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

9700/33 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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UNIVERSITY of CAMBRIDGE
International Examinations

Question	Expected Answers			Additional Guidance	Marks
1 (a) Draw on Fig. 1.1 a line to show the level of water in the large test-tube.					
MMO decision 1	line drawn above or at the same level as the line showing the contents in the Visking tubing;				[1]
(b) State the volume of Benedict's solution and the volume of the solutions and the sample.					
MMO decision 1	(volume of Benedict's) equal to or greater than (volume of each solution **and** sample)	**AND**	(volume of each solution **and** sample) equal;	**Reject** any other values e.g. 2.5 cm^3	[1]
(c) State ONE variable, other than volume, which needs to be kept constant when you do the TESTS and describe how you will keep this variable constant.					
MMO decisions 2	<u>temperature;</u>			**Reject** if in context of Visking tubing set up or experiment e.g. keep at room temperature **Reject** if more than one variable given	[1]
	use of water-bath	**AND** between 80°C and 100°C or boiling;			[1]

Question	Expected Answers		Additional Guidance	Marks
(d) (i) Prepare the space below and record your results.				
PDO recording 2	**1.** table with all cells drawn **No outer boundary needed**	(heading to left/ top) **AND** a <u>heading</u> to describe (sample, or solution or test-tube or glucose);		[1]
	2. (heading) <u>time</u> (/) s or sec(onds) or min(utes);		**Reject** if units in table	[1]
MMO collection 2	**3.** time for 0.3%/**S3** quicker than 0.2%/**S2**;		Must be clear units **Reject** 1.24	[1]
	4. figures for 0.2%/**S2** quicker than 0.1%/**S1**;			[1]
(ii) Estimate the concentration of glucose in the sample.				
ACE interpretation 1	correct estimate from **their** results **Reject i**f sample not recorded in results	**AND** percentage/%;	• is 0.1% or 0.2% or 0.3% • **between** 0.1% and 0.2% • **0.15%** • **between** 0.2% and 0.3% • **0.25%** • **greater/more than** 0.3% • **less than** 0.1% **Reject** any other values **Ignore** use of **S1**,**S2**, **S3**	[1]

Question	Expected Answers	Additional Guidance	Marks
(iii) Suggest how you might modify this investigation to find the effect of temperature on the rate of diffusion of glucose through Visking tubing.			
ACE improvements 2	states 5 or more temperatures OR gives examples of 5 or more 1^{o}C to 100^{o}C;		[1]
	(in context of readings) repeats or more than once or replicates **AND** mean or average OR take samples at same time interval or example of time with units OR same volumes or example of volume with units of samples removed OR rate calculated from time taken to change colour OR same concentration or volume of glucose or example of concentration or volume + units;	**Reject** if change another variable e.g. concentration of glucose **Reject** amount	[1]

<table>
<tr><th>Question</th><th colspan="3">Expected Answers</th><th>Additional Guidance</th><th>Marks</th></tr>
<tr><td colspan="6">(e) (i) Plot a graph to show the results in Table 1.1.</td></tr>
<tr><td rowspan="4">PDO
layout 4

<table><tr><td>0</td><td>0</td></tr><tr><td>15</td><td>14</td></tr><tr><td>30</td><td>22</td></tr><tr><td>45</td><td>26</td></tr><tr><td>60</td><td>28</td></tr><tr><td>75</td><td>29</td></tr></table></td><td>O</td><td>x-axis
time (/) min(ute)s</td><td>y-axis
AND distance (diffused from well by coloured solution /) <u>mm</u>;</td><td></td><td>[1]</td></tr>
<tr><td>S</td><td>scale as 20 min to 2 cm
ECF if no labels on axes for O
Allow 5/10 at origin but must label origin</td><td>AND 5 mm to 2 cm;
Allow 5/10 as long as scale 5 mm to 2 cm but must label origin</td><td>Reject if awkward scale</td><td>[1]</td></tr>
<tr><td>P</td><td>correct plotting using crosses or dots in circle only;</td><td>Intersection of cross must be clear to show plot</td><td>Reject plotting if scale is awkward

