

**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)	less/decreases, AND	some/little/increases	[1]	
		AND (small intestine)	no/little/less/decreases AND	all/lots/more/increases;		
(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	S2 (iodine) blue/black AND	(with Benedict's) blue/no test done;	[1]	
		Ignore actual colours	Reject purple.	Reject colourless		
		S4 (Benedict's only) (brick) red ;			[1]	
		S1 and S3 (Benedict's) either same colour or both colours, <u>less than S4;</u>			[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	[max 3]	
		starch about to be eaten	S2 ;		
		mouth	S1 and/or S3 ;		
		stomach	S1 and/or S3 ;		
		small intestine	S4 ;		
(iv) Explain your answer to (a) (iii).					
ACE	conclusions 3	<u>hydrolysis</u> /ed, used in correct context;		[1]	In correct context
		(starch eaten or S2 /sample identified) no (hydrolysis/breakdown)/ <u>only</u> 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]	Reject calorimeter'
		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]	
		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, unbroken lines	AND	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) $\times 1000/10^3$; OR (length in <u>cm</u> (0.5 to 3.2) $\times 10000/10^4$; 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]	Allow any comparative statement.
		(iodine)no effect/little/less starch in LI/leaf;	(potato) contains more starch;	
		Total		[5]