**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 9700 BIOLOGY

**9700/31** 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.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of 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) |
| **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 |
| **ACE** | Analysis, Conclusions and Evaluation (skills) |
| **MMO** | Manipulations, Measurement and Observation (skills) |
| **PDO** | Presentation of Data and Observations (skills) |

© University of Cambridge International Examinations 2012

| Expected Answers | | | | |
|---|---|---|---|---|
| **1 (a) (i)** | | | | [4] |
| PDO layout 1 | **mp 1** | no shading<br>or<br>dashed line inside cell | **AND**<br>50 mm or larger across widest point in one cell | **AND** clear, sharp, unbroken lines for all outer lines of the cells drawn;<br>**Do not give mark if**<br>• **less than** two outer lines i.e. only 1 cell<br>**or if any outer line has**<br>• any ruled lines<br>• any line more than 1 mm<br>• any feathery or broken / dashed or gap in outer line<br>• any 'tail' or overlap<br>• drawn over the print of question |
| MMO collection 2 | **mp 2** | only <u>two</u> whole cells | | **AND** adjacent walls touching; |
| | | | | **Do not give mark if**<br>• any ruled lines |
| | **mp 3** | cell contents drawn away from cell wall in at least one cell | | **AND** cell wall double line with middle lamella between cells; |
| | | | | **Do not give mark if**<br>• additional organelles e.g. mitochondria, etc. |
| MMO decision 1 | **mp 4** | only correct label, with label line(s) which<br>• touches but does not cross the cell membrane<br>• has at least one cell membrane drawn; | | |
| | | | | **Do not give mark if**<br>• any labels are not of cell structure<br>• any label within drawn area |
| | **(a) (ii)** | | | [2] |
| MMO decisions 2 | **mp 1** | idea of more than one cell; | | |
| | | | | |
| | **mp 2** | counts plasmolysed or counts cells in different states of plasmolysis; | | |
| | | | | **Do not give mark for**<br>• qualitative description only of states of plasmolysis or assigning numbers to each state |

© University of Cambridge International Examinations 2012

**(b) (i)** [5]

***Ignore*** *all references to conclusions i.e. concentrations*

| | | | |
|---|---|---|---|
| PDO recording 2 | **mp 1** | table with all cells drawn | **AND** heading<br>• solution or sample; |
| | **mp 2** | (any correct heading – column or row) number / count(ed) | **AND** plasmolysed; |
| MMO collection 2 | **mp 3** | records for <u>S1, S2 and S3 in this order</u><br>• more than one cell | quantitative data<br>• number of plasmolysed cells; |
| | **mp 4** | records correct pattern in context of cells not pieces / tissues ;<br>**S1 c**ompared to both **S2** and **S3**<br>most plasmolysis number of cells counted | |
| MMO decision 1 | **mp 5** | recorded quantitative data for at least three cells, for each concentration; | |

**(b) (ii)** [1]

| | | | |
|---|---|---|---|
| ACE interpretation 1 | | S2 (0)<u>.25</u> | **AND** S3 (0)<u> .5 </u>(0); |

© University of Cambridge International Examinations 2012

**(b) (iii)** [max 2]

ACE interpretation MAX 2

**mp 1**

*S2/S3*
*From bii*

because fewer plasmolysed cells or more non-plasmolysed cells or less plasmolysis; idea of

***OR***

*S2/S3*
*From bii*

more plasmolysed cells or fewer non-plasmolysed cells or more plasmolysis;

***OR***

comparison of <u>S2 and S3;</u>
**or**
<u>0.25 and 0.50</u> (units not needed);

**mp 2**

*idea of*
***SO***
lower
or
lowest concentration
or
0.25 (units not needed);

***SO***
higher
or
highest concentration
or
0.50 (units not needed);

more or less
less plasmolysed / plasmolysis;

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **(c) (i)** | | | [3] |
| MMO collection 1 | **mp 1** | draws <u>only</u> two cells | **AND** adjacent walls touching;<br><br>**Do not give mark if**<br>• any ruled lines |
| PDO recording 1 | **mp 2** | draws cell contents filling **more** of cell than in **(a)(i)**; | |
| MMO decision 1 | **mp 3** | label cell wall (drawn with two lines all round) with label line to outermost line or between two lines; | |
| **(c) (ii)** | | | [2] |
| ACE conclusions 2 | **mp 1** | *For any correct reference in context of water moving* <u>osmosis</u>*;* | |
| | **mp 2** | <u>(in correct context of cells being in water NOT solution)</u><br><br><u>water potential / ψ</u> outside higher or less negative<br>**or**<br><u>water potential / ψ</u> inside lower or more negative<br>**or**<br>down <u>water potential gradient</u>; | |
| **(d)** | | | [max 3] |
| ACE improvements MAX 3 | **mp 1**<br>**mp 2** | (independent variable)<br>at least two examples (less than 1.0 and not 0.5 or 0.25) ;; | |
| | **mp 1 only** | (without examples)<br>increase or more or different or range of concentrations or solutions; | |
| | **mp 3** | draw graph of molarity<br><br>**or**<br><br>ref. to idea of calculate water potential*;* | |
| | | | **[Total: 22]** |

© University of Cambridge International Examinations 2012

| | | | | |
|---|---|---|---|---|
| **2 (a) (i)** | | | | [4] |
| PDO layout 1 | **mp 1** | no shading | **AND** larger than 50 mm across widest point | **AND** clear, sharp, unbroken lines for two outermost enclosed areas ;<br>**Do not give mark if**<br>• **less than** two hand drawn enclosed areas<br>**or in either of the two outermost enclosed areas has**<br>• any ruled lines<br>• any line 1mm or thicker<br>• any feathery or broken or dashed or gap in line<br>• any 'tails' or overlaps or gaps<br>• drawn over the print of question |
| MMO collection 2 | **mp 2** | no cells | | **AND** drawn at least two enclosed areas and at least one area shown in middle; |
| | | | | **Do not give mark if**<br>• drawn 3-D |
| PDO recording 1 | **mp 3** | (detail of observable feature)<br>central area drawn with irregular feature (not a circle); | | |
| MMO decision 1 | **mp 4** | skin as at least two lines*;* | | |
| **(a) (ii)** | | | | [1] |
| MMO decision 1 | | *with annotation* any area other than skin stained black or black / blue; | | |
| | | | | **Do not give mark if**<br>• annotated within drawn area |
| **(a) (iii)** | | | | [1] |
| ACE conclusion 1 | | area with black / blue stained / changed | | ***AND***<br>area orange or yellow unstained / unchanged / no change; |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **2 (b) (i)** | | | [3] |
| MMO decision 1 | **mp 1** | Shows at least three large values | and at least three smaller values; |
| | | **Must have**<br>same number for whole section and outer skin | |
| MMO collection 1 | **mp 2** | shows at least <u>once</u><br>on raw data <u>mm</u> | **AND** either whole number mm or to 0.5 mm; |
| ACE interpretation 1 | **mp 3** | *from a calculation* the answer is shown as larger whole number to smaller whole number; | |
| | | | **Do not give mark if**<br>• units in ratio<br>• if not to smallest common denominator |
| **(b) (ii)** | | | [1] |
| ACE interpretation 1 | | +/- smallest division | **AND** <u>mm</u> ; |