Reject if only blobs/dots/blobs in circles</td><td>[1]</td></tr>
<tr><td>L</td><td>line joined point to point or smooth curve;</td><td>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>
Extrapolation
• Not beyond x- or y-axis</td><td>Reject if no 0,0 plot</td><td>[1]</td></tr>
</table>

Question	Expected Answers	Additional Guidance	Marks
(ii) Use the graph to calculate the rate of diffusion of the solution between 10 mins and 20 mins. Show on your graph.			
MMO collection 1	1. shows on graph at least one reading(s) between or at 10 and 20 minutes;		[1]
PDO display 1	2. shows **distance divided by time** (has to be clear) any number between 4 and 20 divided by or / or ÷ whole number (between 4 and 20) or shows subtraction of numbers;	**Reject** if not clear distance divided by time	[1]
ACE interpretation 1	3. correct answer **AND** mm min ^{1} or mm per min or mm/min;		[1]
PDO display 1	4. any figure rounded to maximum of four significant figures;		[1]
(iii) Describe and explain the trend in the rate of diffusion shown in the graph you have drawn in (e) (i).			
ACE conclusion 2	(description) rate or distance decreases or slows or levels off;		[1]
	(in correct context of diffusion ref. to) Idea of concentration or diffusion gradient, getting less OR Idea of (high at beginning) concentration or diffusion gradient high OR Idea of (at end) evenly coloured;		[1]

Question	Expected Answers	Additional Guidance	Marks
(f) State the uncertainty of the measurements using this ruler.			
ACE interpretation 1	+/- 0.5 mm OR +/- 0.05 cm;		[1]
	Total		**[22]**

Question	Expected Answers			Additional Guidance	Marks
2 (a) (i) Make a large, labelled drawings of two different types of cell from Fig. 2.1 and one cell from Fig. 2.2. Indicate on the photomicrographs the cells that you have drawn.					
MMO collection 1	**1.** (only cells marked on Figs. **and** drawn)			**Reject** if shown more cells **Reject** if drawing overlaps text of question	[1]
	on Fig. 2.1 **white blood cell**	**AND** any **one** complete red blood cell	on Fig. 2.2 **AND** any one complete red blood cell;		
PDO layout 1	**2.** clear, sharp, (not thicker than grid line for whole line) unbroken lines **Allow** 1 error in three cells 0 error for two or one cell	**AND** no shading	**AND** smallest cell drawn larger than 2 cm (+/- 1mm) at widest point;	Must draw at least TWO cells	[1]
MMO decision 2	**3.** (wbc from Fig. 2.1) (nucleus position) nearer to one side	(nucleus size) **AND** (+ or – 1 mm) nucleus fills between 50 and 75 % of whole cell;		**Reject** if any additional organelles drawn in **any** cell	[1]
	4. Reject if any label is biologically incorrect e.g. cell wall any ref. to plants e.g. cell wall or named plant cell or named animal cell other than blood cells. **Ignore** nucleolus and named blood cells One correct label with label line from nucleus nucleoplasm cytoplasm cell membrane/AW;			**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 cells in Fig. 2.1 and Fig. 2.2.					
PDO recording 2	(organise) table/ venn diagram/ ruled connected boxes	(heading for differences) Fig. 2.1 and Fig. 2.2, labelled cells from **(a) (i)**, named cells linked to figs.	all differences statements opposite each other;	Fig 2.1 | Fig. 2.2	[1]
	heading similarities;				[1]
ACE interpretation 3	Mark with identification from **(i)** drawings even if incorrectly named cells Mark for any similarities or differences max 3 Must be clear which **cells** are being compared or contrasted Ticks and crosses requires a key (continued on next page)				

