UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2008 question paper

9700 BIOLOGY

9700/32 Paper 32 (Advanced Practical 2), 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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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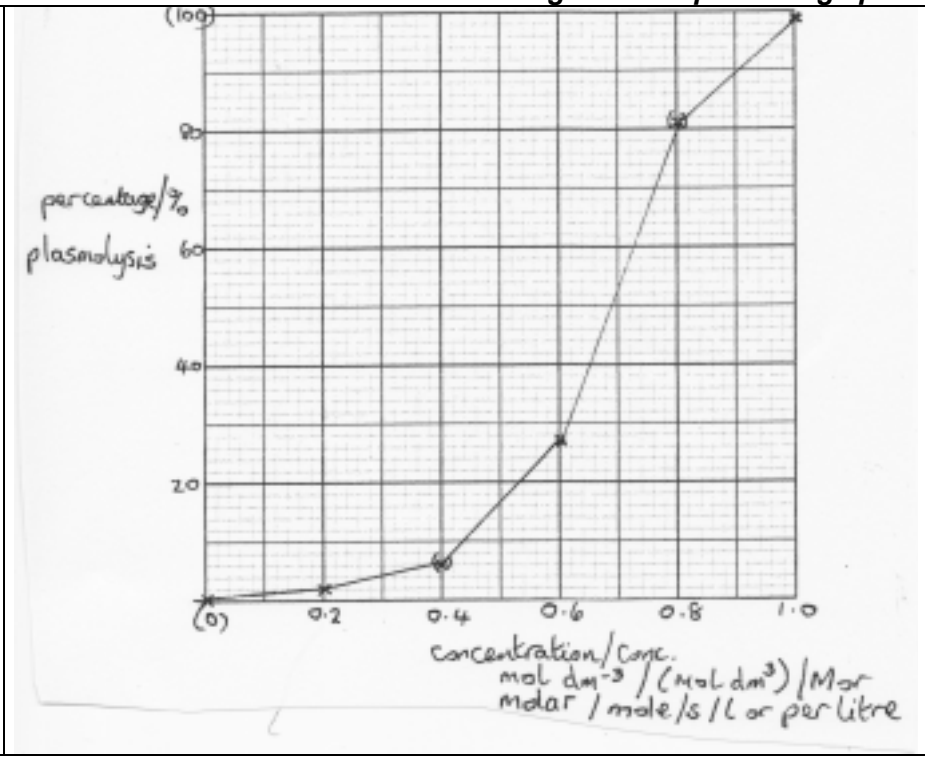
Question	Expected Answers		Additional Guidance	
Draw and label ONE cell in distilled water			2 MMO collection	
1 (a) (i)	one cell drawn (at high power), two lines for cell wall; correct cell structure and <u>cell wall</u> and <u>nucleus</u> labelled correctly;		Ignore low power. Reject two or more cells together. Rej. if have additional organelles mitochondria, chloroplasts, Golgi.	**[2]**
Present your observations from the slides made from distilled water, T1 and T2			2 MMO decisions, 2 PDO recording	
1 (a) (ii)	**Either** single table, all cells drawn, column headings: solution/slide/(distilled) water/**W** and **T1** and **T2**; to left/across top, observations/feature/e.g. to right/ underneath/clear what is recorded in the boxes; **T1** cell membranes/cytoplasm pulled away from cell wall/plasmolysed; **T2** granules/particles in cell/more plasmolysed/destroyed/stained/coloured e.g. brown/black/AW;	**Or** when **only** drawings given three drawings, labelled (distilled) water/**W**, **T1** and **T2**; clear that cell walls and cell membranes are all different (for water, **T1** and **T2**); **T1** cell membranes/cytoplasm pulled away from cell wall/plasmolysed; **T2** granules/particles in cell/<u>more</u> plasmolysed/destroyed/stained/coloured e.g. brown/black/AW;	No outer boundary needed for table. Reject cells shrink or become smaller. Accept vacuole shrinking or drawn. Allow any description that cells have been destroyed/cell membranes ruptured/disorganised/ leakage of cell. Reject cell walls broken down.	**[4]**

Explain observations from water, T1 and T2.					
1 (a) (iii)	**Idea of** 1. high/less negative water potential to lower/more negative water potential/down water potential gradient Any two of: 2. (in water)idea of water has moved in/no net movement; 3. (in **T1**/**T2**) idea of water has moved out; 4. (in **T2**/lead nitrate) killed/destroyed cells/toxic/effect described/AW;	**AND** by osmosis at any point;	In correct context. Accept ψ. Solute/osmotic potential is ignored but must be the same as water potential i.e. from high to low, so reject pt1 if wrong way. Ignore hypotonic and hypertonic but must be in correct context if used. Must be correct with the candidate's own results. Reject cell wall destroyed.		**[2 max]**
Identify two sources of error in this experiment			2 ACE interpretation		
1 (a) (iv)	**Two from** evaporation from solutions/concentration of solution changes; cells left <u>different</u> lengths of time/too short a time/not long enough; AVP; volume/no. of drops used; **or** different or different onions/parts of onion/not fresh/have been frozen/stored;		Reject not immersed. Reject should be same time –not an error. Reject amount.	Mark for any correct. Reject improvements.	**[2 max]**

