UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2012 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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Mark scheme abbreviations:

;	separates marking points
/	alternative answers for the same point
R	reject
A	accept (for answers correctly cued by the question, or by extra guidance)
AW	alternative wording (where responses vary more than usual)
underline	actual word given must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument
mp	marking point (with relevant number)
ecf	error carried forward
I	ignore
ACE	Analysis, Conclusions and Evaluation (skills)
MMO	Manipulations, Measurement and Observation (skills)
PDO	Presentation of Data and Observations (skills)

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Expected Answers			
1 (a) (i)			[1]
MMO decision 1		*Idea of* more than single cell **or** cells in field of view or that eyes can see **or** Idea of repeat or more readings / observations;	
			Do not give mark if • ref. to observe over time or at different times • ref. to staining • any ref. to measuring

(a) (ii)			[4]
PDO recording 2	**mp1**	table with all cells drawn	**AND** heading (top row or left of recorded data column) concentration of sodium chloride solution/mol dm^{-3};
			Do not give mark if • units in cells of headed column
	mp2	(any correct heading – column or row) state(s) of plasmolysis;	
			Do not give mark if • headings for method variables
MMO collection 2	**mp3**	• records more than one cell for 0.8, 0.4. 0.2, or S1,S2,S3 **AND** S4	**AND** records state of plasmolysis for each cell or number of cells in each state;
			Do not give mark if • just record a single result for each solution or plasmolysed to non-plasmolysed
	mp 4	has recorded for **0.8** or **S1** in context of complete or more plasmolysis highest number of cells	**AND** has recorded for **0.2** or **S3** in context of no or slight plasmolysis highest number of cells;
			Ignore • turgid or flaccid

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(a) (iii) [1]

ACE interpretation 1		correct with their results (however shown e.g. % plasmolysed cells) and uses only • 0.8 to 0.4 • 0.4 to 0.2 • 0.2 to 0(.0));	
			Do not give mark if • no results for **S4** • any other values

(a) (iv) [max 1]

ACE interpretation MAX 1		cause of error	WITH idea of error
	mp 1	(dependent variable) *idea of* state of plasmolysis cells on slide and in Fig 1.1	*idea of* difficult to judge / distinguish / see / observe or not enough states shown / only 4 or some cells between diagrams not the same or different;
	mp 2	qualitative;	
		Ignore • ref. to colour or stain • ref. to measurements	

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(a) (v) [max 3]

ACE improvements MAX 3

mp 1	(independent variable) (concentration of sodium chloride) *idea of* use more concentrations or serial dilution;	
mp 2	(dependent variable) more diagrams for more stages of plasmolysis;	
		Do not give mark if • to stain or colour
mp 3	repeat or replicate (in context of each solution);	
		Do not give mark if • more cells
mp 4	(standardised variables) *idea of* leave / soak (cells / onion) for longer or same time or until no further plasmolysis;	
		Do not give mark if • ref. to measure at different times
mp 5	use same onion or same part of onion or same age or fresh onion;	
		Do not give mark if • same cell
mp 6	*idea of* same <u>volume</u> or e.g. with cm^3 of solutions and measuring method;	**Do not give mark if** • amount

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1 (b) (i)				[4]
PDO layout 4	**mp 1**	*x*-axis concentration (of) sodium chloride / NaCl solution / $\times 10^{-2}$ mol dm^{-3}	**AND** *y*-axis percentage or % (of) red blood cells destroyed;	
	mp 2	scale as *x*-axis 0.5 to 2 cm labelled each 2 cm	**AND** *y*-axis 20 to 2 cm labelled each 2 cm ;	
	mp 3	correct plotting of • six points only • as small cross (does not go outside 2 mm × 2 mm square) **or** dot (in circle) **or** cross in circle; **Do not give mark if** • plotted 50% with same as other points • blobs or dots alone • if blob in circle bigger than 1mm diameter		
	mp 4	six plots with ruled lines exactly point to point **or** curve through 6 points	**AND** (quality) smooth line less than 1 mm line thickness ;	
			Do not give mark if • any extrapolation	

(b) (ii)				[2]
MMO collection 1	**mp 1**	shows reading off at 50%;		
ACE interpretation 1	**mp 2**	correct reading from graph	**AND** $\times 10^{-2}$ mol dm^{-3} ;	
		Can have mark if • line crosses at halfway between vertical lines then MUST read half square value e.g. 6.775 • line crosses nearer right vertical then can have only either half square value or value of right vertical • line crosses nearer left vertical then can have only either value of left vertical or half way value		

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(b) (iii) [3]

Ignore *ref. to plasmolysis, water potential, isotonic, hyper/hypotonic, haemolysis*

ACE conclusion 3	**mp 1**	for any correct reference in context of water moving osmosis;	
		Must have • ref to only water moving	
	mp 2	correct idea of movement of water in 0% no net movement of water;	
			Do not give mark if • no movement of water
	mp 3	correct idea of movement of water in 100% idea of water moving into cells;	
			Do not give mark if • ref. to no water out

[Total: 19]

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2 (a) (i) [1]

MMO decision 1		*idea of* describing difference in (P) (in top layer only) bubbles **or** drop(lets) **or** gas **or** air;

Ignore	**Do not give mark for**
• emulsion or immiscible	• bubbles either labelled or drawn on **Q**

(a) (ii) [3]

