

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

9700/31

Paper 31 (Advanced Practical Skills 1),
maximum raw mark 40

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Question	Expected Answers	Marks	Additional Guidance
1 (a) (i)	Prepare the space below and record your results. [6]		
PDO recording 2	1. table with all cells drawn	[1]	
	2. Reject <ul style="list-style-type: none"> • if units in body of table • t or T • additional columns details of method (heading) time with units;	[1]	
MMO collection 2	3. collects data as times for all four pieces of potato;	[1]	
	4. (A) recorded time different from other pieces;	[1]	
MMO decisions 2	5. Reject units must be clear so 1.2 or 1:2 must have min and s or secs records all times correctly as whole seconds or minutes with seconds; UNITS must be clear somewhere	[1]	
	6. replicate recorded;	[1]	

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(ii) Identify two significant sources of error in your investigation.		[2]	
Reject temperature	Error		
1. timing /dropping/distance long pieces of potato or shorter pieces	not accurate/delayed/different; different height to top there is shorter distance to surface longer distance to surface;		
2. (pieces of) potato	stick to sides/bottom of tube don't sink to bottom;	[max 1]	
3. (standardised variables) potato or position in potato or age or storage	not same different/variety old;		
4. water left on potato	not same/different;		
5. (test)-tubes	not same size/height;		
6. hydrogen peroxide	concentration changes/decreases evaporates/degenerates/breaksdown;	[max 1]	
7. (independent variable) lengths/size/surface areas/volumes	not same different vary;	[max 1]	
			max 2 overall

ACE Interpretation MAX 2

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(ii) Complete table 1.1. by calculating the missing value.				[1]		[1]
ACE 1 Interpretation	7; Allow 9.					
	(iii) Plot a graph of the data shown in Table 1.1.					
PDO layout 4	O	x-axis	pH	Reject t		Must have units
				AND y-axis time/s or seconds;	[1]	
	S	Reject awkward scale				Must use more than half grid in x and y.
		scale as each pH to 2 cm		AND 5 seconds to 2 cm;	[1]	
	P	Reject plotting if scale is awkward if only dots/blobs or blobs in circles Allow cross in circle correct plotting using crosses/dots in circle only;		intersection of cross must be clear to show plot. NO cross must touch the line for the next square.	[1]	
L	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 – • ruled lines plot to plot • curve through all plots extrapolation • not beyond x- or y-axis	[1]	Reject if any extrapolation	

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(iv) Explain the relationship between pH and the enzyme catalase shown in the data. [3]	
ACE conclusion 3	(in correct context of pH and activity (below 7/acid or above 7/alkali))
	effect on structure of protein/enzyme/active site
	or bonds
	changed/altered/destroyed/no longer complementary
(below 7 or above 7) do not accept collision(s)/react	[1]
fewer ECSs (enzyme substrate complexes) or less/no substrate can bind/combine/attach fit into enzyme/active site;	[1]
(below 7/above 7) (enzymes) denatured;	[1]
[Total: 20]	

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2	Make a large, high-power drawing to show the details of five of the structures specialised for gas exchange (alveoli). The walls of one alveolus must be touching the walls of at least two other alveoli. Label where gas exchange takes place. [5]	PDO layout 1	1.	Reject if drawn over the print of question			
				Reject	<ul style="list-style-type: none"> thick lines feathery lines 2 'tails' or overlaps or gaps 	<p>AND</p> <p>no shading</p> <p>AND</p> <p>use most of the space provided;</p>	[1]
				clear, sharp, unbroken continuous lines			
				five structures drawn	AND at least 3 structures touching;	[1]	
				at least three alveoli different shapes/sizes	AND thickness of one wall irregular;	[1]	
(walls with) at least 2 cells drawn	AND at least one nucleus drawn;	[1]					
MMO decisions 2		MMO collection 2	5.	Reject	<ul style="list-style-type: none"> if any label is biologically incorrect e.g. cell wall. label within drawn area into centre of alveolus 		
				correct label with label line to wall of alveolus;	[1]		

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(b) (i) Draw a large plan diagram of the bronchiole shown in Fig. 2.1. Label the lumen.				[5]
PDO layout 1	1.	Reject if drawn over the print of question		
		Reject <ul style="list-style-type: none"> thick lines – than grid feathery lines 3 'tails' or overlaps or gaps 		
		AND clear, sharp, unbroken lines	AND no shading	AND use most of space provided;
		AND no cells drawn	AND width of base of fold greater than width of tip of fold;	[1]
MMO collection 2	2.			[1]
	3.	13 to 15 folds in lumen;		[1]
MMO decisions 2	4.	shows indentation;		[1]
	5.	Reject <ul style="list-style-type: none"> if any label is biologically incorrect e.g. cell wall. label within drawn area 		
		correct label with label line to lumen;		[1]

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(ii) Calculate the ratio of the mean thickness of the outer layer of the bronchiole compared to the mean thickness of the wall of the blood vessel shown in Fig. 2.1. [4]			
MMO collection 2	<p>Reject If lines not shown on both bronchiole and blood vessel</p> <p>shows one measurement on each of bronchiole and blood vessel;</p>	[1]	
	<p>Reject If no units If not both same units If metres or converted to metres or micrometres or standard form</p> <p>(one bronchiole measured) to nearest 0.5 mm</p> <p>AND mm;</p>	[1]	
	<p>shows mean adds measurements</p> <p>AND shows division by number of measurements;</p>	[1]	
MMO decisions 2	<p>Reject</p> <ul style="list-style-type: none"> • If given as decimal :1 • If smaller to larger number • If include units <p>answer is larger whole number to smaller whole number or leaves as fraction;</p>	[1]	Either must be to lowest common denominator

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(iii) Prepare the space below so that it is suitable for you to compare the observable features of the bronchiole and blood vessel in the photomicrograph Fig. 2.1.				
PDO recording 2	organise as a table/ Venn diagram/ ruled boxes	AND headed <u>bronchiole</u> and <u>blood vessel</u>	AND differences opposite each other;	
	heading for similarities/similarity/compare (with contrast)/same;			
MMO decision 1	attempted one similarity ;			
ACE interpretation 3	Do not accept			
	• tick and cross without a key			
	• diagrams			
	• 3-D description			
	• incorrect biological terms e.g. endodermis			
		bronchiole	blood vessel	
		similarity		
	S max 1	lumen	smooth muscle	epithelium
		feature		
	D1	lumen shape	irregular/lobed/folded	smooth/oval/not folded;
D2	lumen size	small(er)	larg(er);	
D3	fold	many/present	none/absent;	
D4	no. of layers	more/2	less/1;	
D5	outer/muscle layer/wall	thick(er)/wide(er)	thin(er)/narrow(er);	
D6	overall shape	circular/round	oval/squashed circle;	
			[max 3]	
			[Total: 20]	