

CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9700 BIOLOGY

9700/34

Paper 34 (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 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.

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Mark scheme abbreviations:

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|-------------------------|---|
| ; | 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 |
| AVP | Alternative valid point (examples given as guidance) |

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| 1 (a) (i) | | [1] |
| MMO decision 1 | 1 | <u>volume of W/water</u> AND (number of) <u>drops</u> of (P/indicator); |
| | | (for W/water) R amount |
| (ii) | | [1] |
| MMO decision 1 | 1 | add <u>drops</u> of A/alkali (solution) (not amount) or add same number of drops/stated number of drops of A/alkali (solution) |
| | | AND same colour as/matches (Fig. 1.1) first (test-tube)/all tubes; A (use the original 5 cm ³) putting 1 cm ³ into the other test-tubes; |
| (a) (iii) | | [1] |
| MMO decision 1 | 1 | mark (draw a line on each/all test-tube(s) or tubing) or position the tubing at bottom of test-tube; |
| | | R measuring distance above bottom/below surface without ref. to marking |
| (a) (iv) | | [1] |
| MMO decision 1 | 1 | seconds or s; |

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| (v) | | [3] | | | | | | | | | |
| MMO collection 1 | mp1 | records times for 'start of reading' and 'end-point' in Table 1.1; | | | | | | | | | |
| MMO decision 1 | mp2 | records end time for before (less than) the start time of the next reading; | | | | | | | | | |
| PDO recording 1 | mp3 | records times for all readings to same precision; | | | | | | | | | |
| (vi) | | [1] | | | | | | | | | |
| ACE interpretation 1 | 1 | <p>time taken to reach end-point with whole numbers and correct units seconds/s;</p> <p style="text-align: center;">Table 1.3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">1 st start time</td> <td style="padding: 2px;">0:00</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="padding: 2px;">1 st end-point time</td> <td style="padding: 2px;">1:45</td> <td style="padding: 2px;">105</td> </tr> <tr> <td colspan="3" style="padding: 2px; text-align: center;">time taken to reach end-point = 105 seconds</td> </tr> </table> | 1 st start time | 0:00 | 0 | 1 st end-point time | 1:45 | 105 | time taken to reach end-point = 105 seconds | | |
| 1 st start time | 0:00 | 0 | | | | | | | | | |
| 1 st end-point time | 1:45 | 105 | | | | | | | | | |
| time taken to reach end-point = 105 seconds | | | | | | | | | | | |

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| (vii) | | | [4] |
| PDO recording 2 | mp1 | table with all cells drawn | AND heading (top or left) <u>test-tube or reading or number of test or sample</u> ; |
| | Do not give mark if 'heading' in cells of headed/rows | | |
| PDO recording 2 | mp2 | (heading) <u>time</u> (taken to end-point) (/) <u>s</u> or <u>seconds</u> in any one column; | |
| | Do not give mark if <ul style="list-style-type: none"> • units in cells of this column/row • minutes • additional method information either headings for columns/rows or in cells e.g. volumes | | |
| MMO collection 2 | mp3 | for all 10 (processed/end-point) times records <u>only</u> processed results as <u>whole numbers</u> ; | |
| | | Must have <ul style="list-style-type: none"> • whole seconds only | Do not give mark if <ul style="list-style-type: none"> • raw results |
| | mp4 | [comparing Table 1.1 (first five readings) with Table 1.2 (readings after 10 minutes)] for results showing same trend; | |
| | | Must have <ul style="list-style-type: none"> • processed data | Do not give if <ul style="list-style-type: none"> • raw results (start and end times) |
| (b) | | | [max 3] |
| ACE interpretation max 3 | | cause of error | with idea of error |
| | mp1 | any reference to colour/end-point | difficult to judge/distinguish//identify/ is subjective/varies may be different; |
| | mp2 | quantity/amount of A /alkali | different or varies; |
| | mp3 | Y /yeast (enters tubing) | so goes cloudy/ different amount of yeast for subsequent test-tubes; |
| | mp4 | position of tubing | changes (as shake); |
| | mp5 | shaking | different/varies/not same; |

