Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **May/June 2017**

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

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Question	Answer	Marks	Guidance
1(a)(i)	one table drawn with appropriate lines and number of cells ; correct column and row headings with appropriate units ; ten correct values recorded in correct boxes ; correct conversion of minutes to seconds for all numbers ;	**4**	 **R** if units are in the body of table
1(a)(ii)	X = 71 s ; Y = 229 s ;	**2**	**A** correct times in minutes and seconds **ecf** from **1(a)(i)** for wrong conversion of minutes to seconds max 1 if not rounded up to nearest whole number max 1 if both correct whole numbers but no units
1(a)(iii)	labelled axes with units ; even scale and at least 50% of grid used for time axis ; two correctly plotted bars (±½ a small square), of equal width and separated by a space ;	**3**	 **ecf** from **1(a)(ii)**
1(a)(iv)	gas / oxygen (produced) is trapped within the leaf space ; density is reduced / becomes lighter / buoyancy increases ;	**1**	
1(a)(v)	to identify anomalies / for reliability / for repeatability / to calculate an average ;	**1**	
1(a)(vi)	*measured:* time taken for leaf disc to rise / rate of photosynthesis ; *changed:* location of plant / growing conditions of plant ;	**2**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(vii)</td><td>size of leaf disc / AW ;
concentration of sodium hydrogencarbonate (solution) / 2% ;
volume / height of, sodium hydrogencarbonate / solution ;
plant species ;
light intensity / distance of the lamp ;</td><td>2</td><td>I temperature / pH</td></tr>
<tr><td>1(b)</td><td><table>
<tr><td>error ;;</td><td>improvement ;;</td></tr>
<tr><td>measuring height / not measuring
volume / imprecise volume of sodium hydrogencarbonate</td><td>use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette</td></tr>
<tr><td>leaf discs different distances from lamp / different light intensities / position of lamp</td><td>arrange equidistant / do each test-tube separately / AW</td></tr>
<tr><td>determining when leaf disc starts to rise is subjective</td><td>time until leaf disc reaches, the surface / or rises to a particular level</td></tr>
<tr><td>timing multiple leaf discs</td><td>stagger timing</td></tr>
<tr><td>heating of test-tubes by lamp</td><td>heat-shield / LED lamps / water-bath / AW</td></tr>
</table></td><td>4</td><td>each improvement must relate to the given error

A test-tube rack blocks light / AW</td></tr>
</table>

Question	Answer	Marks	Guidance
2(a)(i)	**1** sun leaf / Fig 2.2, is thicker (overall) / has bigger cells; **ora** **2** sun leaf has a thicker palisade mesophyll layer / thicker spongy mesophyll / thicker mesophyll ; **ora** **3** sun leaf palisade layer is more tightly packed / denser ; **ora** **4** sun leaf has a thicker epidermis ; **ora** **5** sun leaf palisade cells are thinner / taller ; **ora** **6** sun leaf has larger air spaces ; **ora** **7** AVP e.g. sun leaf has a deeper / different shaped, vascular bundle ; **ora**	**2**	
2(a)(ii)	**L**ines drawn that are clear and continuous ; **S**cale: to fill more than half the space ; **D**etail: 4 or 5 layers shown ; **P**roportion: palisade mesophyll layer is between third to a half of total mesophyll ;	**4**	**R** shading / stippling / hatching / cells / ruled lines

Question	Answer	Marks	Guidance
2(a)(iii)	19 mm (±1 mm) ; 19 ÷ 130 = 0.15 mm ;;	**3**	 **ecf** incorrect measurement of line **PQ** if answer incorrect, award 1 mark for correct working shown (19 ÷ 130)
2(b)(i)	(70 – 105 =) 35 (.00) ; ((35 ÷ 70) × 100) = 50 (.00) ;	**2**	**ecf** from calculated difference
2(b)(ii)	comparative data quote in either section with units at least once ; *supports hypothesis:* shade leaves are longer ; **ora** *does not support hypothesis:* sun leaves are thicker ; **ora**	**3**	 **I** larger or bigger **A** sun leaves may be wider / width not measured / width is not given, so cannot calculate area ;
2(c)(i)	extinguish flame / do **not** use a Bunsen burner / no flames ; use a water-bath / place ethanol in a test-tube in boiled water ;	**1**	

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Question	Answer	Marks	Guidance
2(c)(i)	to be able to see colour change / AW ;	**1**	
2(c)(iii)	**1** leaves from the same plant / species ; **2** at least three leaves from sun and three from shade ; **3** boil / heat in water ; **4** heat in ethanol ; **5** rinse leaf ; **6** spread on a white tile ; **7** add iodine solution ; **8** positive test gives a blue-black colour ; **9** detail of a controlled variable, e.g. heated for same length of time / same volume or concentration of iodine solution / leaves picked at same time ;	**5**	**I** de-starching leaves **I** use of a control **I** ref to lab safety
	Total:	**21**	