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BIOLOGY

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Paper 5 Practical Test

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MARK SCHEME

Maximum Mark: 40

Published

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Mark schemes will use these abbreviations

- ; separates marking points
- / alternatives
- I ignore
- R reject
- A accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- AVP any valid point
- **ecf** credit a correct statement / calculation that follows a previous wrong response
- **ora** or reverse argument
- () the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

Question	Answer	Marks	Guidance
1(a)(i)	table drawn with minimum two columns and a line between heading and data ; appropriate column / row headings <u>and</u> appropriate units for percentage concentration of amylase time for starch to be digested / minutes ; three correct amylase concentration recorded in any order; table shows 2 columns for each concentration with times recorded; correct trend shown by results ;	5	R if units in body of table I units in the body of the table (expect 3% faster 2% faster 1%)
1(a)(ii)	idea that iodine remains brown / yellow / orange / no longer changes colour;	1	
1(a)(iii)	(remove a sample from each of the test-tubes and) add (equal volume of) Benedict's solution ; heat (in a water-bath) ;	2	

Question	Answer	Marks	Guidance												
1(b)(i)	<table><tr><td><i>variable</i></td><td><i>controlled by</i></td></tr><tr><td>(volume of) starch (solution)</td><td>5 cm³/ same volume</td></tr><tr><td>(concentration of) starch solution</td><td>same concentration / used throughout</td></tr><tr><td><u>volume</u> of enzyme / amylase</td><td>1 cm³ used</td></tr><tr><td>temperature</td><td>kept at 55–60 ° C</td></tr><tr><td>time</td><td>3 minutes for incubation / 5 minutes for testing the enzyme</td></tr></table> ; ;	<i>variable</i>	<i>controlled by</i>	(volume of) starch (solution)	5 cm ³ / same volume	(concentration of) starch solution	same concentration / used throughout	<u>volume</u> of enzyme / amylase	1 cm ³ used	temperature	kept at 55–60 ° C	time	3 minutes for incubation / 5 minutes for testing the enzyme	2	one mark for the variable, one mark for method of controlling which must related I amount of enzyme I same temperature
<i>variable</i>	<i>controlled by</i>														
(volume of) starch (solution)	5 cm ³ / same volume														
(concentration of) starch solution	same concentration / used throughout														
<u>volume</u> of enzyme / amylase	1 cm ³ used														
temperature	kept at 55–60 ° C														
time	3 minutes for incubation / 5 minutes for testing the enzyme														
1(b)(ii)	so the contents of all the test-tubes reach the same temperature / AW ;	1													
1(b)(iii)	to show that there is no starch in the enzyme solution / to show enzyme does not react with starch / AW ;	1													

Question	Answer	Marks	Guidance
1(c)(i)	idea of judging the colour of the endpoint by eye ; idea of doing several procedures at the same time ; idea that only one drop for both spots of iodine (might give different volumes) ; idea that 1 drop for both spots (could cause contamination); idea of: two samples needed at the same time with the same rod, (then there will be a difference in the actual time) ; idea of: size of drops (from either starch or iodine) added varies ;	2	

Question	Answer	Marks	Guidance																
1(c)(ii)	<table><tr><td><i>e.g. of error</i></td><td><i>improvement</i></td></tr><tr><td>judging colour by eye</td><td>have a standard colour for comparison</td></tr><tr><td>timing and sampling at same time</td><td>start timer then mix and sample and note time when first sample taken</td></tr><tr><td>one drop for two samples</td><td>use a dropper with enough for both samples / have two glass rods</td></tr><tr><td>contamination</td><td>use separate glass rods</td></tr><tr><td>doing two samples at the same time</td><td>take a sample from each tube at the same time with different glass rod / do trials separately</td></tr><tr><td>size of drop for either</td><td>use a syringe / pipette</td></tr><tr><td>time not long enough for enzyme to work</td><td>keep going until all starch has gone</td></tr></table> ;	<i>e.g. of error</i>	<i>improvement</i>	judging colour by eye	have a standard colour for comparison	timing and sampling at same time	start timer then mix and sample and note time when first sample taken	one drop for two samples	use a dropper with enough for both samples / have two glass rods	contamination	use separate glass rods	doing two samples at the same time	take a sample from each tube at the same time with different glass rod / do trials separately	size of drop for either	use a syringe / pipette	time not long enough for enzyme to work	keep going until all starch has gone	1	improvement must match one of the errors from 1(c)(i)
<i>e.g. of error</i>	<i>improvement</i>																		
judging colour by eye	have a standard colour for comparison																		
timing and sampling at same time	start timer then mix and sample and note time when first sample taken																		
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time not long enough for enzyme to work	keep going until all starch has gone																		
1(d)(i)	300 (mg) ;;;	3	if answer incorrect one mark for correct unit and one mark for correct working: $(3 \cdot 2 \cdot 0.5) \div 3\text{cm}^3$ is max 2																
1(d)(ii)	3.4 ;	1	ecf from 1(d)(i)																

