UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

9700 BIOLOGY

9700/35 Paper 31 (Advanced Practical Skills 1), maximum raw mark 40

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UNIVERSITY of CAMBRIDGE
International Examinations

Question		Expected Answers			Additional guidance
1 (a) (i)		**Decide which other concentrations of ascorbic acid to make and complete Table 1.2, including the concentrations from Table 1.1.** **[3]**			
MMO decisions 3	[1]	0.1% and 0.08%	**AND** any two other concentrations	**AND** all in ascending or descending order;	
	[1]	for two other concentrations correct volumes to make 20 cm^3		**AND** correct %;	
	[1]	any three consecutive concentrations with two even intervals the same e.g. 0.08, 0.06, 0.04 or serial dilution by half;			
	(ii)	**Prepare the space below to show the concentration of ascorbic acid and record your results including samples X and Y.** **[6]**			
PDO recording 3		**Reject** • if units for % in the body of table			
	[1]	table with all cells drawn	**AND** heading (top or left) percentage conc(entration);		
		Reject • if units for volume /drops in body of table • if any additional headings for method e.g. volume of ascorbic acid			.
	[1]	(heading) volume/vol cm^3;			
	[1]	volumes recorded to 2 decimal places;			
MMO collection 3	[1]	volume or drops decrease from highest concentration to next highest;			
	[1]	**Reject** if records less than 3 concentrations result for **Y** (water/0%) records lowest volume;			
	[1]	replicate recorded;			

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(iii) Plot a graph of the results. **[4]**

PDO layout 4	O [1]	*x*-axis percentage conc(entration)	**Reject** v **AND** *y*-axis vol(ume) cm^3;	Must have units
	S [1]	**Reject** if awkward scale scale as 0.02% to 2 cm	**AND** sensible volume to 2 cm and uses more than half grid;	
	P [1]	**Reject** plotting if scale awkward if only blobs/dots/blobs in circles if extra plot for **X** value correct plotting using crosses/dots in circle only;	intersection of cross must be clear to show plot.	
	L [1]	straight line through points; error carried forward if scale or plotting incorrect	quality – no thicker than on grid, not feathery for the complete line. joining plots – • ruled lines plot to plot • line of best fit two plots plus even plots (+1) either side or even plots either side • curve through all plots	line of best fit must end either at the horizontal line or the vertical line for each of the end plots i.e. highest and lowest concentration **Reject** if any extrapolation

(iv) Use your graph to estimate the ascorbic acid concentration of sample X. Show clearly on your graph how you obtained the ascorbic acid concentration. **[3]**

MMO collection 1	[1]	shows clearly on graph result for **X** e.g. as single line from volume for **X** or as extra plot;		
ACE interpretation 2	[1]	correct reading of ascorbic acid concentration	**AND** answer to no more than 4 decimal places or three significant figures if 4 decimal places last figure must be 5 (or 0);	
	[1]	%;		

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(v) Identify *two* significant sources of error when finding the concentration of ascorbic acid in sample X. [2]

ACE interpretation max 2

	cause of error	error	
	(dependent variables)	idea of	
[1]	drops stick to sides	volume/number of drops/not counted/not	
	too many drops	included/too high/not accurate	
		too many at once/end-point missed	
[1]	volume for **Y**	too small	
	colour change or same colour	judging	
		determining	
		seeing	
		when;;	
	(standardised variables)		
[1]	drop size/different pressure on syringe/syringe sticking/	not same/vary/different;	
[1]	mixing		
[1]	iodine evaporating/exposed to light		
	(independent variable)		
[1]	(ascorbic acid) evaporates or mixes with air	changes concentration/reacts;	
[1]	concentrations	more/wider/narrower/different needed;	max 2

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	(vi) Suggest how you would make *three* improvements to this investigation.		**[3]**
ACE improvements max 3	[1]	more/wider/narrower/different/examples range of concentrations (ascorbic acid) use graduated pipette or smaller/more divisions/calibration syringe/burette;	
	[1]	device/described for making drops/burette/titrate;	
	[1]	(to identify the end-point) use colorimeter or have a standard colour to compare to or use white tile/paper;	
	[1]	put drops in nearer to mixture or use a smaller test-tube/container or use a wider/larger test-tube/beaker/AW;	
	[1]	replicate/repeat/take more readings (each concentration);	max 3
		[Total: 21]	

