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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

9700 BIOLOGY

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

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Question		Expected Answers			Marks	Additional Guidance
1 (a) (i) Suggest what happens to the concentrations of starch and glucose after the starch suspension has been eaten.						
MMO	decisions 2		(starch)	(glucose/reducing sugar)		
		(stomach)	stays same/no change;		[1]	
		(mouth) AND (small intestine)	less/decreases, AND no/little/less/decreases AND	some/little/increases all/lots/more/increases;	[1]	
(ii) Prepare the space below and record: the tests you used, the quantities of the samples and reagents and your results.						
PDO	recording 2	all cells drawn AND	sample/**S1**, **S2**, **S3**, **S4** as heading for top or left column ;		[1]	**Mark both of separate results tables for mark points 1 and 2.**
		observations/colour/result/s ; **Check heading where colours recorded and credit this heading.**			[1]	
MMO	collection 3	**all** samples tested for starch AND **Ignore actual colours**	**S2** (iodine) blue/black AND **Reject** purple.	(with Benedict's) blue/no test done; **Reject** colourless	[1]	
		S4 (Benedict's only) (brick) red ;			[1]	
		S1 and S3 (Benedict's) either same colour or both colours, less than S4;			[1]	
MMO	decisions 2	same volume for each sample AND	same or excess volume for Benedict's;		[1]	**Reject** if just amounts or drops.
		(Benedict's) heats to more than 80° C /boils AND	same time 10 minutes or less ;		[1]	

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Question		Expected Answers		Marks	Additional Guidance
(iii) Using the information provided and your results, complete Table 1.1 below to identify the samples.					
ACE	interpretation 3	sample	sample identified		
		starch about to be eaten	**S2**;		
		mouth	**S1** and/or **S3** ;		
		stomach	**S1** and/or **S3** ;		
		small intestine	**S4**;	[max 3]	
(iv) Explain your answer to (a) (iii).					
ACE	conclusions 3	hydrolysis/ed, used in correct context;		[1]	In correct context
		(starch eaten or **S2**/sample identified) no (hydrolysis/breakdown)/only contains starch/no glucose/ description of results;			**Allow** results only for starch eaten.
		(stomach or sample identified)idea of **no**/(enzyme action/ breakdown) OR (mouth or sample identified) **little** (enzyme action/breakdown);			
		(small intestine or **S4**/sample identified) more/increased/most (enzyme action/breakdown);		[max 2]	
(b) Suggest how the student could modify this investigation to obtain quantitative measurements of the glucose concentration.					
ACE	improvements 3	use known/range of concentrations of glucose;		[1]	
		serial dilution/description of dilutions/examples of 3 concentrations;		[1]	
		use colorimeter/colour chart/mass of precipitate/time for colour to change/diastix/glucose test strip;		[1]	**Reject** calorimeter'
		draw graph/calibration curve;		[1]	
		compare unknowns/samples to standards/AW;		[max 3]	

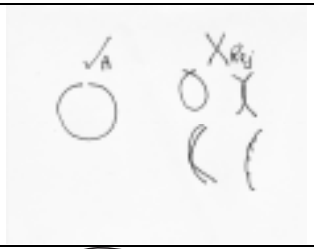
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Question		Expected Answers			Marks	Additional Guidance
(c) (i) Plot a graph of these data shown in Table 1.2.						
PDO	layout 4	**O**	x-axis conc/concentration, g dm^{-3} **Reject** g/dm^{-3} **Allow** g/dm^{3}	**AND** y-axis time, seconds/secs/s ;	[1]	
		S	scale as 5 to 2 cm (allow no 0) or 5 at origin and 20 to 2 cm allow 10 at origin;		[1]	If **O** is incorrect, allow suitable scale more than half grid on both axes.
		P	plotting crosses or dot in circle ONLY **AND** plots correct; No cross larger than X or o. If plot additional point with same symbol used to show calculation/gradient then reject plotting.		[1]	**Do not credit** blobs in or out of circles. **Credit** x s in circles.
		L	ruled/straight line to 3 points; **Allow** point to point if not plotted correctly.		[1]	**Allow** extrapolation to 0 within 3 mm. **Reject** if origin not 0,0. **Do not credit** if any extrapolation beyond 30 or beyond y-axis.
(ii) Use your graph to find the rate of hydrolysis by finding the gradient of the line.						
MMO	collection 1	shows how on graph ;			[1]	
ACE	interpretation 1	correct answer (from their correctly plotted graph); **Allow** any answer between 0.3500 and 0.4255 **Reject** as fraction **OR** 2.350 and 2.900/allow 2 with a fraction;			[1]	**Allow** 1 to 4 significant figures. If graph incorrectly plotted then check readings and calculation.
		Total			**[24]**	