© University of Cambridge International Examinations 2012

**2 (c)** [4]

*If line graph drawn only first mp can be given*

| | | | |
|---|---|---|---|
| PDO layout 4 | **mp 1** | *x*-axis<br>component | **AND** *y*-axis<br>percentage or % mass; |
| | **mp 2** | scale as *x*-axis<br>even bar widths up to 15 mm | **AND** *y*-axis<br>5 to 2 cm and **must** start at 0 and label each 2 cm ; |
| | **mp 3** | correct plotting of each bar in the order in the table with a horizontal line<br>• ruled<br>• smooth line less than 1 mm; | |
| | **mp 4** | bars – must be arranged as pairs of each component, but each pair must have a space between<br>quality – all bar vertical lines drawn including on axis if used<br>• ruled<br>• smooth line less than 1 mm<br>• meet horizontal line exactly | **AND**<br>labelled<br>• any clear labels;<br>e.g. **must be** directly below correct bar or inside bar or shaded with key |
| | | | **Do not give mark if**<br>• horizontal line is extended beyond vertical lines<br>• solid shading or line shading outside a bar |

**(d)** [4]

| | | |
|---|---|---|
| MMO collection 1 | **mp 1** | (plantain) 32.00 and (sweet banana) 24.00<br>**or** (plantain) 68.00 and (sweet banana) 76.00; |
| PDO display 2 | **mp 2** | shows addition of values; e.g. plantain 0.50 + 28.00 + 1.50 + 2.00 and sweet banana 0.25 + 19.50 + 1.75 + 2.50<br>**or**<br>shows subtraction of each component from 100; |
| | **mp 3** | shows subtraction to get difference of 32.00 – 24.00<br>**or** (100 -32.00) – (100-24.00)<br>**or** 76.00 – 68.00; |
| ACE interpretation 1 | **mp 4** | 8.00; |

**[Total: 18]**

© University of Cambridge International Examinations 2012

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 9700 BIOLOGY

**9700/32** Paper 32 (Advanced Practical Skills 2), 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.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of 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) |
| **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 |
| **ACE** | Analysis, Conclusions and Evaluation (skills) |
| **MMO** | Manipulations, Measurement and Observation (skills) |
| **PDO** | Presentation of Data and Observations (skills) |

© University of Cambridge International Examinations 2012

| Expected Answers | | | |
|---|---|---|---|
| **1 (a) (i)** | | | [3] |
| MMO decisions 1 | **mp1** | 1.0(%) | **AND** (simple dilution)<br>next 4 concentrations giving 4 intervals; |
| | | | **Do not give mark if**<br>• rounds concentration e.g. 0.063 in the serial dilution |
| MMO decisions 2 | **mp2** | (shows correct use of **E** in either simple or serial dilution)<br><br>1% / **E** used in first four concentrations for simple dilution<br><br>or<br><br>1% / E used for first dilution only in a serial dilution | **AND**<br><br>$cm^3$ once for **E**; |
| | | | **Do not give mark if**<br>• if no concentrations |
| | **mp3** | (simple or serial dilution)<br>for first four concentrations total final volumes made are between 2 and 10 | AND the same volume for each concentration; |

© University of Cambridge International Examinations 2012

**(a) (ii)** [5]

| | | | |
|---|---|---|---|
| PDO recording 2 | **mp 1** | table with all cells drawn | **AND** heading (<u>top row or left</u> of recorded data column )<br>• <u>percentage concentration</u> of **<u>E</u>** / <u>enzyme</u>; |
| | | | **Do not give mark if**<br>• units in cells of headed column / row |
| | **mp 2** | (heading for any column / row including mean)<br><u>time</u> (/) s or sec(ond)s; | |
| | | | **Do not give mark if**<br>• units in cells of this column / row<br>• min(utes)<br>• additional method information either headings for columns / rows variables or in cells |
| MMO collection 2 | **mp 3** | (mark first column / row of recorded time taken)<br>for at least four concentrations<br>records whole seconds (number less than 180 or > or 'more than 180'); | |
| | **mp 4** | (mark **first** column / row of recorded time taken)<br>(records correct pattern)<br>highest concentration recorded is shorter time than lowest concentration ; | |
| MMO decision 1 | **mp 5** | at least two readings per concentrations<br>**or**<br>six or more concentrations; | |

© University of Cambridge International Examinations 2012

**(a) (iii)** [1]

| | | | |
|---|---|---|---|
| ACE improvement 1 | | replace enzyme / **E** with water<br><br>**or** use water / **W** instead of enzyme / **E**; | |

**(a) (iv)** [1]

| | | |
|---|---|---|
| ACE interpretation 1 | | *(0.5 mm × 2 = 1) <u>+/- 1 mm</u>*<br><br>**or**<br><br>*(+/-)<u>5%</u>;* |

**(a) (v)** [max 2]

| | | Cause of error | WITH idea of error |
|---|---|---|---|
| ACE interpretation MAX 2 | **mp 1** | (dependent)<br>colour change / end-point iodine colour | (idea of)<br>difficult to judge or see or identify; |
| | **mp 2** | idea of reaction | too quick or describes more concentrated goes quickly; |
| | **mp 3** | (standardised)<br>iodine staining<br>**or**<br>time paper left in iodine solution<br>**or**<br><br>iodine( solution) | not same or varies or different;<br><br><br><br>loses colour |
| | **mp 4** | mixing of the solution | not same or varies or different; |
| | **mp 5** | paper<br>**or**<br>splint | drops off or sticks to sides<br><br>difficult to cut / too thick to cut; |

© University of Cambridge International Examinations 2012

**(a) (vi)** [2]

***Do not give mark if*** *ref. to colorimeter*.

ACE interpretation MAX 2

| | | |
|---|---|---|
| **mp 1** | (independent variable)<br>(concentration of enzyme)<br>idea of use more or different or wider / narrower range of concentration(s)<br>**or**<br>repeat; | |
| **mp 2** | (standardised variables)<br>stain each piece of paper for an equal time<br>**or** stain all paper before cutting into pieces; | |
| **mp 3** | fresh iodine solution for each square<br>**or**<br>stronger / darker iodine<br>**or** leave longer in the iodine; | |
| **mp 4** | (when adding **E** to test tube)<br><br>mixing or stirring<br><br>same <u>volume</u> | <br><br>using a stirrer or (electronic) mixer<br><br>**AND**<br>use <u>graduated</u> pipette<br>**or** measuring cylinder<br>**or** burette<br>**or** syringe; |
| | | **Do not give mark if**<br>• making dilutions more accurate |
| **mp 5** | new test tube for each experiment which is the same size<br>**or**<br>use a straw instead of a splint; | |
| **mp 6** | pH | use buffer to keep constant; |