Question	Answer	Marks	Guidance
1(d)(iii)	A (xes) – labelled with units ; S (cale) – even scale ; P (lot) – all given points plotted accurately $\pm \frac{1}{2}$ square ; L (ines) – each line drawn (with a ruler) point to point / smooth free-hand curve through points ;	4	

Question	Answer	Marks	Guidance																		
2(a)(i)	<table><tr><td><i>feature</i></td><td><i>epidermis cell</i></td><td><i>guard cell</i></td></tr><tr><td>shape</td><td>wavy outline</td><td>oval / bean, shaped / AW ;</td></tr><tr><td>chloroplasts / cell inclusions</td><td>absent</td><td>present ;</td></tr><tr><td>cell wall</td><td>thin</td><td>thick / thick on inside edge ;</td></tr><tr><td>cell size</td><td>large</td><td>small ;</td></tr><tr><td>cell arrangement</td><td>not paired</td><td>pairs ;</td></tr></table>	<i>feature</i>	<i>epidermis cell</i>	<i>guard cell</i>	shape	wavy outline	oval / bean, shaped / AW ;	chloroplasts / cell inclusions	absent	present ;	cell wall	thin	thick / thick on inside edge ;	cell size	large	small ;	cell arrangement	not paired	pairs ;	2	one mark per correct row
<i>feature</i>	<i>epidermis cell</i>	<i>guard cell</i>																			
shape	wavy outline	oval / bean, shaped / AW ;																			
chloroplasts / cell inclusions	absent	present ;																			
cell wall	thin	thick / thick on inside edge ;																			
cell size	large	small ;																			
cell arrangement	not paired	pairs ;																			
2(a)(ii)	outline single clear continuous lines, no shading, 2 cells drawn ; drawing occupies at least 50 mm along X–Y ; stoma width is about one sixth of total width of XY ; cell walls drawn as double line not too wide ;	4																			
2(b)	(diameter of guard cells and stomata) value within the range of 31 – 34 mm ; line drawn on candidates diagram and measurement ±1 mm; calculated magnification ;	3																			

Question	Answer	Marks	Guidance
2(c)	absorption (rate) is lower than transpiration 09:00 to 18:00 / during the day / during the light ora ; absorption (rate) is higher than transpiration from 18:00 to 06:00 / at night / in the dark ora ; absorption peaks at 18.00 and transpiration peaks between 14:00 to 16:00 / absorption rate peaks after transpiration rate ora ; transpiration rate increases faster than absorption rate ; comparative data quote for both curves ; rate of absorption and rate transpiration are equal between 08:00 to 09:00 / at 18:00 ;	2	A times in am and pm equivalents A some variation in the 09:00 time

Question	Answer	Marks	Guidance
2(d)	1 ref. to using at least 3 temperatures / humidity ; 2 ref. to (three) values for temperature / humidity ; 3 ref. to means of obtaining the different temperatures / humidity; 4 ref. to checking that the apparatus does not leak ; 5 ref. to one controlled variable ; 6 ref. to second controlled variable; 7 ref. to measuring distance moved (by the air) along capillary ; 8 ref. to fixed time / timing for a fixed distance ; 9 ref. to refilling capillary between measurements ; 10 ref. to at least two replicates ; 11 use same shoot / same number of leaves / same area of leaves ; 12 AVP ; e.g. detail of apparatus set up e.g. cutting shoot underwater / drying leaves allow apparatus to equilibrate before taking any readings	6	A high, medium and low for humidity and temperature e.g. for mp 5 and mp 6: light intensity, light wavelength, wind speed, temperature or humidity