CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

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

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

© Cambridge International Examinations 2013

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)

© Cambridge International Examinations 2013

Expected Answers			
1 (a) (i)			[max 15]
mp1	(MMO Decision) test for <u>glucose/reducing sugar</u> **before** <u>sucrose/non-reducing sugar</u>;		
mp2	(MMO Decision) <u>tests</u> (gets a result for) only remaining solutions in next test so test 1 **<u>S1, S2</u>**, **<u>S3, S4, S5</u>** **AND** test 2 **S1, S2**, **S3, S4, S5** **minus** solution(s) identified in test 1 **AND** test 3 **S1, S2**, **S3, S4, S5** **minus** solution(s) identified in test 1 and test 2 **AND** test 4 **S1, S2**, **S3, S4, S5** **minus** solution(s) identified in test 1, test 2 and test 3;		
mp3	(MMO Decision) <u>cm^3 or ml(s) once</u>	**AND** volume of only Benedict's (solution) or sum of volumes of Fehling's A and B	equal to or more than volume of sample;
mp4	(PDO Recording) draws in all the row lines in test 1 results table only;		

	starch test	glucose test	sucrose test	
Decision on method **M** only starch, glucose, sucrose tests **ignore** protein test	✓ or X	✓ or X	✓ or X	
R and **I** only awarded in correct context of molecule being tested and reagent and for sucrose only if after glucose (mp1 awarded)	test 1	test 2	test 3	test 4
collection records **R**	✓ or X	✓ or X	✓ or X	✓ or X
conclusion identification **I**	✓ or X	✓ or X	✓ or X	✓ or X

© Cambridge International Examinations 2013

M,**R** and **I** are same marking points but can only be awarded in correct contexts of molecule tested and reagent for as shown below:

M decision on	(starch) *Idea of* uses <u>iodine or Lugol's</u>; **do not give mark if** heated	(<u>glucose</u> (**ignore** reducing/non-reducing) or <u>reducing sugar</u> only) <u>Benedict's</u> **AND** <u>boil</u> **or** 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;	(<u>sucrose</u> (**ignore** reducing/non-reducing) or <u>non-reducing sugar</u> only add acid/ HC*l*/ named acid **AND** heat/ warm **AND** neutralise/adds base/alkali/ named alkali;	(protein) **ignore** method
R Records	(starch + iodine) <u>only one</u> positive result blue/black or black or navy blue or dark blue;	(glucose/reducing sugar + Benedict's) <u>only one</u> positive result green or yellow or orange or red or brown or any combination;	(sucrose/non-reducing sugar + Benedict's) <u>only one</u> positive result green or yellow or orange or red or brown or any combination; **ignore** brick **only award** if test done after glucose test. **do not give mark** if S2 and S5 tested	(protein + Biuret or KOH/NaOH and copper sulphate or Biuret A and B) <u>only one</u> positive result biuret only accept lilac or purple or mauve or violet;
	the first test must have recorded results for <u>all five</u> solutions. Tests 2 and 3 must have recorded results for <u>at least two</u> solutions			
I Conclusion	(starch + iodine) **(S)<u>4</u>** and <u>starch</u>;	(glucose/reducing sugar + Benedicts) **(S)<u>5</u>** and <u>glucose</u>;	(sucrose/non-reducing test + Benedicts) **(S)<u>2</u>** and <u>sucrose</u>; only award if test done after glucose test	(protein + biuret or KOH/NaOH and copper sulphate or biuret A and B); (S)**<u>3</u>** and <u>protein</u>
Test 4 **I** is only awarded for (**S)<u>1</u>** and contains no biological molecules/ none;				
[max 15]				

© Cambridge International Examinations 2013

(ii)			[1]
ACE interpretation 1		S<u>2</u>;	
(b)			[3]
ACE improvements 2	mp1	(independent variable) (using reducing sugars or named reducing sugar/glucose/standard solutions) at least 5 sugar concentrations or at least five examples of concentrations;	
	mp2	<u>serial dilution</u> or <u>simple dilution</u> or described method for making different concentrations;	
ACE improvements 1	mp3	(dependent variable) compare results/colour of plant extracts/samples/unknown with known (standard) <u>solutions</u>;	
[Total: 19]			

© Cambridge International Examinations 2013

2 (a) (i) [2]

