CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9700 BIOLOGY

9700/32 Paper 32 (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
ACE	Analysis, Conclusions and Evaluation (skills)
MMO	Manipulations, Measurement and Observation (skills)
PDO	Presentation of Data and Observations (skills)

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Expected Answers				
1 (a) (i)				[1]
MMO decision 1	1	level of water in large beaker shown equal to or above level of yeast suspension in small beaker	**AND** below level of top of small beaker;	
(ii)				[1]
MMO decision 1	1	<u>mark</u> (test-tube B or delivery tube);		
(iii)				[6]
If recorded as graph or bar chart, not table, only mp4 and mp6 can be scored.				
PDO recording 2	mp1	table with all cells drawn	**AND** headings (top row or left of recorded data column) **either** <u>temp</u>(erature/)°C **or** <u>time sec</u>(onds) or <u>s</u>;	
			Do not give mark if • any units (°C or sec(onds) or s) are in cells of headed row/column • two rows of data in one cell	
	mp2	heading <u>number</u> (of) <u>bubbles</u>;		
MMO collection 2	mp3	exactly 8 readings per run for higher temperature	**AND** exactly 8 readings per run for lower temperature	**AND** whole numbers only;
	mp4	first reading higher than last reading for both temperatures*;*		
MMO decision 2	mp5	higher temperature recorded first*;*		
	mp6	one temperature <u>between 40 and 45(^{0}C)</u>	**AND** second temperature <u>at least 5(^{0}C) lower</u>;	

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(iv) [max 2]

ACE Interpretation 2 — max 2

	cause of error	**AND** idea of error
mp1	(dependent variable) (counting) bubbles	bubbles too fast/very fast/too many difficult rate varies miss(ed) some;
mp2	size of bubbles	varies;
mp3	(independent variable) temperature or reaction mixture/yeast/**A**	can change/difficult to keep constant loses heat;
	Do not give mark if • state that temperature of room or water-bath/**W** or **Y** when <u>in beaker</u> changes	

(v) [max 3]

ACE improvements 3 — max 3

mp1	(dependent variable) <u>gas</u> syringe or idea of downward displacement of water <u>and</u> measure <u>volume</u> of gas or less/lower concentration or volume (<u>not</u> amount) of hydrogen peroxide or enzyme;
mp2	(standardised variables) put vaseline/grease around bung (in **A**) or replace with better-fitting bung pH (controlled using) buffer;
mp3	(independent variable) maintained in thermostat(ically controlled water-bath) or describe use of heating and cooling or hot/cold water **AND** uses thermometer (to check temperature) or describe how to insulate **<u>A</u>** or more temps/bigger range of temps (**not** two temps further apart/larger change in temps);
mp4	repeat <u>more than once</u>/replicate<u>s</u>/more times/multiple tests;

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(b) (i)			[1]
MMO decision 1	1	circles 6% trial 3: 20	**AND** circles 12% trial 4: 9;
(b) (ii)			[1]
ACE interpretation 1	1	13 (entered in gap in table or by question);	
			Do not give mark if • 13.0/13.00/13.25 • 12/12.4/12.40
(iii)			[4]
PDO layout 4	mp1	*x*-axis: percent(age) **or** % conc(entration) (of) hydrogen peroxide **or** H_2O_2	**AND** *y*-axis: (mean) time (taken) to collect (20 cm^3 of) oxygen **or** O_2 (/) sec(onds) **or** s ;
		Must have units for both axes	
	mp2	scale on *x*-axis: 5 to 2 cm, labelled each 2 cm	**AND** scale on *y*-axis 10 to 2 cm, labelled each 2 cm;
	mp3	• check there are six points • all six as small cross (does not go outside square on grid) **or** dot in circle **or** cross in circle • correct plotting of points,	
	mp4	six plots with **either** ruled lines exactly point to point or hand-drawn smooth curve for whole graph • starts and ends exactly at end points • also passes through at least two other points exactly • within half a small square of any remaining points	**AND** (quality) smooth line less than 1 mm thick (check with grid);

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(iv) [2]

ACE conclusion 2	mp1	at high/increasing concentrations: • more/many <u>active sites</u> used/occupied/bind/join/ used **or** • more/many <u>enzyme-substrate complexes</u>/<u>E-S complexes</u>	**OR** at low concentrations: • less/fewer <u>active sites</u> occupied/bind/join/used **or** • less/fewer <u>enzyme-substrate complexes</u>/<u>E-S complexes</u>;
	mp2	idea of why reaches maximum rate (limiting factor) • not enough enzyme/active sites **or** • limiting factor is enzyme concentration **or** • <u>all</u> active sites occupied • active sites saturated;	

