 | **Can have**<br>• **ecf** from incorrect plots | **Do not give mark if**<br>• any extrapolation |

| | **(ii)** | | | | [2] |
|---|---|---|---|---|---|
| ACE interpretation 2 | mp1 | *idea of:* (between 10.00 and 17.00 hours ) flow rate increases; | | | |
| | | | | **Do not give mark if**<br>• ref. to decrease before increase<br>• ref. to 6:00 increase<br>• ref. to time increases or daylight | |
| | mp2 | quotes data at 10.00 as reading from their graph | **AND** 17.00 as <u>0.455</u>; | | **AND** must have units once <u>mg min$^{-1}$ or mg/min</u>[1]; |
| | | **A** increase of 0.455 minus their reading at 10:00 e.g. 0.225 = 0.235 mg/min | | **ecf** units used on graph | |

[Total: 20]