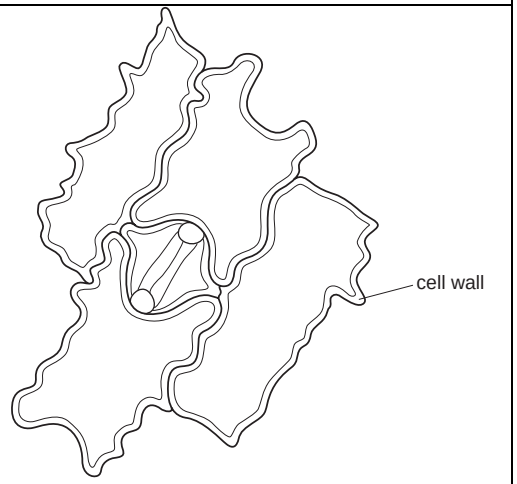
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Question Fig 2.1		Expected Answers			Marks	Additional Guidance
2 (a) Draw a large plan diagram of the section shown in Fig. 2.1.						
PDO	layout 1	clear, sharp, AND unbroken lines	no shading AND	larger than the diagonal across 6 cm grid from apex of drawing	[1]	
MMO	collection 1	no cells AND	only whole section drawn; **Reject** if draw more than whole section labelled.		[1]	
PDO	recording 1	inner layer shown by two/three lines closer together than next line ;			[1]	
MMO	decision 1	drawn 3 large folds as shown in pmg All three folds larger than any of others.	**OR** bulge on side approx. half way between apex and edge ;		[1]	

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Question Fig. 2.2		Expected Answers			Marks	Additional Guidance
(b) (i) Make a large, labelled drawing to show TWO guard cells and the COMPLETE cells that surround them. Do not draw more than 6 cells. Show on Fig. 2.2 the cells you have drawn.						
PDO	layout 1	clear, sharp, AND unbroken lines	no shading AND	does not fit inside the 6 cm grid;	[1]	
MMO	collection 1	shows on Fig 2.2 at least 2 cells AND	2 guard cells only AND	up to 4 complete cells drawn;	[1]	
	1	length of surrounding cell more than width;			[1]	
MMO	decision 1	outline of (surrounding cells) wavy/not straight	AND no air spaces between adjacent cells;		[1]	
	1	cell wall labelled correctly; **Reject** if ultrastructure labelled.			[1]	
(ii) Calculate the actual length in micrometres of one of the guard cells. Show all the steps in your calculation.						
PDO	display 2	(length in <u>mm</u> (5 to 32) × $1000/10^3$; OR (length in <u>cm</u> (0.5 to 3.2) × $10000/10^4$; **Reject** any metre conversions and measurements outside the range given.			[1]	
		divided by 400; Must show division by 400.			[1]	
		Total			**[11]**	

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Question		Expected Answers		Marks	Additional Guidance
3 (a) Prepare the space below and record all your observations.					
PDO	**recording 1**	table/divided space into four with lines and clearly leaf/L stained/LI **AND** unstained/L **AND** potato/P stained/PI **AND** unstained/P;		[1]	
MMO	**collection 1**	(leaf cells/L) at least TWO different types of cells observed; **Allow** drawn or named from epidermal cells/palisade cells/mesophyll cells/xylem vessels/cells/ guard cells.		[1]	
MMO	**decision 1**	(potato cells/P) black/starch AND granules/grains/sacs/AW (when stained with iodine) AND in cells; **Reject** blue/black cells		[1]	
(b) Explain your observations.					
ACE	**interpretation 2**	(iodine) stains/shows starch;		[1]	
		(iodine)no effect/little/less starch in LI/leaf;	(potato) contains more starch;	[1]	**Allow** any comparative statement.
		Total		**[5]**	

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