Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/31**

Paper 3 Advanced Practical Skills 1 **May/June 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 May/June 2019 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.

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Mark scheme abbreviations

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

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Question	Answer	Marks
1(a)(i)	*risk* high **+** reason **;**	**1**
1(a)(ii)	1. (heading) pH **;** 2. (heading for dependent) volume of potassium manganate(VII) / **P +** units **;** 3. collects results for all pHs **;** 4. correct trend **;** 5. records volumes up to 2 decimal places or whole numbers if drops given **;** 6. records results to same precision **;**	**6**
1(a)(iii)	pH **;**	**1**
1(a)(iv)	estimates optimum pH from own results **+** least volume of **P ;**	**1**
1(a)(v)	*any 1 from:* 1. idea of difficulty in reading the volume on syringe because of the dark colour**;** 2. drops stick to the side of the tube so the volume is not accurate **;** 3. difficulty of judgement / identification of appearance colour **;** 4. drop size different / different pressure on syringe / syringe sticking **;** 5. water in named solutions evaporate / hydrogen peroxide decomposes over time **;** 6. *idea that* the time the mixture was left between step 10 and step 11 differs for each pH tested **;**	**1**

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Question	Answer	Marks
1(a)(vi)	*any 3 from:* 1. more / wider / narrower / different / examples / range of, pH (buffers) ; 2. given range of pH buffers either side of the candidates suggested optimum ; 3. use a colorimeter **or** have a colour standard to compare ; 4. replicate / repeat, to calculate a mean / identify anomalous results ; 5. use a burette / syringe / pipette with smaller divisions ; 6. do each pH separately / repeat / take more readings (each pH) ;	**3**
1(b)(i)	1. *x*-axis labelled as temperature / °C **+** *y*-axis labelled as volume of oxygen produced in 180 seconds (/) cm^{-3} ; 2. scale on *x*-axis 10 to 2 cm **+** labelled each 2 cm **+** scale on *y*-axis is 2 to 2 cm **+** labelled each 2 cm; 3. correct plotting of 5 points with a small cross or dot in circle ; 4. smooth, thin line, joined point to point, through 5 points ;	**4**
1(b)(ii)	correctly reads from graph volume of oxygen **+** units cm^3 ;	**1**
1(b)(iii)	*any 3 from:* 1. increasing kinetic energy as temperature increases ; 2. up to 38.5 °C there are more successful collisions / more substrate binds to active site / more enzyme substrate complexes formed ; 3. above 38.5 °C active site of enzyme becomes denatured ; 4. above 38.5 °C active site shape is changed ; 5. above 38.5 °C so less enzyme substrate complexes formed / substrate cannot bind ;	**3**

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Question	Answer	Marks
1(b)(iv)	use of boiled plant extract / enzyme or distilled water to replace the enzyme / plant extract ;	**1**
2(a)(i)	***J1*** *is TS Maize root* 1. minimum size **+** no shading **+** no cells ; 2. whole root drawn **+** at least 3 lines ; 3. correct root shape **+** at least 5 lines across width of section from the centre of drawing; 4. correct proportion of the diameter of the central region to the total diameter of the root ; 5. label line and label to epidermis ;	**5**
2(a)(ii)	1. lines continuous, thin and sharp **+** minimum size ; 2. draws only 4 whole cells **+** each cell touching at least two of the other cells ; 3. cell wall drawn as two lines **+** 3 lines where two cells touch ; 4. shows an air space between cells ; 5. label line and label to cell wall ;	**5**
2(b)(i)	annotates 3 correct features on Fig 2.1 using labels **Q**, **R** and **S** ; ; ; e.g. Fig 2.1 xylem tissue arranged in a cross shape, **J1** arranged in a ring	**3**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(b)(ii)</td><td>
1. correct measurement of the scale bar + units ;

2. correct measurement of length of line Z + units ;

<table>
<tr><th>method A</th><th>method B</th><th>method C</th></tr>
<tr><td>mp 3
scale bar measurement multiplied by 1000 + divided by 273 ;</td><td>mp 3
length of line Z divided by length of the scale bar ;
if line Z or the scale bar has been converted it must be shown</td><td>mp 3 (1 mm =)
273 divided by scale bar length ;
if a conversion of units is done it must be shown</td></tr>
<tr><td>mp 4
displays measurement of line Z + divided by magnification ;</td><td>mp 4
answer to mp3 multiplied by 273 ;</td><td>mp 4
answer to mp3 multiplied by length of Z ;</td></tr>
</table>

5. correct answer + units ;
</td><td>5</td></tr>
</table>

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