© University of Cambridge International Examinations 2012

**(b) (i)** [4]

*If draw a chart then only first mp can be given.*

| | | | |
|---|---|---|---|
| PDO layout 4 | **mp 1** | *x*-axis<br>bead diameter (/) mm | **AND** *y*-axis<br>mass of product (in a minute) (/) mg $min^{-1}$ or mg / min; |
| | **mp 2** | scale as *x*-axis<br><br>1.0 to 2cm labelled each 2cm except origin and 6.0 | **AND** *y*-axis<br><br>10 to 2 cm labelled each 2 cm except origin and 60; |
| | **mp 3** | correct plotting of<br>• five points<br>• as small cross **o**r dot in circle **or** cross in circle to within half a square;<br><br>**Do not give mark if**<br>• plotted 2 cm with same symbol as other points<br>• dots alone<br>• if dot (in circle) bigger than 1mm diameter | |
| | **mp 4** | **five** plots with<br>ruled lines exactly point to point<br>**or**<br>curve through 5 points | **AND** (quality)<br><br>smooth line less than 1 mm thick; |
| | | | **Do not give mark if**<br>• any extrapolation |

© University of Cambridge International Examinations 2012

**(b) (ii)** [1]

| | | | |
|---|---|---|---|
| ACE interpretation 1 | **1** | correct reading from their graph **AND** mg $min^{-1}$ or mg/min; | |
| | | **Can have mark if**<br>• line crosses at halfway between vertical lines then MUST read half square value e.g. 6.775<br>• line crosses nearer right vertical then can have only either half square value or value of right vertical<br>• line crosses nearer left vertical then can have only either value of left vertical or half way value | |

**(b) (iii)** [max 3]

**mp 1, 2 and 3** *do not give mark if ref. to concentration of enzyme or volume of enzyme or surface area to volume ratio of beads or changing number of beads in same sentence as correct idea.*

| | | | |
|---|---|---|---|
| ACE conclusion MAX 3 | **mp 1 and 2** | larger beads<br>**or** diameter increases<br>**or** beads with more surface area | **AND** more active sites (bind / join to substrate)<br>**or**<br>more ES complexes*;;* |
| | **mp 1 only** | larger beads<br>**or** diameter increases<br>**or** beads with more surface area | **AND** have more enzyme / lactase; |
| | **mp 3** | (increase in mass of product slows )<br>*idea of* limiting factor<br>**or** the enzyme is not limiting<br>**or** description e.g. not enough substrate<br>**or** temp or pH*;* | |
| | | | **Do not give mark if**<br>• idea of all substrate broken down |

**[Total: 22]**

© University of Cambridge International Examinations 2012

**2 (a)** [5]

| | | | | |
|---|---|---|---|---|
| PDO layout 1 | **mp 1** | not drawn over the print of question and no shading | **AND** largest innermost enclosed area more than 50mm across widest point | ***AND*** clear, sharp, unbroken lines all inner enclosed areas;<br>**Do not give mark if**<br>• less than 2 hand drawn inner enclosed areas<br>***or if any inner enclosed area has***<br>• any ruled or compass lines<br>• any line 1mm or thicker<br>• any feathery or broken / dashed line or gap in line<br>• any 'tails' or overlaps |
| MMO collection 2 | **mp 2** | only two alveoli drawn with different irregular shapes shown by the inner most line; | | |
| | **mp 3** | 2 complete alveoli with different irregular shapes shown by the inner most line; | | |
| MMO decision 2 | **mp 4** | at least 3 nuclei drawn either within the alveolar wall or touching a wall line; | | |
| | | | | **Do not give mark if**<br>• draw cells<br>• nucleus larger than thickness of alveolus wall |
| | **mp 5** | only one correct label nucleus, with label line touching either<br>the single line of a small enclosed area<br>or into the enclosed area | | **AND**<br>enclosed area must be drawn either within the alveolar wall or touching a wall line; |
| | | | | **Do not give mark if**<br>• nucleus enclosed in a cell<br>• nucleus larger than thickness of alveolus wall when drawn as double line<br>• any label is biologically incorrect e.g. from incorrect organ or plant e.g. epidermis or non observable e.g. cilia<br>• any label within drawn area |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **(b) (i)** | | | [1] |
| MMO decision 1 | | count or find the number of squares; | |
| **(b) (ii)** | | | [4] |
| MMO collection 2 | **mp 1** | Shows a <u>whole number</u><br>• from 82 to 94 (whole lumen) | **AND** shows a whole number<br>either from 48 to 59 (unblocked area)<br>or from 29 to 42 (blocked area) ; |
| | **mp 2** | (records values as)<br>squares **or** $cm^2$ **or** $mm^2$ anywhere once; | |
| | | **Do not give mark if** contradiction with units e.g. squares and $cm^3$ | |
| PDO display 2 | **mp 3** | shows<br><br>(29 to 42 divided by 82 to 94) × 100<br>**or**<br>(82 to 94 minus 48 to 59) divided by 82 to 94 × 100 | **or**<br>100 minus<br>(48 to 59 divided by 82 to 94 × 100)<br>**or** 100 minus (82 to 94 minus 29 to 42 divided by 82 to 94 × 100); |
| | | **Can have**<br>• alternative signs for multiplication (or *) and division | **Do not give mark if**<br>only 100 minus(29 to 42 divided by 82 to 94 × 100) |
| | **mp 4** | answer as a whole number; | |
| | | If do not put answer on answer line but at end of calculation must have % | |

© University of Cambridge International Examinations 2012

**(b) (iii)** [4]

| | | | | |
|---|---|---|---|---|
| PDO layout 1 | **mp 1** | not drawn over the print of question<br><br>and <u>no</u> shading or dashed line inside cell | **AND** largest blood cell larger than 30 mm | **AND** clear, sharp, unbroken lines in <u>all</u> cell <u>surface</u> membranes drawn;<br>**Do not give mark if**<br>• less than 4 cell surface membranes<br>**or if any cell surface membrane has**<br>• two lines in the fish cells<br>• any ruled or compass lines<br>• any line 1mm or thicker (use grid)<br>• any feathery or broken/dashed line or gap<br>• any 'tails' or overlap |
| MMO collection 2 | **mp 2** | only two of each drawn ; | | |
| | | | | **Do not give mark if**<br>• any cell membrane drawn into another cell |
| | **mp 3** | largest fish cell drawn should be smaller than the smallest frog cell drawn;<br>(widest dimension is at least 1 mm bigger) | | |
| | | | | **Do not give mark if**<br>• internal structures other than nucleus inside cells e.g. vacuole / mitochondria |
| MMO decision 1 | **mp 4** | correct label <u>cell (surface) membrane</u> with label line which must touch but not cross the outermost line of a red blood cell; | | |
| | | | | **Do not give mark if**<br>• more than one fish or frog cell labelled<br>• any labels are not of cell structure e.g. epidermis or epithelium<br>• any label within drawn area |

