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

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Question	Expected Answers		Additional Guidance	Marks
1 (a) (i) Calculate t	he surface area of each bead a	nd the mean surface area of b	peads.	
MMO decision 1	1. 5 or more (bead radii/dia	imeters);		[1]
MMO collection 1	2. measures diameter or records radius	AND units mm;	Reject any measurements not whole number of mmReject 6 mm or more for diameter or 3 mm or more for radius	[1]
ACE interpretation 1	3. one correct calculation for	or one bead surface area;		[1]
PDO display 2	 shows addition of bead r number measured or each surface area add number; 	neasurements divided by ded together and divided by		[1]
	5. answer no more than 3 s	sig. figs.;		[1]

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Question	Expected Answers		Additional Guidance	Marks
(ii) Prepare	the space below to record your ob	servations.		
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	5. surface area recorded;			[1]
decisions 3	6. use 20 beads in one tube numbers of beads;	and at least 3 different		[1]
	7. even range;			[1]
(iii) The stud	dent realised that there were two in	dependent variables in this	procedure. State the two independent v	ariables.
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 l	now you would make three improvements to the student's proc	edure.	
ACE	idea of cubes with equal volume of yeast;	Reject amount	[1]
improvements 3	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	 (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	S			Additional Guidance	Marks
2 (a) (i) Draw a large	e plan diagram of a ha	If of the sp	pecimen a	s 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	cells AND drawn only half with detail (shown by epidermis line);			[1]	
	endodermis shown lines	by two	epidermi	gth between s and endodermis is wice the diameter of		[1]
ММО	draws region of xyle	draws region of xylem central;				[1]
decision 2	Reject if any label i one correct label w				Reject if any writing on drawing	[1]

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Question	Expected Answers	;			Additional Guidance	Marks
	high-power drawing of a gr ells. Reject all marks if onl	-	•		vessels and a group of three complete to	uching
PDO layout 1	 clear, sharp, (not thicker than grid line for whole line) unbroken lines 	AND no s	shading	AND smallest group of complete touching cells will not fit inside 6 × 6 cm grid;		[1]
MMO collection 2	only 6 complete cell	only 6 complete cells drawn AND tw touchin		groups of 3 cells;		[1]
	cell wall in at least o drawn angular in on of three		AND oth rounded;	er group of cells		[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 la cell wall;	abel lines t	o lumen i	n xylem AND any	Reject if any writing on drawing	[1]

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Question	Expected Answers	Expected Answers			Marks
(b) (i) Calculate	e the magnification of the spe	ecimen shown i	n Fig. 2.2. Actual le	ngth of line X = 1900 μm.	
MMO collection 1	measures line X correct	measures line X correctly with mm or cm;			[1]
ACE interpretation 2	52 or 52.5 or 53 or 53.5 OR 5.2 or 5.25 or 5.3 or 5.3 OR	5.2 or 5.25 or 5.3 or 5.35 or 5.4 with 0.19			[1]
	correct calculation of ar 0.19;	correct calculation of any figure divided by 1900 or 1.9 or 0.19;			[1]
	the space below so that it is s n Fig. 2.2.	suitable for you	to record the obse	rvable differences between the spe	ecimens on slide
PDO recording 2		ND headed M1 nd Fig 2.2	AND all comparative statements opposite each other;		[1]
	only differences recorded;				[1]

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ACE	feature	M1	Fig. 2.2	Reject all ticks with crosses unless have	[max 2]
interpretation 2	1. xylem shape	star-shape;		key	[]
	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/	smaller/narrower/ thinner or less larger/wider/thicker		
		thinner or less	or more;		

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(c) Plot a graph of the data shown in Table 2.1.						
PDO layout 4	0	<i>x-</i> axis time /hr(s) or hour(s)	<i>y</i> -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]	
	Ρ	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 • <u>Ruled lines plot to plot</u> • <u>Curve through all plots</u>	Reject if not five plots	[1]	
			 Extrapolation Not beyond <i>x</i>- or <i>y</i>-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 			
	То	tal			[21]	