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

9700/33 Paper 33 (Advanced Practical 1), maximum raw mark 40

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Question		Expected Answers						Marks	Additional Guidance
1 (a) (i) Complete table to show how you will carry out the tests on each solution.									
MMO	**decisions 4**	(Starch) iodine AND (reducing sugar) Benedict's AND (protein) Biuret or sodium/Na/potassium/K/hydroxide/OH <u>and</u> copper sulfate;						[1]	
		same volume/quoted volume for solution AND		same/quoted volume or excess volume for Benedict's;				[1]	**Reject** amounts or drops.
		(Benedict's) heats to at least 80^{o} C/ boils AND		same time 10 minutes or less ; **Reject** less than 1 minute				[1]	**Must have units**
		(starch)		(reducing sugar)		(protein)		[1]	**Reject** no change/colourless/negative/positive
		orange to yellow brown	blue/black **Reject** purple	blue to	orange/brown/ red	blue to	violet/ lilac/ purple mauve; **Reject** pink		

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Question		Expected Answers		Marks	Additional Guidance
(ii) Prepare the space below and record your observations of the tests on all the solutions.					
PDO	recording 3	all cells drawn AND **Allow** three tables samples in separate cells and different tests in different cells. **Allow** repeats tests.	sample/**S1**, **S2**, **S3**, **S4**, **S5** as heading for top row or left column ;	[1]	**If more than one table** for points 1 and 2 **all** tables must be correct.
		(heading for top row or left) observations/colour/result/s ;		[1]	
		observations for all solutions and all tests (15 readings);		[1]	
MMO	collection 3	(starch) **S3** blue/black;		[1]	**Reject** positives/negatives/ticks/ crosses for points 4,5 and 6
		(reducing sugar) **S2** any positive colour more than **S3**;		[1]	**Reject** no colour change
		(protein) **S2** and **S5 only** positive i.e. violet/lilac/mauve/purple;		[1]	**S1**, **S3** and **S4** NOT purple
(iii) Use your observations to state the two solutions that should be mixed in equal volumes to provide the correct mixture to feed the young mammal.					
ACE	conclusion 1	**(S)3 and (S)5;**		[1]	

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Question			Expected Answers		Marks	Additional Guidance
(b) (i) Plot these data shown in Table 1.1.						
PDO	layout 4	**O**	x-axis time (/) min AND	y-axis number/no. (of) individuals;	[1]	**Reject** min^{-1}
		S	scale for **chart** x-axis times evenly spaced and uses more than half grid and 2 to 2 cm y-axis	scale for **line** 5 mins to 2 cm and 2 to 2 cm on y;	[1]	**If incorrect O** then must use half or more of grid with sensible scale.
			blocks even width **AND** correctly plotted for day 1; No more than half a square above value	plotting crosses or dot in circle ONLY **AND** plots correct for day 1; No cross larger than X dot must fit inside o on any one point.	[1]	**Do not credit** blobs in or out of circles or a dot and cross in circle. **Credit** xs in circles.
		L	thickness of lines **AND** blocks for day 1 and 2 together **AND** shading/writing and key;	thickness of lines **AND** for both graphs ruled/straight lines joined point to point OR curve through points **AND** labelled/key; No extrapolation either end.	[1]	**Do not credit** if plot blocks as two separate groups. **Allow** if blocks for different times are touching If space between pairs this must be the same.
(ii) Describe the patterns in the results.						
ACE	interpretation 3		(in context of no. of individuals) increases then decreases/AW; peak then drops		[1]	
			(use of data) any quote of data using time with no. of individuals;		[1]	
			comparison between day 1 and day 2 day 2 digestion earlier or faster or day 1 slower/AW time less day 2/time more day 1/AW ;		[1]	

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Question		Expected Answers	Marks	Additional Guidance
(iii) Suggest a reason for the difference between the results for day 1 and day 2.				
ACE	conclusions 1	(mammals) just eaten/different food eaten/different time of day/concentration of enzyme different/health/ (method used) volume of saliva/pH/AW temperature different **Allow** in any context or no context.	[1]	
(iv) Suggest how you might control the variables in this investigation to compare a different species of mammal with the mammal studied.				
ACE	improvements 3	(mammals) same age/healthy/sex/mass/weight/AW;	[1]	**Reject** size
		(treatment/environment) (food) eaten/fed/diet same/time after meal the same live in same conditions/environment/example of variable temperature;	[1] [1]	
		(method) same volume/example of volume of saliva; same number/25 or same volume/5 cm^3 starch or same concentration/1% starch; temperature in water-bath/pH using buffer;	 [max 2]	**Reject** amounts
		Total	**[22]**	

