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**BIOLOGY**

**0610/52**

Paper 5 Practical Test

**October/November 2017**

MARK SCHEME

Maximum Mark: 40

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**Published**

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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This document consists of **10** printed pages.

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

Question	Answer	Marks	Guidance														
1(b)(i)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;"><i>variable</i></th> <th style="text-align: left; padding: 2px;"><i>controlled by</i></th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">(volume of) starch (solution)</td> <td style="padding: 2px;">5 cm<sup>3</sup>/ same volume</td> </tr> <tr> <td style="padding: 2px;">(concentration of) starch solution</td> <td style="padding: 2px;">same concentration / used throughout</td> </tr> <tr> <td style="padding: 2px;"><u>volume</u> of enzyme / amylase</td> <td style="padding: 2px;">1 cm<sup>3</sup> used</td> </tr> <tr> <td style="padding: 2px;">temperature</td> <td style="padding: 2px;">kept at 55–60 ° C</td> </tr> <tr> <td style="padding: 2px;">time</td> <td style="padding: 2px;">3 minutes for incubation / 5 minutes for testing the enzyme</td> </tr> <tr> <td style="text-align: center; padding: 2px;">;</td> <td style="text-align: center; padding: 2px;">;</td> </tr> </tbody> </table>	<i>variable</i>	<i>controlled by</i>	(volume of) starch (solution)	5 cm <sup>3</sup> / same volume	(concentration of) starch solution	same concentration / used throughout	<u>volume</u> of enzyme / amylase	1 cm <sup>3</sup> used	temperature	kept at 55–60 ° C	time	3 minutes for incubation / 5 minutes for testing the enzyme	;	;	<b>2</b>	<p>one mark for the variable, one mark for method of controlling which must related</p> <p><b>I</b> amount of enzyme</p> <p><b>I</b> same temperature</p>
<i>variable</i>	<i>controlled by</i>																
(volume of) starch (solution)	5 cm <sup>3</sup> / same volume																
(concentration of) starch solution	same concentration / used throughout																
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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 ;	<b>1</b>															
1(b)(iii)	to show that there is no starch in the enzyme solution / to show enzyme does not react with starch / AW ;	<b>1</b>															

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 border="1"> <tr> <td data-bbox="344 248 759 300"><i>e.g. of error</i></td> <td data-bbox="759 248 1173 300"><i>improvement</i></td> </tr> <tr> <td data-bbox="344 300 759 384">judging colour by eye</td> <td data-bbox="759 300 1173 384">have a standard colour for comparison</td> </tr> <tr> <td data-bbox="344 384 759 504">timing and sampling at same time</td> <td data-bbox="759 384 1173 504">start timer then mix and sample and note time when first sample taken</td> </tr> <tr> <td data-bbox="344 504 759 620">one drop for two samples</td> <td data-bbox="759 504 1173 620">use a dropper with enough for both samples / have two glass rods</td> </tr> <tr> <td data-bbox="344 620 759 671">contamination</td> <td data-bbox="759 620 1173 671">use separate glass rods</td> </tr> <tr> <td data-bbox="344 671 759 823">doing two samples at the same time</td> <td data-bbox="759 671 1173 823">take a sample from each tube at the same time with different glass rod / do trials separately</td> </tr> <tr> <td data-bbox="344 823 759 908">size of drop for either</td> <td data-bbox="759 823 1173 908">use a syringe / pipette</td> </tr> <tr> <td data-bbox="344 908 759 992">time not long enough for enzyme to work</td> <td data-bbox="759 908 1173 992">keep going until all starch has gone</td> </tr> </table> <p style="text-align: right;">;</p>	<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 <b>1(c)(i)</b>
<i>e.g. of error</i>	<i>improvement</i>																		
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1(d)(i)	300 (mg) ;;;	3	if answer incorrect one mark for correct unit and one mark for correct working: $(3 \times 2 \times 0.5) \div 3 \text{ cm}^3$ is max 2																
1(d)(ii)	3.4 ;	1	<b>ecf</b> from <b>1(d)(i)</b>																

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

Question	Answer	Marks	Guidance																		
2(a)(i)	<table border="1"> <thead> <tr> <th data-bbox="344 248 607 300"><i>feature</i></th> <th data-bbox="607 248 869 300"><i>epidermis cell</i></th> <th data-bbox="869 248 1176 300"><i>guard cell</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="344 300 607 384">shape</td> <td data-bbox="607 300 869 384">wavy outline</td> <td data-bbox="869 300 1176 384">oval/bean, shaped /AW ;</td> </tr> <tr> <td data-bbox="344 384 607 469">chloroplasts / cell inclusions</td> <td data-bbox="607 384 869 469">absent</td> <td data-bbox="869 384 1176 469">present ;</td> </tr> <tr> <td data-bbox="344 469 607 553">cell wall</td> <td data-bbox="607 469 869 553">thin</td> <td data-bbox="869 469 1176 553">thick / thick on inside edge ;</td> </tr> <tr> <td data-bbox="344 553 607 638">cell size</td> <td data-bbox="607 553 869 638">large</td> <td data-bbox="869 553 1176 638">small ;</td> </tr> <tr> <td data-bbox="344 638 607 722">cell arrangement</td> <td data-bbox="607 638 869 722">not paired</td> <td data-bbox="869 638 1176 722">pairs ;</td> </tr> </tbody> </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 ;																			
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2(a)(ii)	<p>outline single clear continuous lines, no shading, 2 cells drawn ;</p> <p>drawing occupies at least 50 mm along X–Y ;</p> <p>stoma width is about one sixth of total width of XY ;</p> <p>cell walls drawn as double line not too wide ;</p>	4																			
2(b)	<p>(diameter of guard cells and stomata) value within the range of 31 – 34 mm ;</p> <p>line drawn on candidates diagram <b>and</b> measurement <math>\pm 1</math> mm;</p> <p>calculated magnification ;</p>	3																			



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

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