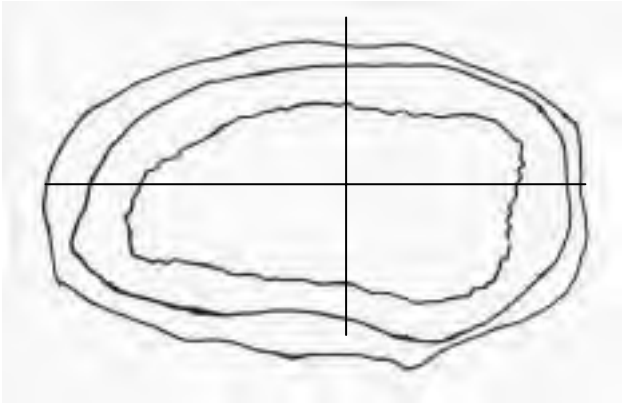
Suggest how you could modify the experiment to investigate the effect of lead nitrate.			3 ACE improvement	
1 (b)	more/serial dilution concentrations of lead nitrate; Then any **TWO** from at least 3 specified lead nitrate concentrations; repeat each concentration/more than one strip (per concentration); keep the time the same/give an example of a time/longer time; keep the volume **AND** method /use graduated pipette/no.of drops the same/AW; same onion/same part/fresh; detailed measurement method/use of eyepiece graticule to measure plasmoylsed cells/count number of plasmolysed cells in a sample of 20 or more;	Reject shorter time.		**[2 max]**

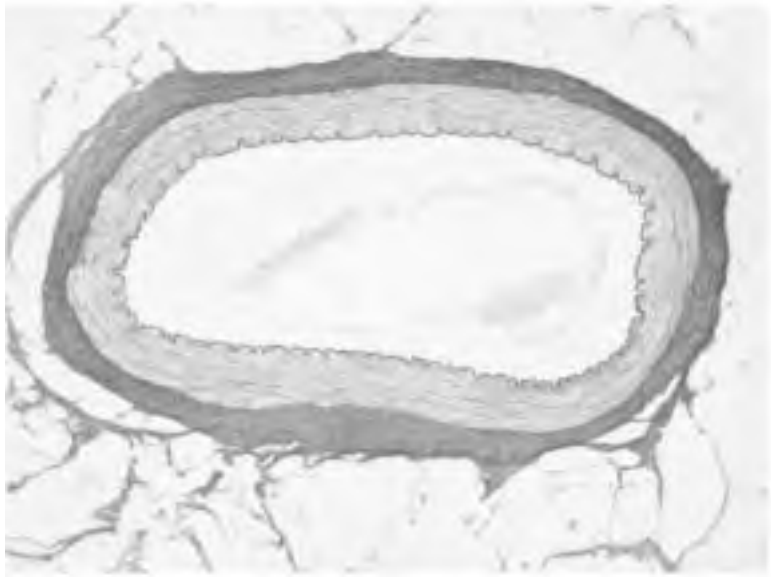
Complete the Table 1.2 by calculating the missing values		PDO displa	
1 (c) (i)	**6,81;**	*A whole numbers only and both correct*	
Plot a graph of concentration of sodium chloride against the percentage plasmolysis of the cells		PDO layout	
1 (c) (ii)			**[3]**

O	x-axis conc, mol dm^{-3}/M or molar/mole(s)/l or per litre	**AND** y-axis percentage/% plasmolysis;	Rej. mol/dm^{-3} and mol dm^3.	[1]
S/P	scale as shown/y axis 25 to 2cms, allow no 0 marked	**AND** plotting crosses or dot in circle ONLY **AND** 0.0, 0.2 and 0.6 and1.0 plotted correctly; no larger then **X** or **O** plots 0.2 must be on horizontal line, 0.2 and 0.6 and 1.0 between the horizontal lines. Ignore incorrect calculated mean plots i.e. 0.4 and 0.8.	Rej. blobs in or out of circle.	[1]
L	either ruled lines joining each point or smooth curve through 0; no thicker than _____ no feathery line, line must go to 0		Rej. any extrapolation beyond either axis.	[1]

Question	Expected Answers	Additional Guidance	
State concentration at which 50% plasmolysis occurred		1 ACE interpretation	
1 (c) (iii)	take reading from candidates own graph, **AND** must have units;	Allow two decimal places. Ecf units from graph.	**[1]**
'The more concentrated the solution the more plasmolysed the cells become' ***draw conclusion include whether the data support the hypothesis and produce a revised hypothesis if necessary***		2 ACE conclusion	
1 (d)	General statement : Either support or no support or partial support for the hypothesis or writes a conclusion which states the hypothesis; quotes 2 sets of figs. with both axes; **OR** idea that up to 0.4 /low concentration only small % plasmolysed/or % plasmolysis does not increase evenly with increasing concentration/or levels off at high concentration;	Needs clear statement. Reject supports conclusion. Idea of correct relationship may quote figures to get same idea. Reject all/100% plasmolysed.	**[2]**