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Question		Expected Answers	Marks	Additional Guidance
2 (a) (i) Draw a large low-power plan diagram of the midrib of the leaf as shown in the shaded area in Fig. 2.1. Label upper surface and one vascular bundle.				
PDO	layout 1	clear, sharp, AND unbroken lines **Allow** 3 or fewer entire drawing. no shading AND shape of section as shown in fig. 2.1 does **not** fit inside grid; **Ignore** additional lamina drawn.	[1]	
MMO	collection 2	no cells drawn AND **Ignore** trichomes definite bulge at bottom of midrib;	[1]	
		region of cells at tip of bulge OR any triangular shape from upper epidermis towards vascular bundle;	[1]	
MMO	decisions 2	complete vascular bundle in lower half of midrib;	[1]	
		(in correct context of midrib) upper surface/epidermis AND vascular bundle labelled;	[1]	**Ignore** cuticle
(ii) Describe one visible adaptation of this leaf and suggest a possible advantage to the plant.				
MMO	decision 1	selects observable feature/curling/rolled/trichomes/hairs/no stomata on upper surface/stomata only on lower/sunken stomata/cuticle; **Allow** lots of/densely packed chloroplasts/palisade cells;	[1]	
ACE	conclusion 1	suggests an appropriate advantage reduces, less AND water loss/evaporation/transpiration; **Allow** traps water/absorbs water/reduces air movement	[1]	

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Question		Expected Answers			Marks	Additional Guidance
(iii) Find the ratio of the thickness of the midrib compared to the thickness of the lamina.						
MMO	**collection 1**	shows midrib measurement larger than lamina;			[1]	**Reject** any units mm/other units anywhere than eyepiece graticule units.
PDO	**display 2**	ratio larger number on left to or **:** smaller number; **Allow** as fraction of larger number over smaller number;			[1]	
		final answer whole numbers only;			[1]	
(b) (i) Make a large, high-power drawing of a group of three cells from the upper epidermis and the cells touching them.						
PDO	**layout 1**	clear, sharp unbroken lines AND	no shading in epidermal cells only AND	whole group does not fit in 6 cm grid;	[1]	
MMO	**collection 2**	**only three** epidermal cells drawn as a chain AND	no spaces/gaps between adjacent cells;		[1]	
		thinnest (epidermal) cell equal or less than half depth of longest cell in layer below;			[1]	
MMO	**decision 1**	label cell wall correctly;			[1]	

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<table>
<tr><th colspan="2">Question</th><th colspan="3">Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td colspan="7">(ii) Prepare the space below so that it is suitable for you to record the observable differences between the upper and lower epidermis of the leaf.</td></tr>
<tr><td>PDO</td><td>recording 1</td><td>organise as a table/
venn diagram/
ruled connected boxes</td><td>headed
upper and lower</td><td>no similarities recorded;</td><td>[1]</td><td><u>upper</u> <u>lower</u> OR venn circles labelled, overlap

empty</td></tr>
<tr><td>ACE</td><td>interpretation 3</td><td colspan="3"><table>
<tr><th>feature</th><th>(upper)</th><th>(lower)</th></tr>
<tr><td>surface</td><td>smooth/flat/even/regular</td><td>rough/bumpy/ irregular;</td></tr>
<tr><td>cell shape</td><td>regular/flattened/ rectangular</td><td>irregular/angular/ pointed;</td></tr>
<tr><td>cell wall</td><td>thick</td><td>thin;</td></tr>
<tr><td>cell/epidermis size</td><td>large/thick</td><td>small/thin;</td></tr>
<tr><td>number
packing</td><td>few
dense/tight</td><td>lots
short/loosely;</td></tr>
<tr><td>trichome/hairs

Reject
spikes/thorns</td><td>none/few</td><td>has/some/lots;</td></tr>
<tr><td>stomata/sunken/ openings/gaps/ pores</td><td>none/absent/no

Reject less</td><td>has/present;</td></tr>
<tr><td>cuticle</td><td>present/thick</td><td>none/thin;</td></tr>
</table></td><td>[max 3]</td><td></td></tr>
<tr><td></td><td></td><td colspan="3">Total</td><td>[18]</td><td></td></tr>
</table>

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