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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.

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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
AVP	Alternative valid point (examples given as guidance)

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1 (a) (i) [1]

MMO decision 1	1	volume of **W**/water	**AND** (number of) drops of **(P/**indicator);
		(for **W**/water) **R** amount	

(ii) [1]

MMO decision 1	1	add drops 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

time taken to reach end-point with whole numbers and correct units seconds/s;

Table 1.3

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) test-tube or reading or number of test or sample;
	Do not give mark if 'heading' in cells of headed/rows	
mp2	(heading) time (taken to end-point) (/) s or seconds in any one column;	
	Do not give mark if • 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 only processed results as whole numbers;	
	Must have • whole seconds only	**Do not give mark if** • 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 • processed data	**Do not give if** • 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 'laptime' on timer;
mp3	(dependent variable) use a colorimeter;
	Do not give mark for • 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;
	OR	
	(for 10 figures processed results) (rejects/'no'/cannot tell) in line with some trend in results	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 • any shading • drawn over the print of the question • any ruled line	**Do not give mark if** • 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** • less than 3 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 • any label within drawn area		

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(b) [4]

PDO layout 1	mp1	suitable plan diagram;		
		Do not give mark if • any shading • drawn over the print of the question • any ruled lines	**Do not give mark if** • less than 40 mm at widest distance across largest cell	**Do not give mark if** • less than four enclosed areas **or if any outer lines (of enclosures)** • 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;		
		Do not give mark if • more than 4 cells		
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 • 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 • to lowest denominator	**Do not give if** • 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 N1 and Fig. 2.1 **AND** third column contains features;

MMO decision 1

mp2: only differences;

Do not give mark if
- any similarities recorded
- any functions
- any non-observable differences

ACE interpretation max 2

max 2

	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 arrangement of air space/ spongy mesophyll	few(er)/less small(er)	many/more/ larg(er);
mp6	packing of palisade cells /layer below epidermis position of palisade cells /layer below epidermis shape of palisade cells	loose/less compact all around leaf rectangular or long(er)	compact upper part of leaf round(er) or short(er);
mp7	shape of vascular bundle ring of cells around vascular bundle	circular present/has/yes	oval 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 time of day (/) hours	**AND** *y*-axis water potential in leaf (cells)/MPa;
mp2	scale as *x*-axis 5.00 or 5:00 to 2 cm labelled each 2 cm	**AND** *y*-axis -1.0 to 2 cm labelled each 2 cm;
mp3	**must be negative scale** • check presence of seven points • all seven as small cross or dot(in circle) or cross in circle; • correct plotting	
mp4	seven plots with ruled lines exactly point to point	**AND** (quality) smooth sharp line;
	ecf from incorrect plots	**Do not give mark if** • any feathery line • irregular thickness

(e) (ii) [1]

ACE conclusion 1

1		**AND**	**AND**
	time	(rate of) transpiration	water potential
	12:00 hours (day)	high	low most negative
	22:00 hours (night)	low	high least negative
	between 12:00 hours and 22:00 hours	decreases	increases/becomes less negative

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