© University of Cambridge International Examinations 2012

**(b) (iv)** [4]

PDO recording 2

| | | | |
|---|---|---|---|
| **mp 1** | organise as a table with only three columns or rows separated by lines (no cells needed) | **AND** headings in any order Fig 2.2 or Fish and Fig 2.3 or Frog | **AND** third column or row contains features; |
| **mp 2** | only observable **differences** (at least two) recorded ; | | |

**Do not give mark if**
- any function or not observable e.g haemoglobin or organelles other than nucleus.
- surface area to volume ratio
- any similarities recorded

ACE interpretation MAX 2

max 2

| | feature | Fig 2.2 fish | Fig.2.3 frog |
|---|---|---|---|
| **mp 1** | size of cells | small(er) | large(r); |
| **mp 2** | number of cells | lots / more | few(er); |
| **mp 3** | size of nucleus | small(er) | large(r); |
| **mp 4** | shape of cell or shape of nuclei | most / more circular or round **or** describes mixed shapes | most / more oval **or** describes mixed shapes; |
| **mp 5** | grouping | *idea of* together / group / sticky / clump / closely packed / overlapping or fewer gaps between cells / more spaces | separate / less closely packed / not overlapping / separate or more gaps between cells / less space ; |

**Ignore**
- functions
- ref. to colour
- 3-D descriptions such as spherical, biconcave, ball, disc, rugby ball shape
- tick and cross without a key
- diagrams

**Can have** difference on one side if e.g. use more or – er with vague answer in other column

**Do not give ACE mark if**
- for each feature the difference is not opposite each other unless comparative statement e.g. more or -er
- or e.g. Fig 2.2 difference i
  difference ii
  Fig 2.3 difference i
  difference ii

**[Total: 18]**

© University of Cambridge International Examinations 2012

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 9700 BIOLOGY

**9700/33** 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.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of 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) |
| **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 |
| **ACE** | Analysis, Conclusions and Evaluation (skills) |
| **MMO** | Manipulations, Measurement and Observation (skills) |
| **PDO** | Presentation of Data and Observations (skills) |

© University of Cambridge International Examinations 2012

| Expected Answers | | | |
|---|---|---|---|
| **1 (a) (i)** | | | [1] |
| MMO decision 1 | | *Idea of*<br>more than single cell<br>**or**<br>cells in field of view or that eyes can see<br>**or**<br>Idea of repeat or more readings / observations; | |
| | | | **Do not give mark if**<br>• ref. to observe over time or at different times<br>• ref. to staining<br>• any ref. to measuring |

| **(a) (ii)** | | | [4] |
|---|---|---|---|
| PDO recording 2 | **mp1** | table with all cells drawn | **AND**<br>heading (top row or left of recorded data column)<br>concentration of sodium chloride solution/mol $dm^{-3}$; |
| | | | **Do not give mark if**<br>• units in cells of headed column |
| | **mp2** | (any correct heading – column or row)<br>state(s) of plasmolysis; | |
| | | | **Do not give mark if**<br>• headings for method variables |
| MMO collection 2 | **mp3** | • records more than one cell for 0.8, 0.4. 0.2, or S1,S2,S3 **AND** S4 | **AND** records state of plasmolysis for each cell or number of cells in each state; |
| | | | **Do not give mark if**<br>• just record a single result for each solution or plasmolysed to non-plasmolysed |
| | **mp 4** | has recorded for **0.8** or **S1**<br>in context of complete or more plasmolysis<br>highest number of cells | **AND** has recorded for **0.2** or **S3**<br>in context of no or slight plasmolysis<br>highest number of cells; |
| | | | **Ignore**<br>• turgid or flaccid |

© University of Cambridge International Examinations 2012

**(a) (iii)** [1]

| | | | |
|---|---|---|---|
| ACE interpretation 1 | | correct with their results (however shown e.g. % plasmolysed cells) and uses only<br>• 0.8 to 0.4<br>• 0.4 to 0.2<br>• 0.2 to 0(.0)); | |
| | | | **Do not give mark if**<br>• no results for **S4**<br>• any other values |

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

| | | | |
|---|---|---|---|
| ACE interpretation MAX 1 | | cause of error | WITH idea of error |
| | **mp 1** | (dependent variable)<br>*idea of*<br>state of plasmolysis<br>cells on slide and in Fig 1.1 | *idea of*<br>difficult to judge / distinguish / see / observe<br>or not enough states shown / only 4<br>or some cells between diagrams<br>not the same or different; |
| | **mp 2** | qualitative; | |
| | | **Ignore**<br>• ref. to colour or stain<br>• ref. to measurements | |

© University of Cambridge International Examinations 2012

**(a) (v)** [max 3]

ACE improvements MAX 3

| | | |
|---|---|---|
| **mp 1** | (independent variable)<br>(concentration of sodium chloride)<br>*idea of* use more concentrations or serial dilution; | |
| **mp 2** | (dependent variable)<br>more diagrams for more stages of plasmolysis; | |
| | | **Do not give mark if**<br>• to stain or colour |
| **mp 3** | repeat or replicate (in context of each solution); | |
| | | **Do not give mark if**<br>• more cells |
| **mp 4** | (standardised variables)<br>*idea of* leave / soak (cells / onion) for longer or same time or until no further plasmolysis; | |
| | | **Do not give mark if**<br>• ref. to measure at different times |
| **mp 5** | use same onion or same part of onion or same age or fresh onion; | |
| | | **Do not give mark if**<br>• same cell |
| **mp 6** | *idea of*<br>same <u>volume</u> or e.g. with $cm^3$ of solutions and measuring method; | **Do not give mark if**<br>• amount |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **1 (b) (i)** | | | [4] |
| PDO layout 4 | **mp 1** | *x*-axis<br>concentration (of)<br>sodium chloride / NaCl solution /<br>$\times 10^{-2}$ mol $dm^{-3}$ | **AND** *y*-axis<br>percentage or % (of )<br>red blood cells destroyed; |
| | **mp 2** | scale as *x*-axis<br>0.5 to 2 cm labelled each 2 cm | **AND** *y*-axis<br>20 to 2 cm labelled each 2 cm ; |
| | **mp 3** | correct plotting of<br>• six points only<br>• as small cross (does not go outside 2 mm × 2 mm square ) **or** dot (in circle) **or** cross in circle;<br>**Do not give mark if**<br>• plotted 50% with same as other points<br>• blobs or dots alone<br>• if blob in circle bigger than 1mm diameter | |
| | **mp 4** | six plots with ruled lines exactly point to point<br>**or**<br>curve through 6 points | **AND** (quality)<br>smooth line less than 1 mm line thickness ; |
| | | | **Do not give mark if**<br>• any extrapolation |
| **(b) (ii)** | | | [2] |
| MMO collection 1 | **mp 1** | shows reading off at 50%; | |
| | | | |
| ACE interpretation 1 | **mp 2** | correct reading from graph | **AND**<br>$\times 10^{-2}$ mol $dm^{-3}$ ; |
| | | **Can have mark if**<br>• line crosses at halfway between vertical lines then MUST read half square value e.g. 6.775<br>• line crosses nearer right vertical then can have only either half square value or value of right vertical<br>• line crosses nearer left vertical then can have only either value of left vertical or half way value | |