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Question		Expected Answers			Additional guidance
2 (a) (i)		**Draw a large plan diagram of the sector shown in Fig. 2.1 to include the outline of two vascular bundles. No details of the internal tissues of the vascular bundles are required. [5]**			
PDO layout 1		**Reject** • if drawn over the print of question			
	[1]	**Reject** • thick lines • feathery lines • 3 'tails' or overlaps or gaps clear, sharp, unbroken lines	**AND** no shading	**AND** uses most of the space provided;	
MMO collection 2	[1]	no cells drawn	**AND** only two vascular bundles drawn in outline only;		
	[1]	rounded/pointed end;			
MMO decisions 2	[1]	longest vascular bundle is less than half width at widest point of section;			
		Reject • if any label is biologically incorrect e.g. cell wall or regions belonging to other organs or animals. • additional label(s) within drawn area			
	[1]	correct label C (can be within drawn area) to tissue below upper or lower epidermis;			

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Question		Expected Answers			Additional guidance
(ii)		**Using high-power, draw a large plan diagram to show one large vascular bundle in detail. Label the phloem.**			**[5]**
PDO layout 1	[1]	**Reject** • if drawn over the print of question			
		Reject • thick lines • feathery lines • 4 'tails' or overlaps or gaps	**AND** no shading	**AND** uses most of space provided;	
		clear, sharp, unbroken lines			
PDO recording 1	[1]	(details of) two regions separated from each other and from each cap;			
MMO collection 1	[1]	no cells	two caps withdrawn;		
MMO decisions 2	[1]	proportion of longest length of one cap is equal to or more than half the longest length between the caps;			
	[1]	**Reject** • if any label is biologically incorrect e.g. regions belonging to other organs or animals. • label within drawn area			
		correct label with label line to phloem;			

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Question		Expected Answers		Additional guidance
(b) Calculate the ratio of the thickness of the layer labelled B compared to the total thickness of the layer labelled A as shown in Fig. 2.2.				**[3]**
MMO collection 1	[1]	**Reject** • if no units • metres.		
		two measurements of A one between 17 to 19 mm and one between 12 to 14 mm or one combined measurement between 28 and 33 mm	**AND** one measurement between 38 to 40 mm;	
PDO display 2	[1]	shows larger figure to smaller figure;		**Reject** if converts to other units (than mm or cm) or standard form
	[1]	(needs working) answer rounded to correct ratio e.g. 39 : 29;		**Reject** if put units

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<table>
<tr><th colspan="2">Question</th><th>Expected Answers</th><th>Additional guidance</th></tr>
<tr><td colspan="4">(c) Prepare the space below so that it is suitable for you to record the observable differences between the specimens on slide L1 and in Fig. 2.2. [3]</td></tr>
<tr><td>MMO decision 1</td><td>[1]</td><td>only observable differences;</td><td></td></tr>
<tr><td>ACE interpretation max 2</td><td>[1]
[1]
[1]
[1]
[1]
[1]
[1]
[1]
[1]</td><td>Ignore
• tick and cross without a key
• ref.to non-observable features
• 3 D shapes
<table><tr><th>feature</th><th>L1</th><th>Fig. 2.2</th></tr><tr><td>vascular bundles
number
arrangement
relative sizes</td><td>
lots/more
chain
different sizes or large and small</td><td>
few/one/two
centre
same sizes;</td></tr><tr><td>caps shape
cap</td><td>semicircles /AW</td><td>not semicircles or one end only;</td></tr><tr><td></td><td>yes/present</td><td>no/none/absent;</td></tr><tr><td>stomata numbers</td><td>none/not visible or few(er)</td><td>yes/more;</td></tr><tr><td>position</td><td>top/bottom/one side</td><td>all round/sides;</td></tr><tr><td>sunken</td><td>no/none/absent</td><td>yes/present;</td></tr><tr><td>leaf shape</td><td>tapered/pointed/elongated</td><td>semicircle/rounded;</td></tr><tr><td>surface Reject regular</td><td>irregular/rough</td><td>smooth;</td></tr><tr><td>extra ring/inner layer/allow endodermis</td><td>no/none/absent</td><td>yes/present;</td></tr></table></td><td>max 2</td></tr>
</table>

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Question		Expected Answers		Additional guidance
(d) Describe how the observable features of Fig.2.2 support the conclusion that this is a leaf from a plant growing in a dry habitat. [3]				
ACE conclusion MAX 3	[1]	sunken stomata or rolled/rounded	to reduce the <u>diffusion</u> of water/decreases diffusion gradient;	
	[1]	thick cuticle or thickened epidermis	to prevent or reduce <u>evaporation</u> of water;	
	[1]	no spongy mesophyll layer or no air spaces	to prevent <u>evaporation</u> from cell walls;	
	[1]	rounder shape or rolled or fewer stomata smaller surface area to volume ratio	to increase humidity/decreases diffusion gradient;	
	[1]	(in context of any of above) reduces <u>transpiration</u> (rate);		max 3
			[Total: 19]	

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