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**BIOLOGY**

**9700/31**

Paper 3 Advanced Practical Skills 1

**October/November 2019**

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.

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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This document consists of **6** printed pages.

**PUBLISHED****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.

**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	Answer	Marks
1(a)(i)	shows at least three more concentrations of ethanol ; shows correct volumes of <b>A</b> and <b>W</b> to make these concentrations ;	<b>2</b>
1(a)(ii)	<ol style="list-style-type: none"> <li>1. <i>heading for independent variable</i>: percentage concentration ethanol <b>and</b> before heading for dependent variable <b>and</b> no units in body of table ;</li> <li>2. <i>heading dependent variable</i>: symbol or colour intensity ;</li> <li>3. readings for all samples ;</li> <li>4. intensity of red colour decreases with decreasing concentration ;</li> <li>5. results recorded using +++++ scale ;</li> </ol>	<b>5</b>
1(a)(iii)	identifies the independent variable as concentration of ethanol ;	<b>1</b>
1(a)(iv)	<p><i>any three from:</i></p> <ol style="list-style-type: none"> <li>1. proteins in membrane denatured ;</li> <li>2. dissolved phospholipids / hydrophobic components (of membrane) ;</li> <li>3. increases permeability ;</li> <li>4. higher concentrations of ethanol <b>and</b> more diffusion of pigment ;</li> </ol>	<b>3</b>
1(a)(v)	<p><i>any two sources of error and improvements from:</i></p> <ol style="list-style-type: none"> <li>1. colour judgement subjective ;</li> <li>2. colorimeter or use of colour chart ;</li> <li>3. cutting to 2 cm ;</li> <li>4. use of cutting template or more precise method of cutting described ;</li> <li>5. time lag ;</li> <li>6. staggered start ;</li> <li>7. washing only once ;</li> <li>8. standardise, e.g. washing twice ;</li> </ol>	<b>4</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(b)(i)	1. x-axis: water potential / MPa <b>and</b> y-axis: acoustic emission / arbitrary units ; 2. scale on x-axis: 0.25 MPa to 2 cm, labelled at least every 2 cm <b>and</b> scale on y-axis: 20 arbitrary units to 2 cm, labelled at least every 2 cm ; 3. correct plotting of all six points using small crosses or dots in circles ; 4. six plots joined with thin line passing through all points and line is either smooth curve or joined plot to plot ;	<b>4</b>
1(b)(ii)	correct value from graph ;	<b>1</b>
1(b)(iii)	<i>any one from:</i>  reduce gap between intervals ; AVP ;	<b>1</b>

Question	Answer	Marks																														
2(a)(i)	1. suitable size <b>and</b> no shading <b>and</b> no cells ; 2. draws correct sector ; 3. correct shape and distribution of tissues ; 4. correct proportions of tissues ; 5. label line <b>and</b> label to epidermis ;	<b>5</b>																														
2(a)(ii)	1. lines continuous, thin and sharp ; 2. draws only four whole cells <b>and</b> each cell touches at least two other cells ; 3. two lines around each cell <b>and</b> three lines where cells touch ; 4. at least one cell with three or more angles ; 5. label line and label to one cell wall ;	<b>5</b>																														
2(b)(i)	1. measures and records length of <b>C–D, E–F</b> and <b>G–H</b> ; 2. measures and records depth of six outer layers ; 3. (for diameter) shows addition of three values <b>and</b> shows division by three <b>and</b> (for depth of outer layer) shows addition of six values <b>and</b> shows division by six ; 4. answers to correct degree of accuracy ;	<b>4</b>																														
2(b)(ii)	states answer as larger whole number to smaller whole number <b>and</b> simplest whole number ratio ;	<b>1</b>																														
2(c)	1. organises comparison into three columns with one column for features <b>and</b> collects only differences ;  any <b>three</b> from:  <table border="1" data-bbox="367 1018 1917 1374"> <thead> <tr> <th data-bbox="367 1018 920 1054">Feature</th> <th data-bbox="920 1018 1464 1054">J1</th> <th data-bbox="1464 1018 1917 1054">Fig. 2.2</th> </tr> </thead> <tbody> <tr> <td data-bbox="367 1054 920 1091">size of vascular bundles</td> <td data-bbox="920 1054 1464 1091">smaller</td> <td data-bbox="1464 1054 1917 1091">larger ;</td> </tr> <tr> <td data-bbox="367 1091 920 1128">xylem</td> <td data-bbox="920 1091 1464 1128">fewer</td> <td data-bbox="1464 1091 1917 1128">more ;</td> </tr> <tr> <td data-bbox="367 1128 920 1165">phloem</td> <td data-bbox="920 1128 1464 1165">fewer</td> <td data-bbox="1464 1128 1917 1165">more ;</td> </tr> <tr> <td data-bbox="367 1165 920 1201">layers of cells around vascular tissue</td> <td data-bbox="920 1165 1464 1201">two layers</td> <td data-bbox="1464 1165 1917 1201">one layer ;</td> </tr> <tr> <td data-bbox="367 1201 920 1238">air spaces</td> <td data-bbox="920 1201 1464 1238">present / more / larger</td> <td data-bbox="1464 1201 1917 1238">absent / less / smaller ;</td> </tr> <tr> <td data-bbox="367 1238 920 1275">thickened layer beneath epidermis</td> <td data-bbox="920 1238 1464 1275">present</td> <td data-bbox="1464 1238 1917 1275">absent ;</td> </tr> <tr> <td data-bbox="367 1275 920 1311">cortex cells</td> <td data-bbox="920 1275 1464 1311">fewer</td> <td data-bbox="1464 1275 1917 1311">more ;</td> </tr> <tr> <td data-bbox="367 1311 920 1348">gaps in outer surface</td> <td data-bbox="920 1311 1464 1348">present / more</td> <td data-bbox="1464 1311 1917 1348">absent / fewer ;</td> </tr> <tr> <td data-bbox="367 1348 920 1374">AVP</td> <td data-bbox="920 1348 1464 1374">described</td> <td data-bbox="1464 1348 1917 1374">described ;</td> </tr> </tbody> </table>	Feature	J1	Fig. 2.2	size of vascular bundles	smaller	larger ;	xylem	fewer	more ;	phloem	fewer	more ;	layers of cells around vascular tissue	two layers	one layer ;	air spaces	present / more / larger	absent / less / smaller ;	thickened layer beneath epidermis	present	absent ;	cortex cells	fewer	more ;	gaps in outer surface	present / more	absent / fewer ;	AVP	described	described ;	<b>4</b>
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