© University of Cambridge International Examinations 2012

**(b) (iii)** [3]

***Ignore*** *ref. to plasmolysis, water potential, isotonic, hyper/hypotonic, haemolysis*

| | | | |
|---|---|---|---|
| ACE conclusion 3 | **mp 1** | for any correct reference in context of water moving<br>osmosis; | |
| | | **Must have**<br>• ref to only water moving | |
| | **mp 2** | correct idea of movement of water in 0%<br>no net movement of water; | |
| | | | **Do not give mark if**<br>• no movement of water |
| | **mp 3** | correct idea of movement of water in 100%<br>idea of water moving into cells; | |
| | | | **Do not give mark if**<br>• ref. to no water out |

**[Total: 19]**

© University of Cambridge International Examinations 2012

**2 (a) (i)** [1]

| | | |
|---|---|---|
| MMO decision 1 | | *idea of* describing difference in (P)<br>(in top layer only)<br>bubbles<br>**or** drop(lets)<br>**or** gas<br>**or** air; |

| **Ignore** | **Do not give mark for** |
|---|---|
| • emulsion or immiscible | • bubbles either labelled or drawn on **Q** |

**(a) (ii)** [3]

***Ignore*** *explanations e.g. hydrophobic molecules, etc.*

| | | | |
|---|---|---|---|
| MMO decisions 2 | **mp 1** | identifies layers correctly<br><br>(on top) oil **AND** (layer underneath) water; | |
| | **mp 2** | *(Idea of position )*<br>labels egg or yolk | **AND**<br>drawn or described egg / drop somewhere in bottom half of oil and top half of water or layer between oil and water; |
| | | **Ignore**<br>• emulsion or immiscible<br>• additional drawings of egg e.g. on surface or tails into lower layer | |
| PDO recording 1 | **mp 3** | detail<br><br>(anywhere)<br>draws egg as drop or distinct rounded shape (not layer); | |
| | | **Ignore** tails | **Do not give mark if**<br>• layer<br>• If egg all at bottom of tube only happens if shaken |

© University of Cambridge International Examinations 2012

**(a) (iii)** [2]

***Ignore*** *explanations precipitate suspensions solutions emulsions*

| | | |
|---|---|---|
| MMO decision 2 | **mp 1** | (**P**) <u>description</u> **P** in **(a) (iii)** compared to **P** in **(a) (i)**<br>looking for something other than labels of contents.<br>idea of<br>cloudy or hazy(ier)<br>**or** milky<br>**or** describes colour e.g. white or yellow or cream(y)<br>**or** ref. to difference in bubbles described e.g.<br>if no bubbles in **P** in **(a)(i)** then allow any bubbles labelled here<br>**or** if bubbles in lower layer in **P** in **(a)(i)** then could have more bubbles in **P** here; |
| | **mp 2** | (annotated <u>description</u> (not contents) of<br>• compare **Q** from **(a)(ii)** to **Q** in **(a)(iii)**<br>(drawn and) <u>labelled</u><br>• egg / yolk at bottom of tube or in lower layer or lower half of test-tube<br>• or labelled (meniscus curved in **(a)(ii)** to) meniscus flat(ter) or not / less curved<br>• top layer foam or froth<br>• bubbles<br>• any valid ref. to cloudier or hazier or milkier or more white or turbid or dense<br>• any valid ref. to different colours recorded; |

| | |
|---|---|
| | **Do not give mark if**<br>• oil, water and yolk drawn as separate layers<br>• labels only as mixture or emulsion |

© University of Cambridge International Examinations 2012

**(b) (i)** [4]

| | | | | |
|---|---|---|---|---|
| PDO layout 1 | **mp 1** | no shading<br>or<br>dashed line inside cell | **AND**<br>largest blood cell larger than 30mm | **AND** clear, sharp, unbroken lines in <u>all</u> cell <u>surface</u> membranes drawn;<br><br>**Do not give mark if**<br>• less than three cell surface membranes<br>**or if any cell surface membrane has**<br>• drawn two lines<br>• any ruled lines<br>• any line more than 1 mm<br>• any feathery or broken or dashed or gap<br>• any 'tail' or overlap<br>• drawn over the print of question |
| MMO collection 3 | **mp 2** | on Fig.2.6 shows in any way three different types of cell | | **AND** draws <u>both</u> white blood cells with a nucleus and at least one red blood cell; |
| | | **Ignore any** labels for cells | | |
| | **mp 3** | drawn neutrophil larger than both of other two types of cells; | | |
| | **mp 4** | (in neutrophil)<br><br>correct shape of nucleus | | **AND** (in other white blood cell)<br><br>nucleus fills more than half the cell **and** positioned closer to or in contact with membrane on one side; |

**(b) (ii)** [5]

| | | | | |
|---|---|---|---|---|
| PDO recording 1 | **mp 1** | organise as a table with only three columns or rows separated by lines (no cells needed)<br>**Ignore** numbered columns | **AND** headings in any order only<br>**Do not give mark if** divide wbc into 2 columns / rows<br><u>red blood cells / rbc</u> and <u>white blood cells / wbc;</u> | **AND**<br>third column / row contains examples of features |
| MMO decision 1 | **mp 1** | <u>only</u> <u>observable</u> differences (at least two) recorded ; | | |
| | | | **Do not give mark if**<br>• any function or ref. to 'not visible' contents e.g. haemoglobin or organelles<br>• two white blood cells given | |

© University of Cambridge International Examinations 2012

ACE interpretation 3

Max 3

| | feature | red blood cells | white blood cells |
|---|---|---|---|
| **mp 1** | *(size)* | small(er) | larger; |
| **mp 2** | *(number)* | many or more | few(er); |
| **mp 3** | *(nucleus presence)* | absent or no(ne) | present or yes; |
| **mp 4** | *(cytoplasm)*<br><br>*(surface)*<br>*(granul(ar/les))* | light(er) (red) or less dense<br>smooth not rough<br>no(one) / absent or agranular | dark(er) (red)<br><br>rough or textured<br>yes / present or granular; |
| **mp 5** | *(grouping)* | idea of together or group or sticky or clump | separate or not in groups; |
| **mp 6** | *(type)* | one or same | two or different types; |