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

MMO collection 2	mp1	**L**	**M**	**N**	**P**
		any numbers which add up to 11or 11.5 or 12		ignore	15 or 15.5 or 16 or 16.5 or 17;
	mp1	any 4 values which add up to 30;			

(ii) [3]

PDO layout 1	mp1	suitable plan diagram **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 3 enclosed areas (ignore cells) • any part of line 1mm or thicker (use grid) • any feathery or broken or dashed line or gap • any tail or overlap	
PDO recording 1	mp2	3 bands (3 lines) which dip downwards	**AND** (completed outline at base as) an enclosed area from ends of lines provided	**AND** two converging lines to R;
MMO decision 1	mp3	(draws correct proportion and shape of layers)		
		3 lines in the top half	**AND** both of the top 2 bands are wider than 3rd band;	

(iii) [2]

PDO display 2	mp1	(inside the drawn outline) shows counting of all complete 1 cm by 1 cm squares **AND** those squares which are half or more than half;	
	mp1	number clearly linked to bundle **AND** number clearly linked to xylem	**AND** larger whole number to smaller whole number to lowest denominator **OR** as fraction larger number over smaller number to lowest denominator;

© Cambridge International Examinations 2013

(b) (i) [4]

if draw a chart then only give mp1

PDO layout 4	mp1	*x*-axis time of day(/) hours	**AND** *y*-axis rate of transpiration (/) g cm^{-2} hr^{-1} ;
	mp2	scale as *x*-axis 5:00 hours to 2 cm, labelled each 2 cm	**AND** *y*-axis 0.5 to 2 cm labelled each 2 cm ;
	mp3	correct plotting of all points as small cross or dot(in circle) or cross in circle;	
	mp4	six plots with ruled lines exactly point to point	**AND** (quality) smooth line less than 1 mm thick;

(ii) [1]

ACE interpretation 1	correct reading from graph with g cm^{-2} hr^{-1};

© Cambridge International Examinations 2013

(c)			[4]
PDO layout 1	mp1	suitable drawing; **do not give mark if** • any shading • draw over the print of the question • any ruled lines • less than 40 mm at widest distance across largest cell • less than six enclosed areas or if any outer lines (of enclosure) • are thicker than 1 mm • are feathery or broken/dashed or have a gap • have any tail or overlap	
MMO collection 1	mp2	only <u>6</u> complete cells drawn **AND** as two groups of 3 touching cells;	
PDO recording 1	mp3	7 or fewer cells	(cells between the layer of stained cells and the vascular bundles) widest dimension of the biggest cell is at least twice the narrowest dimension of the smallest cell (from the layer of stained cells);
MMO decision 1	mp4	in one group of three cells, all cells must be drawn with double lines all the way round **AND** where two pairs of cells touch there must be three lines (representing the middle lamella);	

© Cambridge International Examinations 2013

(d) [max 5]

PDO recording 1	mp1	organise as a table with only three columns or rows separated by lines	**AND** headed J1 and Fig. 2.3	**AND** third column headed feature or AW or contains at least one feature;
MMO collection 1	mp1	collected only differences;		

ACE interpretation MAX 3 — max 3

mp	feature	J1	Fig. 2.3
mp1	*vascular bundle or xylem position*	not in a ring or separate or irregular or scattered or further away from epidermis than others	in a ring or in line or regular or continuous or altogether or near epidermis
	any ref to size	(either way but must be comparative) variation in sizes (small **and** large) **Ignore** thickness	
	number	(either way but must be comparative) Idea of few(er) with more or numerous	
	shape	star-shaped or egg-shaped/AW or pointed at one end	rounded or circular;
mp2	*continuous layer/cambium*	absent or has not or no(ne)	present or has or yes;
mp3	*trichome or hairs **NOT** root hair Accept spike/thorn or hairs etc on cuticle*	absent or has not or no(ne) small(er) or few(er)	present or has or yes large(r) or more;
mp4	*hollow or gap or pith or centre or parenchyma (cells)*	present or has or yes absent or has not or no(ne)	absent or has not or no(ne) present or has or yes;
mp5	*thickened cells/layer/ collenchyma/ sclerenchyma*	present or has or yes	absent or has not or no(ne);
mp6	*layer under epidermis might be called cortex*	thin(ner)	thick(er);

[Total: 21]

© Cambridge International Examinations 2013