UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

9700 BIOLOGY

9700/34 Paper 32 (Advanced Practical Skills 2), maximum raw mark 40

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UNIVERSITY of CAMBRIDGE
International Examinations

Question	Expected Answers		Additional Guidance	Marks
1 (a) (i) Prepare the space below to show concentrations of hydrogen peroxide; volumes of hydrogen peroxide; volumes of distilled water.				
MMO decisions 4	three or more concentrations;			[1]
	includes 10 % as highest;			[1]
	volumes to make up to 10 cm^3 or 20 or 30	**AND** correct;		[1]
	even range or serial dilution;			[1]
(ii) Prepare the space below to record your results.				
PDO recording 2	table with all cells drawn	(heading to left or top) **AND** concentration;		[1]
	(heading for one other column or row) time with units;		**Reject** if units in body of table	[1]
MMO collection 2	collects times in whole seconds or whole minutes;			[1]
	figures for time faster at highest concentration compared with lowest concentration recorded;			[1]
MMO decision 1	repeats/more than one bead recorded for a concentration or six concentrations;			[1]

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Question	Expected Answers	Additional Guidance	Marks
(iii) Identify three significant errors in your investigation. Mark for any correct.			
ACE interpretation 3	(beads) not all same or damaged;		[max 3]
	(test-tube) not vertical (measuring bead to surface);		
	(conditions for enzyme action) temperature not constant;		
	(measuring) beads stuck to sides of tube/stuck together with those already dropped/float up under each other;		
	test-tubes not all the same size;		
	hydrogen peroxide concentration changes or too high or too low;		

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Question	Expected Answers	Additional Guidance	Marks
(iv) Suggest how you would make three improvements to this investigation.			
ACE improvements 3	(ref. to beads) describes selection of bead or passes through sieve with same size holes or mechanism to release or allow to drip from syringe or use spoon or method to prevent damage;		[max 3]
	(ref. to method) (hydrogen peroxide/H) wider range or more concentrations or adjust the concentration or use fresh hydrogen peroxide/H each time or cover hydrogen peroxide or wash and dry beads or use same size of test-tube or use a large test-tube/measuring cylinder;		
	(ref to conditions) thermostatically-controlled waterbath or describes keeping water bath at constant temp;		
	(ref. to measuring) put test-tube in retort stand and make vertical or view at correct angle or use video/camera/light gate to record drop or stain beads or mark line at top;		
	repeats and mean/average;		

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Question	Expected Answers			Additional Guidance	Marks
(b) (i) Plot a graph of the data shown in Table 1.1.					
PDO layout 4	**O**	*x*-axis time/min	*y*-axis **AND** vol(ume/) cm^3;	Must have units	[1]
	S	scale as 1 min to 2 cm	0.5 cm^3 to 2 cm;	**Reject S** if awkward scale	[1]
	P	correct plotting with crosses or dot in circle;	Intersection of cross must be clear to show plot	**Reject** P plotting if awkward scale **Reject** if only blobs or dots or blobs in circles	[1]
	L	ruled/straight line to all points or smooth curve;	Quality – no thicker than on grid, not feathery for the complete line Joining plots – • Ruled lines plot to plot • Curve through all plots Extrapolation • Not beyond *x*- or *y*-axis If not correct in context of data then no extrapolation at either end of data		[1]

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Question	Expected Answers	Additional Guidance	Marks
(ii) Describe and explain the results of the student's investigation.			
ACE conclusion 3	in first minute or from 2.9 drops to 0.8 or fastest or largest increase or biggest volume;		[1]
	hydrogen peroxide/H or substrate fits into or binds to enzyme or active sites or forms ESCs;		[1]
	lack of hydrogen peroxide/H or substrate or hydrogen peroxide not high enough;		[1]
	Total		**[22]**

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Question	Expected Answers	Additional Guidance	Marks
2 (a) (i) Draw a large plan diagram of a sector to include three vascular bundles. Draw a circle around one of the vascular bundles on your plan diagram. Label the xylem.			
PDO layout 1	clear, sharp, (not thicker than grid line for whole line) unbroken lines **AND** no shading **AND** larger than 6 cm across widest point on sector drawn;	**Reject** if overlaps the text of question	[1]
MMO collection 3	no cells **AND** only three vascular bundles **AND** circle round one vascular bundle;		[1]
	any one vascular bundle divided into at least three regions with at least one curved line **AND** middle region of vascular bundle thicker than the epidermis;		[1]
	one vascular bundle from three drawn or circled wider at outer edge than inner edge (apex);	**Reject** if any writing on drawing	[1]
MMO decision 1	**Reject** if any label is biologically incorrect. correct label with label line to inner half of vascular bundle xylem;		[1]

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Question	Expected Answers			Additional Guidance	Marks
(ii) Draw three complete cells from the epidermis which are touching. Draw three complete touching cells between the inner edge of vascular bundle and centre of the specimen. This drawing should show any difference in size observed between these cells and the 'two' epidermal cells.					
PDO layout 1	clear, sharp,	**AND** no shading	**AND** size of bottom group of cells;		[1]
MMO collection 3	two groups of only three cells drawn	**AND** each group of 3 cells touching;			[1]
	(epidermis) all cell walls must have two lines	**AND** straight line between any two cells	**AND** one of these cells, cell wall obviously curved or domed;		[1]
	(inner cells) all cells rounded	**AND** at least one cell larger than smallest epidermal cell;			[1]
(b) (i) Calculate the actual length, in µm, of the structure shown by line X.					
PDO display 2	shows 27.5 or 28 or 28.5 or 29 or 29.5 or 2.75 or 2.8 or 2.85 or 2.9 or 2.95	**AND** multiplied by $\times 1000/10^3$ or multiplied by or $\times 10000/10^4$	divided by 110;		[1]
	any answer correctly rounded to no more than three sig. figs.;				[1]

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Question	Expected Answers		Additional Guidance	Marks
(ii) Using Fig. 2.1 find the mean actual length of these structures. Prepare the space below and record your results.				
PDO recording 2	5 or more recorded;			[1]
	0.0/0.5 mm or 0.00/0.05 cm	OR calculated data to same precision, same number of sig. figs.;		[1]
MMO decision 1	shows addition and division by number of measurements;			[1]
(iii) Draw a large plan diagram of the specimen as shown in Fig. 2.1.				
PDO layout 1	no cells	**AND** five areas of thickening touching epidermis;		[1]

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Question	Expected Answers	Additional Guidance	Marks
(c) Annotate your plan diagram to show three differences between your diagram and the specimen on slide N1.			
ACE interpretation 3	**Any three annotated labels on plan** features labelled: under epidermis patches thickening or present;		[max 3]
	vascular bundles scattered or not in ring or in centre;		
	vascular bundle thickening or collenchyma on top and bottom/more;		
	vascular bundle shape longer/thinner;		
	pith or centre cells not completely stained cells OR cells relatively much smaller compared to vascular bundle OR no intercellular or air spaces between cells;		
	air space present or large;		
	whole shape or outer square or not wavy or has straight sides;		
	Total		**[18]**

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