**Ignore**

- functions
- ref. to colour
- shape of cell or nucleus
- 3-D descriptions such as spherical, biconcave, ball, disc
- tick and cross without a key
- diagrams

**Can have** difference on one side if e.g. use more or –er with vague answer in other column

If **no** organisation then
**give mark** only if difference in same sentence or following sentences

**Do not give mark if**

- for each feature the difference is not opposite each other
- or e.g. red blood cell difference i
  difference ii
  white blood cell difference i
  difference ii

© University of Cambridge International Examinations 2012

**(b) (iii)** [6]

| | | | |
|---|---|---|---|
| MMO collection 1 | **mp 1** | shows at least one value for each of **J**, **K**, **L**, **M** and **N** or the same number of values from each cell;<br><br>**Ignore**<br>use of metres or $\mu$m | |
| MMO decision 1 | **mp 2** | shows <u>mm</u> at least <u>once</u> on values 8 or higher; | |
| PDO display 2 | **mp 3** | shows addition of at least <u>five</u> values | **AND**<br>shows division by number of values; |
| | | **Can have**<br>• alternative signs for division | ***Do not give mark for***<br>• $\Sigma$x/n unless x and n have key |
| | **mp 4** | shows at least <u>one</u> conversion of mm to $\mu$m by showing<br>• <u>multiplication</u> by 1000 or $10^3$ | **AND** shows<br>figure divided by1430; |
| | | **Can have**<br>• alternative signs for multiplication (or *)<br>• or alternative signs for division | **Do not give mark if**<br>• metres anywhere<br>• no mm anywhere |
| PDO layout 1 | **mp 5** | draws <u>only</u> one 'bumpy / spiky' cell<br><br>with no shading; | **AND do not give mark if**<br>• any feathery or broken or dashed or gap or overlap or tail in the outline of cell<br>• drawn over the print of question |
| MMO collection 1 | **mp 6** | shows any one measurement across a <u>drawn</u> cell<br>(if more than one cell drawn then must be labelled **J**);<br><br>**Do not give mark if**<br>• cell has smooth shape e.g. oval, round etc. | |

**[Total: 21]**

© University of Cambridge International Examinations 2012

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 9700 BIOLOGY

**9700/34** Paper 32 (Advanced Practical Skills 2), 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.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of 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) |
| **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) |

© University of Cambridge International Examinations 2012

| Question 1 | | Expected Answers | |
|---|---|---|---|
| **(a) (i)** | | | [3] |
| MMO decisions 3 | **mp 1** | 100 | **AND**<br>• (simple dilution) next four concentrations (five concentrations in total) with four even intervals;<br>e.g. 100, 80, 60, 40, 20<br>e.g. 100, 90, 80, 70, 60<br>e.g. 100, 75, 50, 25, 0<br><br>• (serial dilution)<br>e.g. 100,50, 25,12.5, 6.25<br>e.g. 100,10,1,0.1 and 0.01 |
| | | | **Do not give mark if**<br>• rounds up or down e.g.12 or 13 or 6.3<br>• if no concentrations |
| | **mp 2** | for <u>first four</u> concentrations shows the use of 100% or plant extract / correctly<br>• plant extract / P / 100 into <u>all</u> simple dilution<br>• plant extract / P / 100 <u>only for first one</u> in a serial dilution | **AND** (P) $cm^3$ ; |
| | | | **Do not give mark if**<br>• if no concentrations |
| | **mp 3** | for first four concentrations total final volume <u>10</u> ; | |

© University of Cambridge International Examinations 2012

**(a) (ii)** [6]

| | | | |
|---|---|---|---|
| PDO recording 2 | **mp 1** | table with all cells drawn | **AND**<br>heading (top or left of recorded data column)<br>percentage concentration (of) plant extract or P; |
| | | **Do not give mark if**<br>• % in cells of headed column<br>• other units mol $dm^{-3}$<br>• no units | |
| | **mp 2** | (heading – column or row including mean)<br>time (/)s or sec(onds); | |
| | | **Do not give mark if**<br>• units in cells of this column / row<br>• min(utes)<br>• additional method information either headings for columns / rows variables or in cells e.g. volumes and concentration in same cells | |
| MMO collection 2 | **mp 3** | (mark first column / row of recorded time taken)<br>for at least four concentrations<br>records whole seconds numbers less than 180 or '> or more than 180'; | |
| | | **Must have**<br>• whole numbers<br>• numbers 180 or less | |
| | **mp 4** | (mark first column / row of recorded time taken)<br>(records correct pattern)<br>highest concentration recorded is shorter time than lowest concentration ; | |
| MMO decision 2 | **mp 5** | at least two readings per concentration **or** six or more concentrations; | |
| | **mp 6** | mean / average recorded or rate recorded for two or more concentrations; | |

© University of Cambridge International Examinations 2012

**(a) (iii)** [max 3]

*Mark as incorrect idea that any errors which affect all tubes equally.*

| | | | |
|---|---|---|---|
| ACE interpretation MAX 3 | | cause of error | WITH idea of error |
| | **mp 1** | (independent variable – different concentrations of plant extract, catalase)<br>plant extract (on paper) | not even **or** bubbles / foam on side;<br>(do not give if gas bubbles/oxygen) |
| | **mp 2** | volume or amount or concentrations of extract<br><br>time of dipping or soaking<br><br>extract left on paper<br><br>thickness of paper | *idea of*<br><br>different (different pieces of paper)<br><br>not the same<br><br>not removed<br><br>varies; |
| | **mp 3** | (dependent variable – different times for paper to rise in hydrogen peroxide solution)<br><br>timing | paper sinking to bottom<br>variable time for paper to reach bottom<br>paper rises flat **or** paper on edge **or** foam on paper; |
| | **mp 4** | hydrogen peroxide | not the same (concentration) for each square of paper<br>or lost<br>has P (from previous concentration)<br>idea of used up or not new / fresh; |
| | **mp 5** | paper | *idea of*<br>sticking to sides; |
| | **mp 6** | temperature of hydrogen peroxide | rises; |

© University of Cambridge International Examinations 2012

**(a) (iv)** [max 3]

ACE improvements MAX 3

| | | |
|---|---|---|
| **mp 1** | (concentration of extract)<br>idea of using more concentrations or serial dilution<br><br>**or**<br><br>repeat; | |
| | Ignore mean or average | |
| **mp 2** | (standardised variables)<br>use same piece / source of paper<br><br>same time for soaking or dipping into plant extract; | |
| **mp 3** | pH | use buffers to keep constant; |
| **mp 4** | hydrogen peroxide | use fresh hydrogen peroxide / renew for each square (so 'not used up'); |
| **mp 5** | container<br><br>or squares | use deeper / wider container so squares do not touch sides<br>smaller or as circles; |

