CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9700 BIOLOGY

9700/33 Paper 33 (Advanced Practical Skills 1), maximum raw mark 40

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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:

;	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)

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1 (a) [max 11]

Summary:

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

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

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

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

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correct context of molecule tested and reagent shown by brackets.

<table>
<tr><td rowspan="2">MMO Decision on method</td><td>(starch)
idea of:
uses <u>iodine</u></td><td>(<u>glucose</u>)

<u>Benedict's</u></td><td colspan="2">AND
<u>boil</u>
or
or boil/heat to <u>degrees</u> or <u>°C</u> AND any whole number 80 to and including 100 or range within 80 to 100 e.g. 80 to 100;</td><td>(sucrose)
add HCl/named acid AND boil AND neutralise with $NaHCO_3$ or named alkali;</td></tr>
<tr><td>Do not give mark if
• heat</td><td colspan="4"></td></tr>
<tr><td rowspan="2">MMO Collection records results</td><td>(starch+iodine)
<u>only one</u> positive result

Blue/black or black</td><td colspan="2">(glucose + Benedict's)
<u>only one</u> positive result

green or yellow or orange or red or brown or any combination;</td><td>(sucrose+Benedict's)
only for test 2 or test 3 where after glucose test

<u>only one</u> positive result
green or yellow or orange or red or brown or any combination; ignore brick

Do not give mark if
• S1 and S3 tested</td></tr>
<tr><td colspan="4">The first test must have recorded results for <u>all three</u> solutions.</td></tr>
<tr><td>I ACE interpretation 1</td><td>(starch + iodine)

(S)<u>2</u> and <u>starch</u>;</td><td colspan="2">(glucose/ reducing sugar+Benedicts)

(S)<u>3</u> and <u>glucose</u>;</td><td>(sucrose+Benedicts)

<u>only for test 2 if test 1 is glucose</u>
(S)<u>1</u> and <u>sucrose</u>;</td></tr>
</table>

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(b) (i) [1]

ACE interpretation 1	1	glucose;	

(ii) [4]

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

(b) (iii) [1]

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

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(c) [3]

		R if change another variable, e.g. use **S1**, **S2** and **S3**. **R** if change of temperature in context of Benedict's test, e.g. add Benedict's then change temperature	
ACE improvements **2**	mp1	(independent variable) *idea of* at least 5 temperatures or examples (can have even if no units) (within range 5 to 100);	
	mp2	(in context of temperature change) Idea of (maintained) in thermostatic(ally-controlled) water-bath or describe use of heating and cooling or hot/cold water **AND** uses thermometer (to check temperature) ;	
		A thermoregulatory electr(on)ic or digital incubator	***Do not give mark if*** • air-conditioned or temperature-controlled rooms
AND <u>*one*</u> *of the following only in context of changing temperature:* ***ignore*** *number with* ***S*** ***A*** *any* ***S*** *or sucrose* ***Do not give mark if*** glucose			
ACE improvements max 1	mp3	*(standardise variables)* keep volumes of E/enzyme **AND** S/substrate/starch/sucrose the same or any volume any volume between 2 cm^3 and 25 cm^3 (units once);	
	mp4	equilibrate E/enzyme and **S**/substrate/starch/sucrose separately described **AND** then mix;	
	mp5	(dependent variable) *idea of* test with iodine or test for starch or *idea of* test with Benedict's or test for glucose/reducing sugar;	
			[Total: 20]

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2 (a) (i) [2]

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

MMO collection 2

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

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(ii) [3]

		suitable plan diagram;		
PDO layout 1	mp1	**Do not give mark if** • any line outside the drawn line given • any line off the grid • any shading • any ruled line	**AND** clear, sharp, unbroken lines **Do not give mark if** • less than <u>three</u> enclosed areas (**ignore** cells) or any lines have • any part of line 1 mm or thicker • any feathery or broken or dashed line or gap • any tail or overlap	
PDO recording 1	mp2	second layer from **R**/bottom must be convex shape at top edge (curves up)	**AND** *(completed outline at base as)* an enclosed area from <u>ends of lines</u> provided *(line*)	**AND** *(line drawn from <u>right edge</u>)* bulges out then curves in through three boxes below to right of **R** AND reaches *<u>to **R**</u>;*
			Do not give mark if • cells drawn • more than four regions/enclosed areas • if drawn outside grid	
MMO decision 1	mp3	(draws correct proportion and shape of layers) measured along line from **J** to **R**, length of first layer (near **J**) is less than half the length of the second layer from **R**;		

(iii) [2]

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

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(b) [3]

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

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(c)				[max 4]
do not give mark if ref. to cell structures, e.g. (cell) wall or vacuoles or nuclei or membrane				
PDO recording 1	mp1	organise as a table with columns and rows		**AND** heading feature ;
ACE interpretation max 3	max 3		feature	description of **K1** (Fig 2.1)
		mp1	epidermis	smooth or no bumps or regular;
		mp2	thickening/collenchyma sclerenchyma/ or triangles/red cells	triangular or present or has or yes present or has or yes;
		mp3	vascular bundles size	different sizes or small and large;
			(position)	idea of scattered or 'ring and others' or 'near/close to epidermis and in middle' or random;
			(shape or sheath/cells around vascular bundle)	oval shape or present or has or yes;
			(number)	more or large(r);
			(xylem (vessels/cells) **N**)	idea of large(r) or big(ger);
		mp4	air spaces or gaps or holes **R** vacuoles	large(r)or present or has or yes;
		mp5	stomata or guard cells or gaps or holes or grooves or ridges	present or has or yes;
		mp6	cuticle or idea of extra outer layer	present or has or yes;
	ignore • 3-D descriptions, e.g. rugby ball shape • tick or cross without a key • diagrams • ref. to size except where shown			if no organisation then give mark only if description in same sentence as feature

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(d) (i) [4]

if draw a chart then only mp1 for orientation.

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

Additional guidance:

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

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(ii)				[2]
ACE interpretation 2	mp1	*idea of:* (between 10.00 and 17.00 hours) flow rate increases;		
			Do not give mark if • ref. to decrease before increase • ref. to 6:00 increase • ref. to time increases or daylight	
	mp2	quotes data at 10.00 as reading from their graph	**AND** 17.00 as <u>0.455</u>;	**AND** must have units once <u>mg min^{-1} or $mg/min^{(1)}$</u>;
		A increase of 0.455 minus their reading at 10:00 e.g. 0.225 = 0.235 mg/min	**ecf** units used on graph	
[Total: 20]				

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