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

9700/34 Paper 32 (Advanced Practical Skills 2), maximum raw mark 40

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UNIVERSITY of CAMBRIDGE
International Examinations

Question		Expected Answers		Additional guidance
1 (a) (i)		**Show clearly on Fig.1.1 what you would expect the contents of the test-tube to look like after 10 minutes. You will gain marks for clear labels.** **[2]**		
ACE conclusions 2	[1]	line drawn level with half way mark	AND more yeast drawn towards bottom of tube or another line to show a separate region;	
	[1]	one label or description;		
	(ii)	**State the time intervals you will use and what you will use the graph paper scale to measure.** **[2]**		
MMO decisions 2	[1]	uses 10 minutes	**AND** at least three times (including 10) even time intervals between consecutive three;	
		Or one/two/two and a half minutes or two mins 30s intervals; **Reject** if does not divide into 10 e.g. 3 minutes		
	[1]	measures or describes measuring e.g. (use graph paper) to find distance/length	**AND** description of what is measured; e.g. from halfway mark to top of sediment or bottom of tube to top of sediment/or from Fig. 1.1/AW;	
	(iii)	**…decide on the volume of Y and the volume of each buffer solution to use. Describe all the steps you used to work out the volume.** **[1]** **State the volume of Y and the volume of each buffer solution to use.** **[1]**		
MMO decisions 2	[1]	describes all following steps • takes into account to (half-way) line • takes into account 1 cm^3 calcium chloride/C • divides by half;		**Allow** • to 0.1 cm^3
	[1]	volume of Y <u>equal</u> to volume of buffer AND cm^3 / ml on both;		

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Question		Expected Answers		Additional guidance
(iv)		**Prepare the space below and record your observations.**		**[5]**
PDO recording 2	[1]	table with all cells drawn	**AND** heading (top or left) pH;	
	[1]	**Reject** • if units anywhere else except headings • t or T		
		(headings) time min(utes)	**AND** length/depth/height/AW with mm or cm;	
MMO collection 2	[1]	different results/observations for different pH minimum 2 pH;		
	[1]	recorded to 1 mm or 0.1 cm only;		**Reject** if no units/if mixed units **Allow as error carried forward** whole or 0.5 units on graph paper
MMO decision 1	[1]	repeats recorded;		
(v)		**Use your results to state the effect of pH on the yeast suspension.**		**[1]**
ACE conclusion 1	[1]	(yeast settles) more / higher rate of • at some pH • or correct example of pH with results;		**Reject** activity

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Question		Expected Answers		Additional guidance
(vi)		**Identify *one* significant source of error in this experiment.**		**[1]**
ACE interpretation max 1		cause of error	error	
	[1]	(dependent variable) boundary/ top of layers or bubbles on surface	idea of finding measuring seeing determining judging;	
	[1]	or graph paper and test-tube	lining up;	
	[1]	(standardised variables) test-tubes sizes/ mixing/adding/readings	not constant not same/different/vary cannot be done at same time;	max 1
(vi)		**State the degree of uncertainty of using the graph paper scale as a measure.**		**[1]**
ACE interpretation 1	[1]	+/– 2 mm;		**Reject** % error **Allow** +/– 0.2 cm or +/– whole or 1 graph paper unit

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Question		Expected Answers	Additional guidance
(vii)	**Suggest how you could make this investigation as accurate as possible … as reliable as possible**		**[3]**
ACE improvements max 3	C control of any relevant variable; [1] [1]	(for volumes) use measuring cylinder/burette/graduated pipettes or tubes or smaller (divisions)syringes Or hold tube vertical in retort stand/attach graph paper to tubes;	**Allow** for either accuracy or reliable
	A1 improving measurements to get a true value [1]	use ruler/graph paper, with smaller divisions/vernier calipers or colorimeter or collect and dry sediment or larger/more volumes so heights larger;	
	A2 [1]	set up each pH separately/stagger timing/longer time;	
	A3 [1]	more buffer solutions or examples of extra buffer/pH;	
	R1 improve method to get repeat data [1]	repeat or replicate;	
	R2 [1]	weigh out (initial) mass of yeast ;	max 3

