Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 2022**

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U 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.

Mark scheme abbreviations:

;	separates marking points
/	alternative answers for the same marking point
R	reject
A	accept
I	ignore
AVP	any valid point
AW	alternative wording (where responses vary more than usual)
ecf	error carried forward
underline	actual word underlined must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument

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Question	Answer	Marks
1(a)(i)	1. correct concentrations (5.0, 2.5, 1.25, 0.625) and % at least once ; 2. shows transfer of 10(cm^3) to each beaker from the previous beaker ; 3. shows 10 (cm^3) of water added to each beaker ;	**3**
1(a)(ii)	1. *heading for independent variable:* percentage concentration of molecule **R** (before heading for dependent variable) and no units in body of table ; 2. *heading dependent variable:* number of drops ; 3. results recorded for all concentrations ; 4. number of drops recorded for the highest concentration of **R** is fewer than for the lowest concentration of **R** ; 5. results recorded as whole drops ;	**5**
1(a)(iii)	identifies two errors, e.g. drop size varies, difficult to judge endpoint ; ;	**2**
1(a)(iv)	*any **one** improvement and must be linked to an error in **1(a)(iii)**, e.g.:* 1. (drop size varies) measure the volume used instead of the number of drops ; 2. (difficult to judge endpoint) use a colorimeter ;	**1**
1(a)(v)	records a number for **U** that is less than that recorded for 10% and more than that recorded for the lowest concentration ;	**1**
1(a)(vi)	correctly labels scale bar with different concentrations of molecule **R** ; *concentrations must match to those listed in **1(a)(ii)***	**1**
1(a)(vii)	estimates the correct concentration of **R** in **U** by placing **U** in the correct position on the scale bar ;	**1**
1(b)(i)	1. *x*-axis: plant extract and bars labelled **B**, **C**, **D**, **E** and **F** and *y*-axis: time / s ; 2. *x*-axis: even width of bars and scale on *y*-axis: 10 seconds to 2 cm, labelled at least each 2 cm ; 3. correct plotting of all five bars ; 4. five separate bars drawn and with horizontal and vertical lines joined precisely ;	**4**
1(b)(ii)	plant extract **F** ;	**1**

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Question	Answer	Marks
1(c)(i)	1 22 μg cm^{-2} ;	1
1(c)(ii)	*any **two** from:* 1. prevents formation of cell, wall / membrane ; 2. cell / bacterial, lysis **or** cells / bacteria, burst ; 3. inhibits, transcription / translation / protein synthesis ; 4. inhibits cell division ; 5. acts as an enzyme inhibitor ; 6. inhibits DNA, replication / synthesis ;	2

Question	Answer	Marks
2(a)(i)	1. uses most of the available space and no shading ; 2. whole leaf section drawn and no cells drawn ; 3. correct shape of the leaf ; 4. draws stomata opening into an air space ; 5. label line and label to epidermis ;	5
2(a)(ii)	*any **one** from:* 1. cuticle ; 2. few stomata ;	1
2(a)(iii)	1. uses most of the available space and all lines sharp and continuous ; 2. draws only four whole cells and each cell touches at least one other cell ; 3. cell wall drawn as two lines around each cell and three lines where cells touch ; 4. draws inclusions in at least two cells ; 5. label line and label to one cell wall ;	5

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(b)</td><td>1. three correct differences
any three from e.g.:

<table>
<tr><th>feature</th><th>J1</th><th>Fig. 2.1</th></tr>
<tr><td>vascular tissue</td><td>smaller in proportion to the whole leaf</td><td>larger in proportion to the whole leaf ;</td></tr>
<tr><td>air spaces</td><td>more</td><td>fewer ;</td></tr>
<tr><td>shape of leaf</td><td>triangle</td><td>elongated ;</td></tr>
<tr><td>stomata</td><td>fewer</td><td>more ;</td></tr>
</table></td><td>3</td></tr>
<tr><td>2(c)</td><td>1. measures and records the correct length of the scale bar ;
2. shows the length of scale bar divided by 950 ;
3. shows the length of line X–Y divided by the answer to mp2 ;
4. records the correct width of the leaf <u>and</u> units ;</td><td>4</td></tr>
</table>

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