[Total: 21]

2 (a) (i) [5]

PDO layout 1	mp1	**Do not give mark if** • any shading • drawn over the print of the question • any ruled lines	**Do not give mark if** less than <u>40mm</u> from outmost line to base of corner vascular bundle	**AND** clear, sharp, unbroken lines **Do not give mark if** • less than two lines and less than four enclosed areas (ignore cells) **or any lines with** • any part of line 1mm or thicker (use grid) • any feathery or broken or dashed line or gap • any tail or overlap;
MMO collection 3	mp2	<u>no</u> cells drawn	**AND** top right sector drawn;	
	mp3	draws at least <u>seven</u> lines across any point of width of section (outside to inside);		
	mp4	corner vascular bundle: • wider than deep **and** • outer line not straight or concave	**AND** divided into at least 3 regions (ignore cells and vertical rays);	
MMO decision 1	mp5	labels pith with label line either touching or further to the centre than the innermost line **or** ending further to the centre than the inside edge of the vascular bundle;		

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(ii)				[5]
PDO layout 1	mp1	Suitable drawing;		
		Do not give mark if • any shading • drawn over the print of the question • any ruled lines in lines of <u>corner</u> cells	**Do not give mark if** • less than 40 mm at widest distance across largest cell	**Do not give mark if** • less than six outer enclosed areas **or if any outer lines (of enclosures)** • are thicker than 1 mm (use grid) • are feathery, broken/dashed or have gaps • have tails or overlaps;
MMO collection 3	mp2	only <u>6</u> complete cells drawn	**AND** as two groups of 3 touching cells;	
	mp3	seven or fewer cells in total	**AND** (cells from tissue in centre) widest dimension of the biggest cell is at least <u>2</u> times the narrowest dimension of the smallest cell (from cells in the corner);	
	mp4	in <u>either</u> 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 3 lines (representing the middle lamella);		
MMO decision 1	mp5	<u>one</u> correct label "<u>cell wall</u>", with <u>one</u> label line which must touch outermost line of a cell or finish between the two cell wall lines;		

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	(iii)			[3]
MMO decision 1	mp1	shows measurements for <u>both</u> types of cell	**AND** as whole numbers or x.5 only	**AND** units as "eyepiece", (e)gu or epu or "units" or "divisions" or "lines" or "marks" written anywhere;
		Can have • values recorded in any context, e.g. in addition • ½ instead of 0.5 • decimals in means	**Do not give mark if** • no units • units in m, cm, mm, μm, nm • not clear which measurements correspond to which type of cell	
PDO display 2	mp2	shows division by number of cells (3 or more), for both cell types;		
	mp3	*for final answer only:* larger whole number to smaller whole number (larger number first) **OR** as fraction, with larger whole number over smaller whole number	**AND** to the lowest common denominator;	
	(iv)			[max 1]
ACE conclusion 1	max 1	*one from:* thick walls large walls small cells/lumen closely packed cells no spaces between cells high ratio of wall to cell (much) staining;		

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(b) [5]

PDO recording 2	mp1	organise as table with <u>three</u> columns or rows separated by lines (no cells needed)	**AND** two columns headed <u>M1/slide</u> and <u>Fig 2.2</u> in any order	**AND** third column contains features;
	mp2	only observable differences (at least two) recorded;		
	Do not give mark if describes "cell" rather than "section" or "stem" for incorrect tissues			

ACE interpretation 2			feature	Slide M1	Fig. 2.2
	max 1	mp1	vascular bundles/vascular tissue/xylem/phloem	any comparative statement **except** size, or distance in from outside	any comparative statement **except** size, or distance in from outside, or in corners;
	max 2	mp2	pith/centre	not hollow/(has) cells/more cells/big(ger) (**not** "present")	hollow/no cells/less cells/small(er) (**not** "absent")*;*
		mp3	thickened cells/ collenchyma/ sclerenchyma/fibres/ described	in corners/not (on) vascular bundles/idea of more (**not** present/absent)	not in corners/(on) vascular bundles/idea of less (**not** present/absent);
		mp4	cortex/(layer) under epidermis	no/less/small(er) <u>air spaces</u>	yes/more/large(r) <u>air spaces;</u>
		mp5	outer layer/epidermis	thick(er) or more/2 layer(s) of cells or no gaps/stomata/guard cells or no trichomes/hairs (**not** root hairs) (**not** smaller)	thin(ner) or less/1 layer of cells or gaps/stomata/ guard cells or no trichomes/hairs (**not** root hairs) (**not** bigger)

[Total: 19]

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