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Question		Expected Answers		Additional guidance
(b) (i)		**Plot a graph of the data shown in Table 1.1.**		**[4]**
PDO layout 4	O [1]	*x*-axis calcium chloride/$CaCl_{(2)}$ conc(entration)(/) <u>m mol</u>	**Reject** t/T **AND** *y*-axis time (/) min;	Must have units
	S [1]	**Reject** if awkward scale 0.25 to 2 cm scale as 0.2 to 2 cm	**AND** 20 to 2 cm;	error carried forward if incorrect O then must use more than half provided grid in *x* and *y*
	P [1]	**Reject** • plotting if scale is awkward unless 0.25 • if only blobs/dots/blobs in circles. 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 – • <u>ruled lines plot to plot</u> extrapolation • not beyond *x*- or *y*-axis Ignore • if in context of data correct to go to 0,0 must be within 2 mm of 0 • if not correct in context of data then no extrapolation at either end of data.	**Reject** if any extrapolation beyond 0 or 1.0.
(ii)		**State the concentration of calcium chloride required for the yeast to sediment out at 40 minutes.**		**[1]**
MMO collection 1	[1]	correct reading of concentration to no more than 2 significant figures;		

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Question		Expected Answers			Additional guidance
				[Total: 22]	
2 (a) (i)		Select a large vascular bundle and draw a large plan diagram of the vascular bundle. Label the xylem tissue.			[5]
PDO layout 1	[1]	**Reject** if drawn over print of question			
		Reject thick lines • feathery lines • 4 'tails' or overlaps or gaps	**AND** no shading	**AND** uses most of the space provided;	
		clear, sharp, unbroken lines			
MMO collection 3	[1]	no cells drawn	**AND** draws only one vascular bundle;		
	[1]	(vascular bundle) shows an outline which encloses vascular bundle tissues;			
	[1]	(in one vascular bundle) wider at one end than the other (tapered) Or at least three regions shown;			
MMO decision 1	[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 xylem to region middle to tapered end;			

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Question		Expected Answers			Additional guidance
(ii) Make a high-power drawing of one trichome, with at least three cells, and one epidermal cell on each side touching the base of the trichome. Label the trichome.					**[5]**
PDO layout 1	[1]	**Reject** if drawn over print of question			
		Reject • thick lines – than on grid • feathery lines • 5 'tails' or overlaps or gaps if double cell walls	**AND** no shading	**AND** uses most of the space provided;	
		clear, sharp, unbroken lines in cell outlines			
MMO collection 2	[1]	5, 6 or 7 cells;			
	[1]	cells drawn as a touching group	**AND** cell walls as double lines with middle lamella in 3 adjacent (epidermal) cells;		
MMO decisions 2	[1]	(cell or tip of trichome or broken) pointed or rounded Or (in trichome) one larger cell or large base cell;			
	[1]	**Reject** • if any label is biologically incorrect e.g. labels belonging to other organs or animals. • label within drawn area			
		correct label with label line to trichome;			

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Question		Expected Answers	Additional guidance
(b) (i)		**Calculate the ratio of the diameter of the vascular tissue labelled X to the total diameter of the plant organ labelled Y.**	**[3]**
PDO recording 1	[1]	(measurements to same degree of precision) whole mm or 0.5 mm;	**Allow** 0.1 cm or 0.15 cm
PDO display 2	[1]	shows larger figure to or: smaller figure or larger figure divided by smaller figure;	
	[1]	rounds to correct ratio e.g. 125:69 or leaves as fraction e.g. 125/69;	**Reject** if include units in answer **Reject** 1.86:1

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Question		Expected Answers			Additional guidance
(ii)		**Prepare the space below so that it suitable for you to describe the observable differences between M1 and Fig. 2.1.**			**[5]**
PDO recording 1	[1]	organise as a table or Venn diagram or ruled connected boxes	headed M1 and Fig. 2.1	differences opposite each other;	M1 | Fig. 2.1
ACE interpretation 4		**Reject** tick and cross without a key –			if no organisation then mark points only if in same sentence or following sentences. **Allow** differences even if not opposite each other. **Allow** difference on one side if e.g. use more or –er.
		feature	M1	Fig. 2.1	
	[1]	shape	irregular/wavy/uneven/ starshape/swellings	oval/circular; Ignore regular	
	[1]	pith/hollow space/empty/ lumen/cavity **Ignore** vacuole	present/yes	absent/no;	
	[1]	vascular tissue/bundle/ xylem	bundles/around edge/ scattered	stele/in centre;	
	[1]	number of vascular bundles/ tissue/xylem	(vascular bundles) more/(xylem)less	(vascular bundles) less/(xylem)lots/more;	
	[1]	thickened layer/stained layer/collenchyma/AW	present	absent;	
	[1]	outer epidermis	thick	thin;	
	[1]		continuous/smooth	rubbing off/flaky/AW;	
	[1]	trichomes/hairs	present/yes/some/more **Allow** less	absent/no/none/fewer; **Allow** more	
	[1]	trichome shape	hair-like/pointed	irregular;	max 4
				[Total: 18]	

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