Question	Expected Answers	Additional Guidance		
Draw a LARGE, LOW-POWER plan diagram of photomicrograph fig 2.1. (artery)		1 MMO collection, 3 PDO layout		
2 (a) (i)	sharp, clear unbroken lines, height no more than two thirds the length ; no cells, no shading, larger than 6 cm in any direction; at least three lines (plus very thin inner layer if shown); uneven all the way round and one solid inner line;	Outer two lines **only** 	No more than 2 errors. Actual = 5.5 cm to 9 cm.	**[4]**





Use this information to calculate the actual width of the lumen.		2 MMO collection, 1 PDO recording, 1 PDO displa	
2 (a) (ii)	Each division on stage scale is 0.1 mm = V **First mark** Reject any measurements given for mark points 1 and 2. Accept units or divisions.		

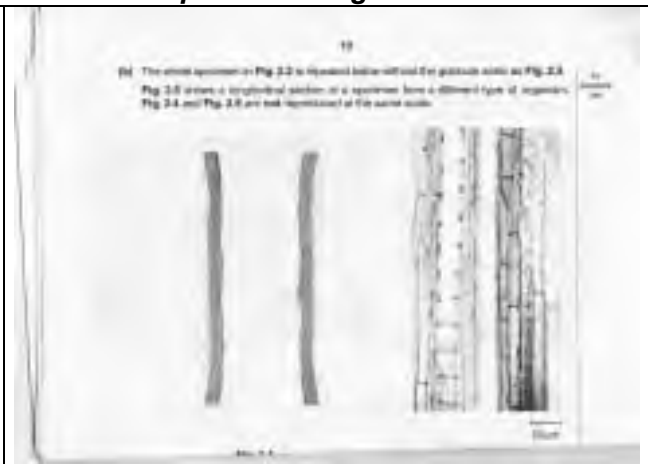
First Mark	No. of eyepiece grat. W	7		14		28				29			
Second Mark	No. of eyepiece grat. Y	4.5	9.0	9	18	7	18	25	36	7	18	25	36
	No on stage micrometer Z	5	10	5	10	2	5	7	10	2	5	7	10
Third Mark	Show logical reasoning	**EITHER** Z divided by Y first, then proceed and allow multiplication by either V and then W, or W and then V, even though not strictly the correct reasoning. Ignore answer and units. Rej. if additional figs. even if x1.				**OR** Z x V AND divided by Y. followed by x W Ignore answer and units. Rej. if additional figs. even if x1.							
Fourth Mark	Need NOT be the correct answer	Either between 100 and 999 with μm Allow standard form if correct. Reject metres.				OR answer between 0.1 and 0.99 with mm; Allow standard form if correct. Reject metres.							

First two marks are for – collecting the correct data. The third mark is for display – showing clear reasoning in the calculation.
Fourth mark is for recording – use of the correct units. **[4]**

Suggest how an error in measuring the lumen could occur		1 ACE interpretation	
2 (a) (iii)	not knowing where edge is/lumen irregular shape/preparation squashed/only 1 measurement/thicknesses of lines(stage micrometer)/between divisions on eyepiece graticule/one scale line is not at edge of lumen/focussing of both scales/lining up the scales;	Ignore parallax error	**[1]**

Compare and contrast specimens Fig. 2.4 and 2.5.	2 MMO collection 1 PDO recording 2 ACE interpretatio	

2 (b) (i)



organised as a table/Venn diagram/ruled boxes connected, correctly headed;
comparative statements opposite each other;

Must have at least one similarity.

	Fig. 2.4	Fig. 2.5
both have	lumen/central space;	
lumens	larger,	smaller;
number (lumen/tubes)	single/one,	more/lots;
cells /cell walls/end walls	none/absent,	present;
bands	absent/none	present;
Ref. pits/circles/spots	none,	present;

Accept tubes/vessels as alternative to lumen.
Reject ref. to Fig. 2.4 having cells – not visible.

Reject uses
Rej. ref. lignin/cellulose with walls or bands.

[5]

Suggest one feature which indicates the Fig 2.5 is a plant			ACE conclusio		
2 (b) (ii)	have cell walls/xylem/phloem/sieve tube (element)/companion cell/pits/rings;		Ignore cellulose, lignin, vessel on own. Reject sieve plates.		[1]
Make a labelled drawing of 5 representative cells.			1 MMO collection, 3 MMO decisions		
2 (b) (iii)	5 shown on Fig.; drawn 3 diverse cells; 3 different sizes; at least 1 cell drawn with bands/parts of bands/pits;	**AND** longer than wide;	Reject point 1 if more than 5 marked or drawn. Entire cells or open tubes. **Ignore labels.**	Reject points 2, 3 and 4 if more than 2 TS or textbook. Max 1 point, 1 only	**[1]** **[3]**