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

9700/35 Paper 31 (Advanced Practical Skills 1), 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		Additional Guidance	Marks
1 (a) (i) Complete the sentences: If the plant tissue ….. water then the sucrose solution will become more dilute. This will change the solution so that it becomes ……dense.				
ACE conclusion 1	loses and less;			[1]
(ii) Show clearly on the diagrams below how you would expect to see the drop move.				
ACE conclusion 2	(same concentration/middle tube) drop stays at same height/no movement;			[1]
	(more concentrated/left tube) shows drops/sinks/falls	(less concentrated/right tube) **AND** rises;		[1]
(iii) Decide on the concentrations of sucrose solution. Prepare the space below to show concentrations of sucrose solution; volumes of 1.0 mol dm^{-3} sucrose solution; volumes of distilled water.				
MMO decisions 3	three concentrations;			[1]
	even range;			[1]
	correct volumes to make 50 cm^3	**AND** correct molarity;		[1]

Question	Expected Answers		Additional Guidance	Marks
(iv) Prepare the space below to record your observations.				
PDO recording 3	table with cells drawn no outer boundary	(heading to top/left) **AND** conc(entration)/mol dm^{-3};		[1]
	(headings) (syringe) **A**	**AND** (syringe) **B**;		[1]
	(records) description or key to show movement;			[1]
MMO collection 2	**A** (0.7 mol dm^{-3}) moves up and down;			[1]
	B (0.25 mol dm^{-3}) moves up in molarities more than 3 and down in others;			[1]
MMO decision 1	records more than one drop for each concentration;			[1]
(v) Use your results to estimate the sucrose concentration.				
ACE interpretation	**(A)** correct with their results;			[1]
	(B) correct with results;			[1]

Question	Expected Answers			Additional Guidance	Marks
(b) (i) Plot a graph of the data shown in Table 1.1.					
PDO layout 4 **0.15 –5.0** **0.35 –12.0** **0.55 –19.0** **0.75 –26.0** **1.00 –35.0**	**O**	*x*-axis [sucrose] or conc mol dm^{-3}/M/molar	*y*-axis **AND** water potential/Ψ kPa x10^2;	Must have units	[1]
	S	scale as 0.2 to 2 cm (allow no 0) ECF if no labels or incorrect on axes for O	**AND** negative 0 at top –10 to 2 cm;	**Reject** if awkward scale	[1]
	P	correct plotting using crosses or dot in circle;	Intersection of cross must be clear to show plot	**Reject** plotting if scale is awkward or if only blobs/dots/blobs in circles	[1]
	L	ruled/straight line through points;	Quality – not thick, not feathery for the complete line Joining plots – • Ruled lines plot to plot • Straight line through most plots • Straight line extrapolated to 0 Extrapolation not beyond *x*- or *y*-axis	**Reject** if not five plots	[1]

Question	Expected Answers		Additional Guidance	Marks
(ii) Using your results and your graph estimate the water potential of sample A (0.70).				
MMO collection 1	(using their result for **A**) shows clearly on graph how one water potential obtained;		**Allow** any indication but must be estimate of **A**	[1]
ACE interpretation 1	any correct reading of water potential(s)	**AND** kPa x10^2;	If **A** between … and …. reads off two water potentials allow any correct **Allow** if correct with result and reading from graph	[1]
(iii) Describe how you would improve the investigation to obtain a more accurate estimate of the water potential of sample A.				
ACE improvement 3	more (sucrose) solutions of known water potential;			[max 3]
	two further examples of concentration of sucrose or describes more around where drop drops and rises;			
	more sucrose solutions or concentrations to estimate **A**;			
	standardise the volume of the methylene blue dye OR suggests method for controlling volume of drop;			
	method to introduce drop OR measure time to rise or sink;			
	Total			**[23]**

Question	Expected Answers			Additional Guidance	Marks
2 (a) (i) Draw a large plan diagram of half of the trachea showing the ends of the cartilage ring. Label the diagram. Reject all marks except label if only 1 line.					
PDO layout 1	clear, sharp, unbroken lines	**AND** no shading	**AND** large; Minimum of three lines	**Reject** if overlaps text in question	[1]
MMO collection 2	no cells	**AND** drawn only half; Minimum of two lines.			[1]
	(in half section) has at least two ends of cartilage ring;				[1]
MMO decision 2	at least 6 lines for layers;				[1]
	Reject if any label is biologically incorrect e.g. cell wall **Reject** if any labels from other tissues e.g. arteries, veins, plant tissues and named cells unless described as a layer **Accept** any one label with label line correct cartilage epithelium (smooth) muscle layer of Goblet/mucus cells lumen;			**Reject** if any writing on drawing	[1]

Question	Expected Answers			Additional Guidance	Marks
(ii) Prepare the space below so that it is suitable for you to compare and contrast the specimens on slide L1 and in Fig. 2.1.					
PDO recording 1	organised as AND table/venn diagram/ruled connected boxes	correctly headed AND	comparative statements opposite each other;	L1 | Fig 2.2	[1]
MMO collection 1	lumen clearly identified as present in both;				[1]
ACE interpretation 3	**feature:**	**L1 (trachea):**	**Fig. 2.1:** (bronchiole)	Ticks and crosses requires a key **Reject** 3D, disc or spherical or arbitrary or random **Reject** negatives e.g. not circular **Reject** opposites e.g. regular	[max 3]
	then three of:				
	1.lumen shape or lining	regular/circular not folded/no villi	irregular/not circular folded/villi;		
	2. cilia or brush border microvilli	present cilia/brush border	absent or not visible microvilli;		
	3. cartilage	present	absent;		
	4. surrounding cells/air sacs/spaces	absent or no(ne)	present or have;		
	5. epithelium	thinner/narrower	thicker/wider;		
	6. goblet or mucus cells	present or visible	absent or not visible;		
	7. size	wider/larger	narrower/smaller;		
	8. whole shape similarities: smooth muscle	oval/triangular (whole shape) round/circular	round/circular;		

Question	Expected Answers	Additional Guidance	Marks
(iii) Calculate the actual distance across the lumen of the structure shown by line X in Fig. 2.1.			
MMO collection 1	measures line **X** correctly in mm or cm **Reject** m	mm/cm 28/2.8 28.5/2.85 29/2.9 29.5/2.95 30/3 **Reject** use or conversion to metres **Reject** if no units	[1]
PDO display 2	shows their measurement divided by or / or ÷ 70 **AND** × 1000 or 10^3 (mm) or 10000 or 10^4 (cm) or × 10 × 1000;		[1]
	figure to no more than three sig. figs.;		[1]

(b) Make a large drawing of three of these structures, which must be complete, to show the differences between them. Draw a circle on Fig. 2.2 around each of the structures Z which you have drawn.					
MMO collection 1	circles 3 complete **Z** structures on Fig 2.2		**AND** draws three;	**Reject** if overlaps text of question	[1]
PDO layout 1	clear, sharp, unbroken lines	**AND** no shading	large;		[1]
MMO decisions 2	two of six structures match those drawn for shape;				[1]
	one enclosure matches any one structure shape	**AND**	position;	**Reject** if more detail	[1]
	Total				**[17]**