Question	Expected Answers	Additional Guidance	Marks

feature	Fig. 2.1		Fig. 2.2
Only credit each number once.	rbc or label from **(i)**	wbc or label from **(i)**	rbc or label
1. size	(rbc) small(er)	(wbc) larg(er)	
cells;	small(er)		larg(er)
2. types of cells;	rbc or label	and wbc or label	and only rbc/label
		wbc present	no wbc
	two		one
3. number	many or more cells/rbcs		few(er) cells/rbcs
	many or more rbcs	one or a **Reject** few/small no.	
OR degree of packing;	dens(er)/more overlapping rbcs		less dense;
4. nucleus	absent **Allow** cannot be seen	present	
	absent **Allow** cannot be seen		present
	(no key)	present	present
OR nucleus shape;		lobed or irregular	not lobed or oval or round or regular or smooth
5. cell shape;	circular or round	irregular	
	circular or round		oval
		irregular	oval **Allow** few or some round **Reject** round
6. cytoplasm;	not granular	granular	
		granular	not granular or normal
7. cytoplasm OR cell membrane;	(no key) present		

Beware Fig 2.1 cells magnified 3+ more than Fig 2.2 so cells in Fig 2.1 smaller
Reject nucleus

Reject if just cells have nucleus present or absent

Reject 3D , rugby or disc or spherical or biconcave or arbitrary or random
Reject negatives e.g. not circular
Reject opposites e.g. regular

[max 3]

<table>
<tr><th>Question</th><th colspan="3">Expected Answers</th><th>Additional Guidance</th><th>Marks</th></tr>
<tr><td colspan="6">(iii) Calculate the actual diameter of the cell shown by the line X in Fig. 2.2.</td></tr>
<tr><td rowspan="2">MMO
collection 2</td><td colspan="3">measures line X correctly in mm or cm;

Reject m</td><td><table><tr><th>mm</th><th>cm</th></tr><tr><td>26(.0)</td><td>2.6</td></tr><tr><td>26.5</td><td>2.65</td></tr><tr><td>27(.0)</td><td>2.7</td></tr><tr><td>27.5</td><td>2.75</td></tr><tr><td>28(.0)</td><td>2.8</td></tr></table></td><td>[1]</td></tr>
<tr><td colspan="3">shows
(their measurement divided by or / or ÷ 700)

AND × 1000 or 10^3 (mm)
or 10000 or 10^4 (cm) or × 10 × 1000;</td><td>Reject use or conversion to metres
Reject if no units</td><td>[1]</td></tr>
<tr><td colspan="6">(iv) Suggest how you would obtain a mean diameter for cells of this type.</td></tr>
<tr><td>ACE
improvement 1</td><td>idea of make more measurements
Reject calculate</td><td>AND add together</td><td>AND divide by the number of measurements;</td><td></td><td>[1]</td></tr>
</table>

Question	Expected Answers	Additional Guidance	Marks
(b) (i) Draw a large plan diagram of two different blood vessels shown in K1. Reject if one line for each vessel.			
PDO layout 1	**1.** clear, sharp, (unbroken lines) complete vessels only **AND** no shading **AND** large;	**Reject** if overlaps text of question	[1]
MMO collection 2	**2.** no cells **AND** only two complete vessels drawn; Minimum of **three** lines between two vessels		[1]
	3. different vessels; (more than one) at least two complete vessels OR total size **or** shape; Minimum of **three** lines between two vessels		[1]
MMO decision 2	**4.** at least one complete vessel drawn with two or more layers; Minimum three lines		[1]
	5. one with wall thicker than other vessel wall;	**Reject** if more than two vessels	[1]

Question	Expected Answers	Additional Guidance	Marks
(ii) Suggest one way in which these blood vessels are adapted for transport.			
ACE conclusion 1	lumen/hollow OR smooth muscle OR tunica media OR elastic fibres/elastin OR collagen OR tunica externa;	**Reject** if more than one given	[1]
	Total		**[18]**