Ignore *explanations e.g. hydrophobic molecules, etc.*

MMO decisions 2	**mp 1**	identifies layers correctly (on top) oil **AND** (layer underneath) water;	
	mp 2	*(Idea of position)* labels egg or yolk	**AND** drawn or described egg / drop somewhere in bottom half of oil and top half of water or layer between oil and water;
		Ignore • emulsion or immiscible • additional drawings of egg e.g. on surface or tails into lower layer	
PDO recording 1	**mp 3**	detail (anywhere) draws egg as drop or distinct rounded shape (not layer);	
		Ignore tails	**Do not give mark if** • layer • If egg all at bottom of tube only happens if shaken

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(a) (iii) [2]

Ignore *explanations precipitate suspensions solutions emulsions*

MMO decision 2	**mp 1**	(**P**) <u>description</u> **P** in **(a) (iii)** compared to **P** in **(a) (i)** looking for something other than labels of contents. idea of cloudy or hazy(ier) **or** milky **or** describes colour e.g. white or yellow or cream(y) **or** ref. to difference in bubbles described e.g. if no bubbles in **P** in **(a)(i)** then allow any bubbles labelled here **or** if bubbles in lower layer in **P** in **(a)(i)** then could have more bubbles in **P** here;
	mp 2	(annotated <u>description</u> (not contents) of • compare **Q** from **(a)(ii)** to **Q** in **(a)(iii)** (drawn and) <u>labelled</u> • egg / yolk at bottom of tube or in lower layer or lower half of test-tube • or labelled (meniscus curved in **(a)(ii)** to) meniscus flat(ter) or not / less curved • top layer foam or froth • bubbles • any valid ref. to cloudier or hazier or milkier or more white or turbid or dense • any valid ref. to different colours recorded;

	Do not give mark if • oil, water and yolk drawn as separate layers • labels only as mixture or emulsion

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(b) (i) [4]

PDO layout 1	**mp 1**	no shading or dashed line inside cell	**AND** largest blood cell larger than 30mm	**AND** clear, sharp, unbroken lines in <u>all</u> cell <u>surface</u> membranes drawn; **Do not give mark if** • less than three cell surface membranes **or if any cell surface membrane has** • drawn two lines • any ruled lines • any line more than 1 mm • any feathery or broken or dashed or gap • any 'tail' or overlap • drawn over the print of question
MMO collection 3	**mp 2**	on Fig.2.6 shows in any way three different types of cell		**AND** draws <u>both</u> white blood cells with a nucleus and at least one red blood cell;
		Ignore any labels for cells		
	mp 3	drawn neutrophil larger than both of other two types of cells;		
	mp 4	(in neutrophil) correct shape of nucleus		**AND** (in other white blood cell) nucleus fills more than half the cell **and** positioned closer to or in contact with membrane on one side;

(b) (ii) [5]

PDO recording 1	**mp 1**	organise as a table with only three columns or rows separated by lines (no cells needed) **Ignore** numbered columns	**AND** headings in any order only **Do not give mark if** divide wbc into 2 columns / rows <u>red blood cells / rbc</u> and <u>white blood cells / wbc;</u>	**AND** third column / row contains examples of features
MMO decision 1	**mp 1**	<u>only</u> <u>observable</u> differences (at least two) recorded ;		
			Do not give mark if • any function or ref. to 'not visible' contents e.g. haemoglobin or organelles • two white blood cells given	

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ACE interpretation 3

Max 3

	feature	red blood cells	white blood cells
mp 1	*(size)*	small(er)	larger;
mp 2	*(number)*	many or more	few(er);
mp 3	*(nucleus presence)*	absent or no(ne)	present or yes;
mp 4	*(cytoplasm)* *(surface)* *(granul(ar/les))*	light(er) (red) or less dense smooth not rough no(one) / absent or agranular	dark(er) (red) rough or textured yes / present or granular;
mp 5	*(grouping)*	idea of together or group or sticky or clump	separate or not in groups;
mp 6	*(type)*	one or same	two or different types;

Ignore

- functions
- ref. to colour
- shape of cell or nucleus
- 3-D descriptions such as spherical, biconcave, ball, disc
- tick and cross without a key
- diagrams

Can have difference on one side if e.g. use more or –er with vague answer in other column

If **no** organisation then
give mark only if difference in same sentence or following sentences

Do not give mark if

- for each feature the difference is not opposite each other
- or e.g. red blood cell difference i
  difference ii
  white blood cell difference i
  difference ii

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(b) (iii) [6]

MMO collection 1	**mp 1**	shows at least one value for each of **J**, **K**, **L**, **M** and **N** or the same number of values from each cell; **Ignore** use of metres or μm	
MMO decision 1	**mp 2**	shows <u>mm</u> at least <u>once</u> on values 8 or higher;	
PDO display 2	**mp 3**	shows addition of at least <u>five</u> values	**AND** shows division by number of values;
		Can have • alternative signs for division	***Do not give mark for*** • Σx/n unless x and n have key
	mp 4	shows at least <u>one</u> conversion of mm to μm by showing • <u>multiplication</u> by 1000 or 10^3	**AND** shows figure divided by1430;
		Can have • alternative signs for multiplication (or *) • or alternative signs for division	**Do not give mark if** • metres anywhere • no mm anywhere
PDO layout 1	**mp 5**	draws <u>only</u> one 'bumpy / spiky' cell with no shading;	**AND do not give mark if** • any feathery or broken or dashed or gap or overlap or tail in the outline of cell • drawn over the print of question
MMO collection 1	**mp 6**	shows any one measurement across a <u>drawn</u> cell (if more than one cell drawn then must be labelled **J**); **Do not give mark if** • cell has smooth shape e.g. oval, round etc.	

[Total: 21]

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