**(b) (i)** [4]

PDO layout 4

| | | |
|---|---|---|
| **mp 1** | *x*-axis<br>percentage concentration hydrogen peroxide or $H_2O_2$ | **AND** *y*-axis<br>time (/) s or sec(onds) to collect oxygen or $O_2$; |
| **mp 2** | scale as *x*-axis<br>5 to 2 cm labelled each 2cm | **AND** *y*-axis<br>10 to 2 cm labelled each 2cm ; |
| **mp 3** | correct plotting of<br>• **five** points only<br>• as small cross (does not go outside square on grid) **or** dot (in circle) **or** cross in circle to within half a square; | |
| **mp 4** | **five** plots with<br>ruled lines exactly point to point<br>**or**<br>curve through five points | **AND** (quality)<br>smooth line less than line thickness on grid; |
| | | **Do not give mark if**<br>• any extrapolation |

© University of Cambridge International Examinations 2012

| **(b) (ii)** | | | [3] |
|---|---|---|---|
| ACE conclusion 3 | **mp 1** | **either**<br>ref. to increase or more hydrogen peroxide or substrate reacts with or binds to enzyme or catalase;<br>**or**<br>low hydrogen peroxide or substrate so does not react with or bind to enzyme or catalase; | |
| | **mp 2** | correct ref. to use of active site(s) or ESC(s) or enzyme-substrate complexes; | |
| | **mp 3** | (at high hydrogen peroxide)<br>Idea of<br>• <u>limiting factor</u> (**or** hydrogen peroxide <u>not</u> limiting factor)<br>• too few active sites / ESCs or active sites full / allow 'enzyme saturated'<br>• temperature or pH; | |
| | | | **Do not give mark if**<br>• ref. to idea of reaction slows or slowing down or decreases |
| | | | **[Total: 22]** |

© University of Cambridge International Examinations 2012

<table>
<tr><th colspan="2">Question 2</th><th colspan="3">Expected Answers</th></tr>
<tr><td colspan="5">(a) (i) [5]</td></tr>
<tr><td rowspan="1">PDO layout 1</td><td>mp 1</td><td><u>not</u> drawn over the print of question<br>AND<br>no shading</td><td>AND<br>largest blood vessel larger than 50 mm</td><td>AND<br>clear, sharp, unbroken lines for <u>all</u> outermost enclosed areas ;<br>Do not give mark if<br>• less than two outermost enclosed areas<br>or if any outermost line has<br>• any ruled or compass lines<br>• any line more than1 mm<br>• feathery or broken or dashed or gap<br>• any 'tail' or overlap</td></tr>
<tr><td rowspan="3">MMO collection 3</td><td>mp 2</td><td>no cells</td><td colspan="2">AND drawn at least two complete vessels;</td></tr>
<tr><td>mp 3</td><td colspan="2">drawn different vessels<br>must be <u>only two</u> complete vessels</td><td>AND<br>different shapes;</td></tr>
<tr><td>mp 4</td><td colspan="2">(at least one complete vessel drawn with at least two layers (minimum three lines)</td><td>AND in this vessel inner lining crinkled or corrugated all round;</td></tr>
<tr><td rowspan="2">MMO decision 1</td><td rowspan="2">mp 5</td><td colspan="3">correct label muscle or tunica media with label line to layer touching endothelium (inner line) of complete vessel with thickest wall;<br>Must have minimum of three enclosed areas, line must touch middle line or be between the middle and inner line</td></tr>
<tr><td colspan="2">If label both vessels with muscle or tunica media then both must be correct</td><td>Do not give mark if<br>• any label which is biologically incorrect e.g. from incorrect organ or plant e.g. epidermis<br>• any label within drawn area</td></tr>
</table>

© University of Cambridge International Examinations 2012

**(a) (ii)** [5]

| | | | | |
|---|---|---|---|---|
| PDO layout 1 | **mp 1** | not drawn over the print of question<br>**AND**<br>no shading | **AND**<br>larger than 50 mm across widest point of inner enclosed area on any alveolus | **AND**<br>clear, sharp, unbroken lines for all inner enclosed areas**;**<br>**Do not give mark if**<br>• less than two hand drawn inner enclosed areas<br>**any of the inner enclosed areas has**<br>• any ruled lines<br>• any line more than 1mm<br>• any feathery line or broken or dashed or gap in line<br>• any 'tails' or overlaps or gaps |
| MMO collection 2 | **mp 2** | only two inner enclosed areas<br>**Ignore**<br>double lines | **AND** with shared adjacent wall | **AND** with outer line partly drawn to show each end of the shared wall; |
| | **mp 3** | at least 2 complete alveoli of different shapes; | | |
| MMO decision 2 | **mp 4** | drawn all shared walls with all other alveoli (all round both alveoli) | | **AND** (walls with) at least **three** nuclei drawn enclosed in the alveolar wall;<br>**Do not give mark if** draw cells |
| | **mp 5** | only correct label gas exchange membrane with label line(s) which<br>• touches the line or between two lines; | | |
| | | | | **Do not give mark if**<br>• any label is biologically incorrect e.g. from incorrect organ or plant e.g. epidermis or non-observable structures e.g. cilia<br>• label within drawn area |

© University of Cambridge International Examinations 2012

**(a) (iii)** [3]

| | | | | |
|---|---|---|---|---|
| MMO collection 1 | **mp 1** | shows at least one value for each of **C**, **D**, **E**, **F**, and **G AND** correct unit mm anywhere which match values;<br><br>**Ignore**<br>use of metres or mm | | |
| PDO display 2 | **mp 2** | shows addition of five values | **AND** shows division by 5; | |
| | | | ***Do not give mark for***<br>• *Σx/n unless x and n have key* | |
| | **mp 3** | shows at least <u>one</u> conversion of mm to mm by showing<br>• multiplication by ×1000 or $10^3$;<br>or conversion from cm to mm<br>• ×10 000 or $10^4$ | **AND** shows figure divided by / or ÷ 95 or $\frac{\quad}{95}$ | |
| | | | **Do not give mark if**<br>• metres anywhere<br>• no mm or cm anywhere | |

© University of Cambridge International Examinations 2012

**(b)** [max 5]

**PDO recording 1**

**mp 1**

organise as a table with only three columns or rows separated by lines (no cells needed)
**Ignore** number column

**AND** headings in any order only
Fig. 2.2 / healthy and
Fig. 2.3 / unhealthy

**AND**
third column or row contains features;

**MMO decision 1**

**mp 2**

only observable differences (at least two) recorded;

**Do not give mark if**
- any similarities recorded
- any function e.g. 'for gas exchange' or not observable tar
- surface area to volume ratio
- healthy and unhealthy / bursting / damaged

