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

9700/32 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) Calculate the surface area of each bead and the mean surface area of beads.				
MMO decision 1	1. 5 or more (bead radii/diameters);			[1]
MMO collection 1	2. measures diameter or records radius	**AND** units mm;	**Reject** any measurements not whole number of mm **Reject** 6 mm or more for diameter or 3 mm or more for radius	[1]
ACE interpretation 1	3. one correct calculation for one bead surface area;			[1]
PDO display 2	4. shows addition of bead measurements divided by number measured or each surface area added together and divided by number;			[1]
	5. answer no more than 3 sig. figs.;			[1]

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Question	Expected Answers		Additional Guidance	Marks
(ii) Prepare the space below to record your observations.				
PDO recording 2	1. table with all cells drawn	(heading top/left) **AND** surface area (/)mm^2 or no. of beads;	**Reject** if units in body of table	[1]
	(heading) 2. colour/observation;			[1]
MMO collection 2	3. only records at 2, 4 and 6 (minutes);			[1]
	(highest no. of beads) 4. yellow/green;			[1]
MMO decisions 3	5. surface area recorded;			[1]
	6. use 20 beads in one tube and at least 3 different numbers of beads;			[1]
	7. even range;			[1]
(iii) The student realised that there were two independent variables in this procedure. State the two independent variables.				
ACE interpretation 1	surface area or number of beads	**AND** enzyme or yeast concentration/quantity;	**Reject** more than two variables	[1]

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Question	Expected Answers	Additional Guidance	Marks
(iv) Suggest how you would make three improvements to the student's procedure.			
ACE improvements 3	idea of cubes with equal volume of yeast;	**Reject** amount	[1]
	idea of equal shaking;		
	repeat measurements AND mean or average;		[max 2]
	colorimeter/white card or pH paper or meter;		
	separate beads using Petri dish/larger container;		
	use thermostatically-controlled water-bath;		
	idea keep time the same e.g. stagger start or have separate experiments;		
	use more beads or more surface areas;		

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Question	Expected Answers	Additional Guidance	Marks
(b) Describe and explain the results shown in Table 1.2.			
ACE conclusions 3	1. (in context of data) stops increasing or levels off or stops or stays constant or no more carbon dioxide or reaction stops;		[1]
	(in any correct context use of) 2. enzyme or catalase or active sites or ESCs;		[max 2]
	3. glucose or substrate fits into active sites or forms ESCs or (slowing or stops) lack of glucose or substrate or glucose not high enough or build up of product or ethanol lack of oxygen build up of carbon dioxide change in pH carbon dioxide dissolves into glucose or substrate or solution or water;		
	Total		**[19]**

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Question	Expected Answers			Additional Guidance	Marks
2 (a) (i) Draw a large plan diagram of a half of the specimen as shown in Fig. 2.1. Label xylem and the cortex.					
PDO layout 1	clear, sharp, (not thicker than grid line for whole line) unbroken lines	**AND** no shading	**AND** large 5 cm or more from centre of stele to epidermis;	**Reject** if overlaps the text of question	[1]
MMO collection 2	no cells	**AND** drawn only half with detail (shown by epidermis line);			[1]
	endodermis shown by two lines	**AND** length between epidermis and endodermis is at least twice the diameter of stele;			[1]
MMO decision 2	draws region of xylem central;				[1]
	Reject if any label is biologically incorrect. one correct label with label line from xylem or cortex;			**Reject** if any writing on drawing	[1]

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Question	Expected Answers			Additional Guidance	Marks
(ii) Make a high-power drawing of a group of three complete touching xylem vessels and a group of three complete touching cortex cells. Reject all marks if only two cells drawn except label mark?					
PDO layout 1	**1.** clear, sharp, (not thicker than grid line for whole line) unbroken lines	**AND** no shading	**AND** smallest group of complete touching cells will not fit inside 6 × 6 cm grid;		[1]
MMO collection 2	only 6 complete cells drawn	**AND** two groups of 3 touching cells;			[1]
	cell wall in at least one cell drawn angular in one group of three	**AND** other group of cells rounded;			[1]
MMO decision 2	(xylem) thicker cell wall than (cortex) cell walls; Measure thickest on both.			**Allow** only if cell walls drawn as double lines for both groups of cells	[1]
	correct labels with label lines to lumen in xylem **AND** any cell wall;			**Reject** if any writing on drawing	[1]

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Question	Expected Answers			Additional Guidance	Marks
(b) (i) Calculate the magnification of the specimen shown in Fig. 2.2. Actual length of line X = 1900 µm.					
MMO collection 1	measures line **X** correctly with mm or cm;				[1]
ACE interpretation 2	show in last calculation before answer 52 or 52.5 or 53 or 53.5 or 54 with 1.9 OR 5.2 or 5.25 or 5.3 or 5.35 or 5.4 with 0.19 OR 52000 or 52500 or 53000 or 53500 or 54000 with 1900;				[1]
	correct calculation of any figure divided by 1900 or 1.9 or 0.19;				[1]
(ii) Prepare the space below so that it is suitable for you to record the observable differences between the specimens on slide M1 and in Fig. 2.2.					
PDO recording 2	organise as a table/venn diagram/ruled connected boxes	**AND** headed M1 and Fig 2.2	**AND** all comparative statements opposite each other;		[1]
	only differences recorded;				[1]

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ACE interpretation 2	feature	M1	Fig. 2.2	**Reject** all ticks with crosses unless have key	[max 2]
	1. xylem shape	star-shape;			
	2. xylem position	centre;			
	3. phloem	clearer or can see or present	not clear or cannot see or absent;		
	4. pith	absent	present;		
	5. thickened cells under epidermis	absent	thick ring/present;		
	6. epidermis layers	one or thin(ner)	two or thick(er);		
	7. size cortex stele/xylem	larger/wider/thicker or more smaller/narrower/ thinner or less	smaller/narrower/ thinner or less larger/wider/thicker or more;		

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Question	Expected Answers			Additional Guidance	Marks
(c) Plot a graph of the data shown in Table 2.1.					
PDO layout 4	**O**	*x*-axis time /hr(s) or hour(s)	*y*-axis **AND** vol(ume) /cm^3 hr^{-1};	Must have units	[1]
	S	scale as 1hr to 2 cm (allow no 0) Allow 1 at origin as long as 1hr to 2 cm must label origin.	**AND** 0.5 cm^3 to 2 cm; Allow 0. 5 at origin must label origin if not 0	**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	straight line between all points or smooth curve through all points;	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 in context of data correct to go to 0,0 must be within 2 mm of 0 If not correct in context of data then no extrapolation at either end of data	**Reject** if not five plots	[1]
	Total				**[21]**

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