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**BIOLOGY**

**0610/52**

Paper 5 Practical Test

**May/June 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 **8** 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)	table drawn with appropriate lines and number of cells ; column and row headings and appropriate units; three trials for <b>W</b> and three for <b>S</b> identified (e.g. by number and letter) ; correct trend ;	4	R if units are in the body of table
1(a)(ii)	conclusion fits with the candidate's results ;	1	
1(a)(iii)	gas / oxygen (produced) is trapped within the leaf space ; density is reduced / becomes lighter / buoyancy increases ;	1	
1(a)(iv)	<i>measured:</i> time taken for leaf disc to rise ;  <i>changed:</i> solution ;	2	A light intensity / distance of lamp from test tubes
1(a)(v)	size of leaf disc / AW ; number of leaf discs ; concentration of sodium hydrogencarbonate (solution) / 2% ; volume / height of, sodium hydrogencarbonate (solution) / liquid / water; plant species; light intensity / distance of the lamp ;	2	

Question	Answer	Marks	Guidance																		
1(a)(vi)	<table border="1"> <tr> <td data-bbox="304 264 799 316"><i>error</i> ;;</td> <td data-bbox="799 264 1290 316"><i>improvement</i> ;;</td> </tr> <tr> <td data-bbox="304 316 799 464">measuring height / not measuring volume / imprecise volume of sodium hydrogencarbonate / water</td> <td data-bbox="799 316 1290 464">use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette</td> </tr> <tr> <td data-bbox="304 464 799 584">leaf discs different distances from lamp / different light intensity / position of the lamp</td> <td data-bbox="799 464 1290 584">arrange equidistant / AW</td> </tr> <tr> <td data-bbox="304 584 799 703">determining when disc starts to rise is subjective</td> <td data-bbox="799 584 1290 703">time until leaf disc reaches the surface / or rises to a particular level</td> </tr> <tr> <td data-bbox="304 703 799 823">leaf disc did not sink</td> <td data-bbox="799 703 1290 823">use a greater number of leaf discs and measure time on only those which sank</td> </tr> <tr> <td data-bbox="304 823 799 874">timing multiple leaf discs</td> <td data-bbox="799 823 1290 874">stagger timing</td> </tr> <tr> <td data-bbox="304 874 799 959">heating of test-tubes by lamp</td> <td data-bbox="799 874 1290 959">heat-shield / water-bath / use LED lamp / AW</td> </tr> <tr> <td data-bbox="304 959 799 1078">leaf discs were destroyed</td> <td data-bbox="799 959 1290 1078">use fresh leaf discs / have more leaf discs in the sample and measure only those that rise</td> </tr> <tr> <td data-bbox="304 1078 799 1163">AVP</td> <td data-bbox="799 1078 1290 1163">matches AVP</td> </tr> </table>	<i>error</i> ;;	<i>improvement</i> ;;	measuring height / not measuring volume / imprecise volume of sodium hydrogencarbonate / water	use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette	leaf discs different distances from lamp / different light intensity / position of the lamp	arrange equidistant / AW	determining when disc starts to rise is subjective	time until leaf disc reaches the surface / or rises to a particular level	leaf disc did not sink	use a greater number of leaf discs and measure time on only those which sank	timing multiple leaf discs	stagger timing	heating of test-tubes by lamp	heat-shield / water-bath / use LED lamp / AW	leaf discs were destroyed	use fresh leaf discs / have more leaf discs in the sample and measure only those that rise	AVP	matches AVP	4	<p>each improvement must relate to the given error</p> <p><b>A</b> test-tube rack blocks light / AW</p>
<i>error</i> ;;	<i>improvement</i> ;;																				
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1(b)(i)	<p>X = 71 s ; Y = 229 s ;</p>	2	<p>max 1 if not rounded up to nearest whole number max 1 if both correct whole numbers but no units</p>																		

<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
1(b)(ii)	labelled axes with units ;  even scale and at least 50% of grid used for time axis ;  two correctly plotted bars ( $\pm\frac{1}{2}$ a small square), of equal width and separated by a space ;	<b>3</b>	<b>ecf</b> from <b>1(b)(i)</b>

Question	Answer	Marks	Guidance
2(a)(i)	<p><b>1</b> sun leaf / Fig 2.2, is thicker (overall) / has bigger cells; <b>ora</b></p> <p><b>2</b> sun leaf has a thicker palisade mesophyll layer / thicker spongy mesophyll / thicker mesophyll ; <b>ora</b></p> <p><b>3</b> sun leaf palisade layer is more tightly packed / denser ; <b>ora</b></p> <p><b>4</b> sun leaf has a thicker epidermis ; <b>ora</b></p> <p><b>5</b> sun leaf palisade <u>cells</u> are thinner / taller ; <b>ora</b></p> <p><b>6</b> sun leaf has larger air spaces ; <b>ora</b></p> <p><b>7</b> AVP e.g. sun leaf has a deeper / different shaped, vascular bundle ; <b>ora</b></p>	<b>2</b>	
2(a)(ii)	<p>Lines drawn that are clear and continuous ;</p> <p>Scale: to fill more than half the space ;</p> <p>Detail: 4 or 5 layers shown ;</p> <p>Proportion: palisade mesophyll layer is between third to a half of total mesophyll ;</p>	<b>4</b>	<b>R</b> shading / stippling / hatching / cells / ruled lines
2(a)(iii)	<p>19 <u>mm</u> (<math>\pm 1</math> mm) ;</p> <p><math>19 \div 130</math></p> <p>= 0.15 mm ;;</p>	<b>3</b>	<b>ecf</b> incorrect measurement of line <b>PQ</b> if answer incorrect, award 1 mark for correct working shown ( $19 \div 130$ )

Question	Answer	Marks	Guidance
2(b)(i)	$(70 - 105 =) 35(.00)$ ; $((35 \div 70) \times 100) = 50(.0)$ ;	2	
2(b)(ii)	comparative data quote in either section with units at least once ;  <i>supports hypothesis:</i> shade leaves are longer ; <b>ora</b>  <i>does not support hypothesis:</i> sun leaves are thicker ; <b>ora</b>	3	I larger or bigger  <b>A</b> sun leaves may be wider / width not measured / width is not given, so cannot calculate area ;
2(c)(i)	extinguish flame / do <b>not</b> use a Bunsen burner / no flames ;  use a water-bath / place ethanol in a test-tube in boiled water ;	1	
2(c)(ii)	to be able to see colour change / AW ;	1	

Question	Answer	Marks	Guidance
2(c)(iii)	<p><b>a</b> leaves from the same plant / species ;</p> <p><b>b</b> at least three leaves from sun and three from shade ;</p> <p><b>c</b> boil / heat in water ;</p> <p><b>d</b> heat in ethanol;</p> <p><b>e</b> rinse leaf;</p> <p><b>f</b> spread on a white tile</p> <p><b>g</b> add iodine solution ;</p> <p><b>h</b> positive test gives a blue-black colour ;</p> <p><b>i</b> detail of controlled variable, e.g. heated for same length of time / same volume or concentration of iodine (solution) / leaves picked at the same time ;</p>	<b>5</b>	<p>I de-starching leaves</p> <p>I use of a control</p> <p>I ref to lab safety</p>
	<b>Total:</b>	<b>21</b>	