**ACE interpretation MAX 3**

| | feature | Fig. 2.2 healthy lung | Fig. 2.3 unhealthy lung |
|---|---|---|---|
| **mp 1** | size (of air space / lumen / diameter)<br>surface area / gas exchange membrane alveolar wall | Small / small(er)<br><br>larg(er)<br><br>more | Large / larg(er);<br><br>small(er)<br><br>few(er) or less |
| **mp 2** | number | many | few(er); |
| **mp 3** | shape of alveolus or wall | wavy / irregular / more folded | smooth / even / less folded; |
| **mp 4** | thickness | thin(ner) | thick(er); |
| **mp 5** | number of nuclei | many / more | few(er) / less; |
| **mp 6** | black particles<br>**ignore** tar | absent or no(one) or has not or some | present or yes or has or more; |

**Ignore**
- functions
- ref. to colour
- shape of cell or nucleus
- 3-D descriptions such as spherical, biconcave, ball, disc
- tick and cross without a key
- diagrams

**Do not give ACE marks if**
- for each feature the difference is not opposite each other unless comparative statement e.g. more or -er

  Fig. 2.2 difference i
  difference ii
  Fig. 2.3 difference i
  difference ii

[**Total: 18]**

© University of Cambridge International Examinations 2012

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

# 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.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

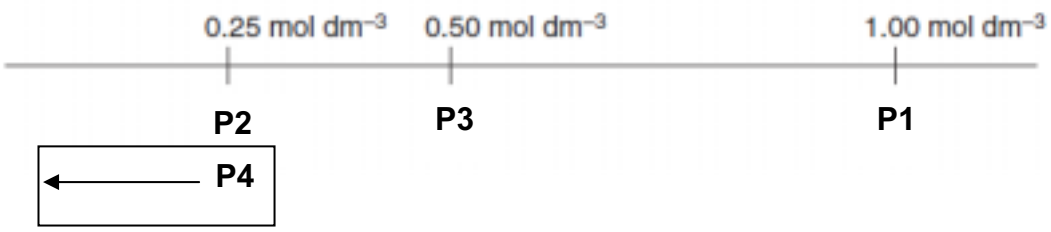
Mark scheme abbreviations:

| | |
|---|---|
| **;** | 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) |
| **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) |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **1 (a) (i)** | | | [1] |
| 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<br>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 | | *Idea of* use same pressure<br>**or**<br>repeat readings<br>**or**<br>use more than one piece of plant material*;* | |
| **(a) (iv)** | | | [1] |
| MMO decision 1 | | *evenly spaced whole minutes not less than 3 minutes until no further change in bend or until 10 minutes;* | |
| **(b) (i)** | | | [7] |
| PDO recording 2 | **mp 1** | table with all cells drawn | **AND** heading (top or left)<br>sample or plant tissue(s) or solution or conc(entration) ; |
| | **mp 2** | (heading)<br>angle of bend degree(s) or °; | |
| | | | **Do not give mark if**<br>• units in cells of column below heading |
| MMO collection 3 | **mp 3** | at 0 time 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; | |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| 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**;<br><br> | |
| ACE conclusion 1 | **mp 2** | (using first recorded result)<br>**P4** recorded in correct position (below 0.25 or as lowest angle of bend); | |
| | | | **Do not give mark if**<br>• if write a concentration for **P4** |
| **(b) (iii)** | | | [1] |
| ACE conclusion 1 | | higher or less negative <u>water potential</u> outside<br><br>or <u>water potential</u> gradient steeper in 1 mol | **AND**<br>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)<br>pressure | inaccurate / varies / not same; |
| | **mp 2** | material | difficult to hold and measure; |
| | **mp 3** | (standardised variables)<br>lengths or widths or size<br>or cross sectional area | different / varies / not same; |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **(b) (v)** | | | [1] |
| ACE interpretation 1 | | +/- 1 degree or °; | |
| **(b) (vi)** | note: *reliable: to have results which are as repeatable as possible* *accuracy: change method of measuring to obtain results as close as possible to the true value* | | [max 3] |
| 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]** |

© University of Cambridge International Examinations 2012

| **2 (a)** | | | | | [6] |
|---|---|---|---|---|---|
| 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;<br>**Do not give mark if**<br>• less than two outer walls<br>• any ruled lines<br>• any line 1 mm or thicker<br>• any feathery or broken / dashed or gap in line<br>• any 'tail' or overlap with an enclosed area<br>• drawn over the print of question | |
| MMO collection 3 | **mp 2** | only 4 cells drawn | | **AND** shows two from each slide;<br><br>**Do not give mark if**<br>• any ruled lines | |
| | **mp 3** | (detail of observable feature)<br>starch grains uneven sizes or drawn as irregular area inside cell; | | | |
| | **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;<br>**S1** starch grains **AND** (iodine) black vs **S2** (methylene blue) clear / white<br>**or S1** starch grains visible / see more vs **S2** starch grains not visible / see few<br>**or** (iodine) single mass vs (methylene blue) separate grains | | | |
| MMO decision 1 | **mp 6** | labels with a ruled label line one starch grain only; | | | |

© University of Cambridge International Examinations 2012

**(b) (i)** [6]

| | | | | |
|---|---|---|---|---|
| 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 ;<br>**Do not give mark if**<br>• less than four hand drawn enclosed areas (not cells)<br>• any line 1mm or thicker<br>• any ruled lines<br>• any feathery or broken / dashed or gap in line<br>• any 'tails' or overlaps<br>• 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)<br>drawn with two continuous lines | | **AND**<br>drawn enclosed area in centre space ; |
| MMO decision 2 | **mp 5** | (except outer layer and centre space)<br>at least three additional enclosed areas; | | |
| | **mp 6** | correct label, with label line to <u>enclosed</u> area, xylem; | | |
| | | | | **Do not give mark if**<br>• any label within drawn area |

© University of Cambridge International Examinations 2012

| | | | |
|---|---|---|---|
| **(b) (ii)** | | | [2] |
| 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**<br>• units in ratio<br>• if not to smallest common denominator |
| **(c) (i)** | | | [4] |
| PDO layout 4 | **mp 1** | *x*-axis<br>time (/) hours or hr(s) | **AND** *y*-axis<br>concentration of sugars (/) $m$mol; |
| | **mp 2** | scale as *x*-axis<br>5 to 2 cm labelled each 2 cm except origin 25 | **AND** *y*-axis<br>0.10 to 2 cm labelled each 2 cm; |
| | **mp 3** | correct plotting; | |
| | **mp 4** | two lines with five plots with ruled lines point to point | **AND** (quality)<br>smooth line less than 1 mm thick; |
| | | | **Do not give mark if any extrapolation** |

© University of Cambridge International Examinations 2012

**(c) (ii)** [2]

ACE interpretation 1

**mp 1** *Idea of*
concentration of sugars decreases for 8 hrs or in dark and then increases;

ACE conclusion 1

**mp 2** *(explains decrease **and** increase)*

| *in context of decrease or in dark / no light / night* | *in context of increase or in light / sun / day* | |
|---|---|---|
| *sugars used up* | *sugars made* | |
| *only respiration or no photosynthesis* | *photosynthesis* | ; |

**[Total: 20]**

© University of Cambridge International Examinations 2012