

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.

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:

;	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)
<u>underline</u>	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)

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]
<i>If recorded as graph or bar chart, not table, only mp4 and mp6 can be scored.</i>			
PDO recording 2	mp1	table with all cells drawn	AND headings (top row or left of recorded data column) either <u>temp(erature)/°C</u> or <u>time sec(onds)</u> or <u>s</u> ;
			Do not give mark if <ul style="list-style-type: none"> 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(°C)</u>	AND second temperature <u>at least 5(°C) lower</u> ;

		(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 <ul style="list-style-type: none"> 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 A or more temps/bigger range of temps (not two temps further apart/larger change in temps);	
		mp4	repeat <u>more than once</u> /replicates_/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 <ul style="list-style-type: none"> • 13.0/13.00/13.25 • 12/12.4/12.40
(iii)		[4]
PDO layout 4	mp1	x-axis: <u>percent</u> (age) or <u>% conc</u> (entration) (of) <u>hydrogen peroxide</u> or <u>H₂O₂</u> AND y-axis: (mean) <u>time</u> (taken) <u>to collect</u> (20 cm ³ of) <u>oxygen</u> or <u>O₂</u> (/) <u>sec</u> (onds) or <u>s</u> ; Must have units for both axes
	mp2	scale on x-axis: <u>5 to 2 cm, labelled each 2 cm</u> AND scale on y-axis <u>10 to 2 cm, labelled each 2 cm;</u>
	mp3	<ul style="list-style-type: none"> • check there are six points • all six as small cross (does not go outside square on grid) or dot <u>in circle</u> or cross in circle • correct plotting of points,
	mp4	six plots with either <u>ruled</u> lines exactly point to point or hand-drawn smooth curve for <u>whole</u> graph <ul style="list-style-type: none"> • starts and ends <u>exactly</u> at end points • also passes through at least two other points <u>exactly</u> • 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: <ul style="list-style-type: none"> more/many <u>active sites</u> used/occupied/bind/join/used or more/many <u>enzyme-substrate complexes/E-S complexes</u> 	OR at low concentrations: <ul style="list-style-type: none"> less/fewer <u>active sites</u> occupied/bind/join/used or less/fewer <u>enzyme-substrate complexes/E-S complexes</u>; 	
	mp2	idea of why reaches maximum rate (limiting factor) <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> less than two lines and less than four enclosed areas (ignore cells) or any lines with <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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;		

(ii)		[5]								
PDO layout 1	mp1	<p>Suitable drawing;</p> <table border="1"> <tr> <td> <p>Do not give mark if</p> <ul style="list-style-type: none"> any shading drawn over the print of the question any ruled lines in lines of <u>corner</u> cells </td> <td> <p>Do not give mark if</p> <ul style="list-style-type: none"> less than 40 mm at widest distance across largest cell </td> <td> <p>Do not give mark if</p> <ul style="list-style-type: none"> less than six outer enclosed areas <p>or if any outer lines (of enclosures)</p> <ul style="list-style-type: none"> are thicker than 1 mm (use grid) are feathery, broken/dashed or have gaps have tails or overlaps; </td> </tr> </table>	<p>Do not give mark if</p> <ul style="list-style-type: none"> any shading drawn over the print of the question any ruled lines in lines of <u>corner</u> cells 	<p>Do not give mark if</p> <ul style="list-style-type: none"> less than 40 mm at widest distance across largest cell 	<p>Do not give mark if</p> <ul style="list-style-type: none"> less than six outer enclosed areas <p>or if any outer lines (of enclosures)</p> <ul style="list-style-type: none"> are thicker than 1 mm (use grid) are feathery, broken/dashed or have gaps have tails or overlaps; 					
	<p>Do not give mark if</p> <ul style="list-style-type: none"> any shading drawn over the print of the question any ruled lines in lines of <u>corner</u> cells 	<p>Do not give mark if</p> <ul style="list-style-type: none"> less than 40 mm at widest distance across largest cell 	<p>Do not give mark if</p> <ul style="list-style-type: none"> less than six outer enclosed areas <p>or if any outer lines (of enclosures)</p> <ul style="list-style-type: none"> are thicker than 1 mm (use grid) are feathery, broken/dashed or have gaps have tails or overlaps; 							
MMO collection 3	<table border="1"> <tr> <td>mp2</td> <td>only <u>6</u> complete cells drawn</td> <td>AND as two groups of 3 touching cells;</td> </tr> <tr> <td>mp3</td> <td>seven or fewer cells in total</td> <td>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);</td> </tr> <tr> <td>mp4</td> <td colspan="2"> <p>in <u>either</u> group of three cells:</p> <ul style="list-style-type: none"> 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); </td> </tr> </table>	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	<p>in <u>either</u> group of three cells:</p> <ul style="list-style-type: none"> 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); 	
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	<p>in <u>either</u> group of three cells:</p> <ul style="list-style-type: none"> 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;								

(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 <ul style="list-style-type: none"> • values recorded in any context, e.g. in addition • ½ instead of 0.5 • decimals in means 	Do not give mark if <ul style="list-style-type: none"> • 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	<i>for final answer only:</i> 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	<i>one from:</i> 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;	
		mp2	pith/centre	not hollow/(has) cells/more cells/big(ger) (not “present”)	hollow/no cells/less cells/small(er) (not “absent”);	
	max 2	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 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]	