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| (c) | | [max 3] |
| ACE improvement max 3 | max 3 | mp1 (standardised variables) (start colour) mix W /water and P /indicator and A /alkali in one beaker and then put into test-tubes; |
| | | mp2 (instead of using one syringe containing yeast) have one syringe(with yeast) per reading/end-point or idea of individual timing/set each one up separately/fixed time between each transfer or another person to help record time or identify end-point or gather data/use 'laptimer' on timer; |
| | | mp3 (dependent variable) use a colorimeter; Do not give mark for <ul style="list-style-type: none"> • use of white tile • calorimeter |
| | | mp4 (to obtain at least three sets of data) repeat more than once; |
| | | mp5 machine to standardise shaking; |
| | | mp6 (from alkali to neutral/acid) use pH meter to detect change; |
| (d) | | [2] |
| ACE conclusion 2 | mp1 (for 10 figures processed results) supports/'yes' as <u>all data</u> consistent or cannot tell/'no' if data not consistent; | |
| | mp2 (for 10 figures processed results) (supports/'yes') in line with some trend in their results | <u>end-point times</u> become <u>longer</u> or quotes correctly any selective comparative data; |
| | (for 10 figures processed results) (rejects/'no'/cannot tell) in line with some trend in results | OR no consistent pattern/ <u>end-point times</u> become <u>shorter</u> or quotes correctly any selective comparative data; |
| | | [Total: 20] |

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| 2 (a) | | | | [5] |
| PDO layout 1 | mp1 | suitable plan diagram; | | |
| | | Do not give mark if <ul style="list-style-type: none"> any shading drawn over the print of the question any ruled line | Do not give mark if <ul style="list-style-type: none"> less than 60mm at widest point (across mid-rib upper to lower epidermis) | AND clear, sharp, unbroken lines for outermost line; Do not give mark if <ul style="list-style-type: none"> less than <u>3</u> enclosed areas open-ended in epidermis lines any part of the line 1mm or thicker (use grid) any feathery or broken or dashed line or gap any 'tail' or overlap in line |
| MMO collection 3 | mp2 | no cells | AND drawn whole section | |
| | mp3 | draws vascular bundle (in central area) with interior subdivided into at least three enclosed areas or at least 3 stomata; | | |
| | mp4 | at least one circle at end OR clear double line for outside of vascular bundle; | | |
| MMO | mp5 | labels the epidermis with label line ending either within three lines of epidermis; | | |
| | | Do not give mark if <ul style="list-style-type: none"> any label within drawn area | | |

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| (b) | | | | | [4] |
| PDO layout 1 | mp1 | suitable plan diagram; | | | |
| | | Do not give mark if <ul style="list-style-type: none"> any shading drawn over the print of the question any ruled lines | Do not give mark if <ul style="list-style-type: none"> less than 40 mm at widest distance across largest cell | Do not give mark if <ul style="list-style-type: none"> less than four enclosed areas or if any outer lines (of enclosures) <ul style="list-style-type: none"> any feathery or broken/dashed line or have gaps have tails or overlaps | |
| MMO collection 2 | mp2 | only <u>4</u> complete cells drawn | AND adjacent (touching) cells as a group; | | |
| | mp3 | the 2 end cells should touch only one other cell; | | | |
| MMO decision 1 | mp4 | the cells must be drawn with double lines all the way round AND where two pairs of cells touch there must be 3 lines (representing the middle lamella); | | | |
| | | Do not give mark if <ul style="list-style-type: none"> organelles e.g. mitochondria, Golgi, etc. | | | |
| (c) | | | | | [2] |
| PDO display 2 | mp1 | shows measurement of diameter (with reference to vascular bundle) | AND shows measurement of width (with reference to xylem) | AND shows both measurements as whole numbers or 0.5 only | AND units; |
| | mp2 | (in context of measurements) answer as larger <u>whole</u> number to/: smaller <u>whole</u> number (no units in final ratio) or as fraction as larger <u>whole</u> number over smaller <u>whole</u> number (no units in final ratio); | | | |
| | | Must have <ul style="list-style-type: none"> to lowest denominator | | Do not give if <ul style="list-style-type: none"> if no measurements shown anywhere | |

