Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **October/November 2019**

MARK SCHEME

Maximum Mark: 40

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Question	Mark scheme	Mark	Guidance
1(a)(i)	table drawn with lines, minimum two columns + row headings underlined + suitable headings **;** colour matches condition **;**	**2**	
1(a)(ii)	*independent variable:* light (and dark) / amount of light **;** *dependent variable:* colour (of the chloroplast suspension) **;**	**2**	
1(a)(iii)	volume of chloroplast suspension **;** concentration of chloroplast suspension **;** volume of DCPIP **;** concentration of DCPIP **;** time **;** (same) age / type of leaf **;** temperature / ice-cold **;** buffer solution / pH **;**	**2**	
1(a)(iv)	light is needed for photosynthesis / AW **; ora**	**1**	
1(b)	2 **and** 8 **;** °C **;**	**2**	
1(c)(i)	to identify, anomalous results / outliers / AW **;**	**1**	

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<table>
<tr><th>Question</th><th>Mark scheme</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1(c)(ii)</td><td>
<table>
<tr><th>error ;</th><th>improvement ;</th></tr>
<tr><td>chloroplasts settle out</td><td>stir the chloroplast suspension</td></tr>
<tr><td>(plastic) pipettes are used to measure volume / volume of chloroplasts was inaccurate</td><td>use a syringe / burette, to measure the chloroplasts</td></tr>
<tr><td>temperature not maintained</td><td>insulate beaker / use heat shield / add more ice</td></tr>
<tr><td>DCPIP and chloroplast extract not mixed</td><td>stir or shake</td></tr>
<tr><td>subjective end-point / AW</td><td>use colour chart / white surface / colorimeter</td></tr>
<tr><td>mixture of leaves</td><td>select leaves of same type</td></tr>
<tr><td>different time for each test-tube</td><td>stagger start / do sequentially</td></tr>
<tr><td>test-tubes not the same temperature as water-bath at the start</td><td>leave in water-bath for some time before starting / equilibrate</td></tr>
<tr><td>AVP, e.g. insufficient CO_2</td><td>AVP, e.g. add HCO_3</td></tr>
</table>
</td><td>2</td><td>the improvement must match the error given</td></tr>
</table>

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Question	Mark scheme	Mark	Guidance
1(d)	*given method (max 2):* **1** method of extracting chloroplasts **;** **2** add DCPIP to chloroplasts **;** **3** concentration / (stated) volume of chloroplast suspension **;** **4** concentration / (stated) volume of DCPIP **;** **5** buffer solution / pH **;** *new method:* **6** two or more different temperatures **;** **7** method to maintain temperature **;** **8** measure time taken for DCPIP to become colourless / determine reduction in blue colour after set time / AW **;** **9** equilibrate **;** **10** same carbon dioxide / CO_2, concentration **;** **11** leaves / chloroplasts, from same plant **;** **12** same light intensity / same distance from light source **;** **13** AVP **;** **14** set up a test-tube with no DCPIP to compare to / method of telling when it has become colourless **;** **15** set up control with boiled / no chloroplasts / glass beads **;** **16** two or more repeats / replicates **;** **17** safety **;** e.g. goggles / gloves / ref. to safe method of heating / ref. to use of tongs for hot objects	**6**	**A** correct alternative methods

Question	Mark scheme	Mark	Guidance
2 (a)(i)	*lines:* single clear lines, no shading **;** *size:* at least half available space **;** *detail:* bottom epidermal cell larger than top epidermal cell **;** thickening of guard cell inner cell indicated **;**	**4**	
2 (a)(ii)	31 ±1 (mm) **;** 0.08 (mm) **;;**	**3**	ecf from measurements
2 (b)(i)	5 (20% sucrose, repeat 7) circled or indicated **;**	**1**	
2 (b)(ii)	3.0 **;** μm **;**	**2**	
2(c)(i)	410 **;;**	**2**	
2(c)(ii)	axes labelled with units **;** even scale and working area occupies at least half the grid in both directions + bars clearly identified **;** all values plotted accurately ± half a small square **;**	**3**	
2(c)(iii)	(average number of stomata open) decreases and then increases **;** suitable data quote **;** e.g. fewest open at 12:00 / highest number open at 00:00 / (decreases) from 0:00 (hours) to 12:00 / (increases) from 12:00	**2**	

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Question	Mark scheme	Mark	Guidance
2(d)(i)	iodine solution **;**	**1**	
2(d)(ii)	*procedure:* add Benedict's (solution / reagent) **;** heat **;** green / yellow / orange / (brick) red **;** *safety:* goggles / gloves / appropriate precaution with hot water described **;**	**4**	

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