

**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:

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

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

<b>(v)</b>		<b>[3]</b>									
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;									
<b>(vi)</b>		<b>[1]</b>									
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;"><b>Table 1.3</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">1 st start time</td> <td style="padding: 5px;">0:00</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">1 st end-point time</td> <td style="padding: 5px;">1:45</td> <td style="padding: 5px;">105</td> </tr> <tr> <td colspan="3" style="padding: 5px; 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	<b>AND</b> heading (top or left) <u>test-tube or reading or number of test or sample;</u>
	<b>Do not give mark if</b> '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;	
	<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• units in cells of this column/row</li> <li>• minutes</li> <li>• additional method information either headings for columns/rows or in cells e.g. volumes</li> </ul>		
MMO collection 2	mp3	for all 10 (processed/end-point) times records <u>only</u> processed results as <u>whole numbers</u> ;	
		<b>Must have</b> <ul style="list-style-type: none"> <li>• whole seconds only</li> </ul>	<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• raw results</li> </ul>
	mp4	[comparing Table 1.1 (first five readings) with Table 1.2 (readings after 10 minutes)] for results showing same trend;	
		<b>Must have</b> <ul style="list-style-type: none"> <li>• processed data</li> </ul>	<b>Do not give if</b> <ul style="list-style-type: none"> <li>• raw results (start and end times)</li> </ul>
<b>(b)</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 <b>A</b> /alkali	different or varies;
	mp3	<b>Y</b> /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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<b>(c)</b>		[max 3]
ACE improvement max 3	max 3	mp1 (standardised variables) (start colour) mix <b>W</b> /water and <b>P</b> /indicator and <b>A</b> /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;  <b>Do not give mark for</b> <ul style="list-style-type: none"> <li>• use of white tile</li> <li>• colorimeter</li> </ul>
		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;
		<b>(d)</b>
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	<b>OR</b>  no consistent pattern/ <u>end-point times</u> become <u>shorter</u> or quotes correctly any selective comparative data;
		<b>[Total: 20]</b>

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<b>2 (a)</b>				[5]
PDO layout 1	mp1	suitable plan diagram;		
		<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>any shading</li> <li>drawn over the print of the question</li> <li>any ruled line</li> </ul>	<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>less than 60mm at widest point (across mid-rib upper to lower epidermis)</li> </ul>	<b>AND</b> clear, sharp, unbroken lines for outermost line; <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>less than <u>3</u> enclosed areas</li> <li>open-ended in epidermis lines</li> <li>any part of the line 1mm or thicker (use grid)</li> <li>any feathery or broken or dashed line or gap</li> <li>any 'tail' or overlap in line</li> </ul>
MMO collection 3	mp2	no cells	<b>AND</b> 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;		
		<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>any label within drawn area</li> </ul>		

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



(d)				[max 4]																																																
PDO recording 1	mp1	organise as a table with only three columns or rows separated by lines	<b>AND</b> headed <u>N1</u> and <u>Fig. 2.1</u>	<b>AND</b> third column contains features;																																																
MMO decision 1	mp2	only differences;  <b>Do not give mark if</b> <ul style="list-style-type: none"> <li>any similarities recorded</li> <li>any functions</li> <li>any non-observable differences</li> </ul>																																																		
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);
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<b>(e) (i)</b>				[4]	
PDO layout 4	mp1	x-axis <u>time of day (/) hours</u>	<b>AND</b> 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>	<b>AND</b> y-axis <u>-1.0 to 2 cm labelled each 2 cm;</u>		
	mp3	<b>must be negative scale</b> <ul style="list-style-type: none"> <li>• check presence of seven points</li> <li>• all seven as small cross or dot(in circle) or cross in circle;</li> <li>• correct plotting</li> </ul>			
	mp4	<u>seven</u> plots with <u>ruled</u> lines exactly point to point	<b>AND</b> (quality) smooth sharp line;		
	<b>ecf</b> from incorrect plots		<b>Do not give mark if</b> <ul style="list-style-type: none"> <li>• any feathery line</li> <li>• irregular thickness</li> </ul>		
<b>(e) (ii)</b>				[1]	
ACE conclusion 1	1	time  12:00 hours (day)  22:00 hours (night)  between 12:00 hours and 22:00 hours	<b>AND</b>  (rate of) transpiration  high  low  decreases	<b>AND</b>  water potential  low most negative  high least negative  increases/becomes less negative	