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| (d) | | | | [max 4] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|---|--|---|--|--------------------------|---------|----|----------|-----|-------------------|-------------------------|--------------------------|-----|-------------------|-------------------|--------------------|-----|--------------------------------|--------------|------------|---|-----------|-----------|-----|--|--------------------|---------|---|-----------------|--------------------|-------------------------|-------------------------|-------------------------|-----|--------------------------|----------|------|--------------------------------------|-----------------|-----------------|-----|----------------------|-----------------|----------------|-----|---------------------------------|----------------------------------|------------------------------------|------|---|----------|------------|
| PDO recording 1 | mp1 | organise as a table with only three columns or rows separated by lines | AND headed <u>N1</u> and <u>Fig. 2.1</u> | AND third column contains features; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MMO decision 1 | mp2 | only differences; Do not give mark if <ul style="list-style-type: none"> • any similarities recorded • any functions • any non-observable differences | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ACE interpretation max 2 | max 2 | <table border="1"> <thead> <tr> <th></th> <th>feature</th> <th>N1</th> <th>Fig. 2.1</th> </tr> </thead> <tbody> <tr> <td>mp3</td> <td>cuticle/epidermis</td> <td>any comparative comment</td> <td>any comparative comment;</td> </tr> <tr> <td>mp4</td> <td>number of stomata</td> <td>many/more/present</td> <td>few(er)/less/none;</td> </tr> <tr> <td rowspan="2">mp5</td> <td>air space/ spongy mesophyll</td> <td>few(er)/less</td> <td>many/more/</td> </tr> <tr> <td>arrangement of air space/ spongy mesophyll</td> <td>small(er)</td> <td>larg(er);</td> </tr> <tr> <td rowspan="3">mp6</td> <td><u>packing</u> of palisade cells /layer below epidermis</td> <td>loose/less compact</td> <td>compact</td> </tr> <tr> <td><u>position</u> of palisade cells /layer below epidermis</td> <td>all around leaf</td> <td>upper part of leaf</td> </tr> <tr> <td>shape of palisade cells</td> <td>rectangular or long(er)</td> <td>round(er) or short(er);</td> </tr> <tr> <td rowspan="2">mp7</td> <td>shape of vascular bundle</td> <td>circular</td> <td>oval</td> </tr> <tr> <td>ring of cells around vascular bundle</td> <td>present/has/yes</td> <td>absent/none/no;</td> </tr> <tr> <td>mp8</td> <td>extra circles/canals</td> <td>yes/has/present</td> <td>no(ne)/absent;</td> </tr> <tr> <td>mp9</td> <td>any (overall) comparative shape</td> <td>rounded ends or midrib as 'bump'</td> <td>pointed ends or has pointy midrib;</td> </tr> <tr> <td>mp10</td> <td>any reference to size (whether overall shape or internally)</td> <td>big(ger)</td> <td>small(er);</td> </tr> </tbody> </table> | | | | feature | N1 | Fig. 2.1 | mp3 | cuticle/epidermis | any comparative comment | any comparative comment; | mp4 | number of stomata | many/more/present | few(er)/less/none; | mp5 | air space/ spongy mesophyll | few(er)/less | many/more/ | arrangement of air space/ spongy mesophyll | small(er) | larg(er); | mp6 | <u>packing</u> of palisade cells /layer below epidermis | loose/less compact | compact | <u>position</u> of palisade cells /layer below epidermis | all around leaf | upper part of leaf | shape of palisade cells | rectangular or long(er) | round(er) or short(er); | mp7 | shape of vascular bundle | circular | oval | ring of cells around vascular bundle | present/has/yes | absent/none/no; | mp8 | extra circles/canals | yes/has/present | no(ne)/absent; | mp9 | any (overall) comparative shape | rounded ends or midrib as 'bump' | pointed ends or has pointy midrib; | mp10 | any reference to size (whether overall shape or internally) | big(ger) | small(er); |
| | | | feature | N1 | Fig. 2.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | mp3 | cuticle/epidermis | any comparative comment | any comparative comment; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | mp4 | number of stomata | many/more/present | few(er)/less/none; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | mp5 | air space/ spongy mesophyll | few(er)/less | many/more/ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | arrangement of air space/ spongy mesophyll | small(er) | larg(er); | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | mp6 | <u>packing</u> of palisade cells /layer below epidermis | loose/less compact | compact | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | <u>position</u> of palisade cells /layer below epidermis | all around leaf | upper part of leaf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | shape of palisade cells | rectangular or long(er) | round(er) or short(er); | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | mp7 | shape of vascular bundle | circular | oval | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ring of cells around vascular bundle | present/has/yes | | absent/none/no; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| mp8 | extra circles/canals | yes/has/present | no(ne)/absent; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| mp9 | any (overall) comparative shape | rounded ends or midrib as 'bump' | pointed ends or has pointy midrib; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| mp10 | any reference to size (whether overall shape or internally) | big(ger) | small(er); | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| (e) (i) | | | | [4] | |
| PDO layout 4 | mp1 | x-axis <u>time of day (/) hours</u> | AND y-axis <u>water potential in leaf (cells)/MPa;</u> | | |
| | mp2 | scale as x-axis <u>5.00 or 5:00 to 2 cm labelled each 2 cm</u> | AND y-axis <u>-1.0 to 2 cm labelled each 2 cm;</u> | | |
| | mp3 | must be negative scale <ul style="list-style-type: none"> • check presence of seven points • all seven as small cross or dot(in circle) or cross in circle; • correct plotting | | | |
| | mp4 | <u>seven</u> plots with <u>ruled</u> lines exactly point to point | AND (quality) smooth sharp line; | | |
| | ecf from incorrect plots | | Do not give mark if <ul style="list-style-type: none"> • any feathery line • irregular thickness | | |
| (e) (ii) | | | | [1] | |
| ACE conclusion 1 | 1 | time 12:00 hours (day) 22:00 hours (night) between 12:00 hours and 22:00 hours | AND (rate of) transpiration high low decreases | AND water potential low most negative high least negative increases/becomes less negative | |