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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

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.

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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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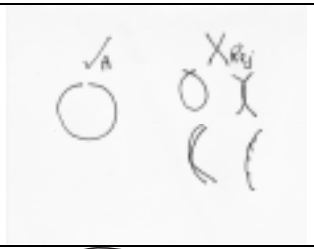
Question Fig 2.1		Expected Answers			Marks	Additional Guidance
2 (a) Draw a large plan diagram of the section shown in Fig. 2.1.						
PDO	**layout 1**	clear, sharp, AND unbroken lines	no shading AND	larger than the diagonal across 6 cm grid from apex of drawing	[1]	
MMO	**collection 1**	no cells AND	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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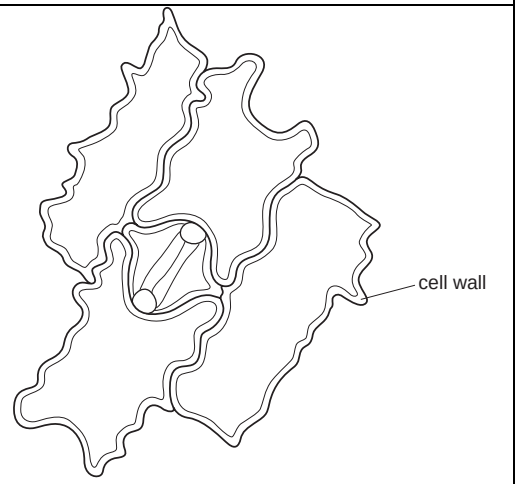
Question Fig. 2.2		Expected Answers			Marks	Additional Guidance
(b) (i) Make a large, labelled drawing to show TWO guard cells and the COMPLETE cells that surround them. Do not draw more than 6 cells. Show on Fig. 2.2 the cells you have drawn.						
PDO	layout 1	clear, sharp, AND unbroken lines	no shading 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]**	