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**BIOLOGY**

**9700/33**

Paper 3 Advanced Practical Skills 1

**October/November 2016**

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.

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
1(a)	<p><i>(layout of drawing)</i></p> <ol style="list-style-type: none"> <li>1 quality of line for outer wall of cell thin and sharp + large size ;</li> <li>2 only one cell drawn + shows plasmolysis ;</li> <li>3 cell wall drawn as two lines close together ;</li> <li>4 uses one label line + one label to cell surface membrane ;</li> </ol>	<b>4</b>
1(b)(i)	<p><i>(decisions on serial dilutions)</i></p> <ol style="list-style-type: none"> <li>1 correct concentrations of 0.5, 0.25, 0.125, 0.0625 + mol dm<sup>-3</sup> ;</li> <li>2 shows transfer of 10 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> to next dilution + 10 cm<sup>3</sup> transferred from 2nd to 3rd beaker and from 3rd to 4th and from 4th to 5th + cm<sup>3</sup> ;</li> <li>3 adds 10 cm<sup>3</sup> of water to each beaker ;</li> </ol>	<b>3</b>
1(b)(ii)	<p><i>(recording results)</i></p> <ol style="list-style-type: none"> <li>1 table drawn + heading, concentration + sucrose + mol dm<sup>-3</sup> ;</li> <li>2 heading, time + seconds ;</li> <li>3 records results for at least four concentrations ;</li> <li>4 correct pattern of results, the highest concentration of sucrose recorded as the shortest time for colour change ;</li> <li>5 times recorded as whole seconds ;</li> </ol>	<b>5</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
1(b)(iii)	<i>(records time for U)</i>  appropriate number for time + seconds ;	<b>1</b>
1(b)(iv)	<i>(interpretation of estimate)</i>  correct answer in accordance with recorded times ;	<b>1</b>
1(b)(v)	<i>(improvements to procedure)</i> <i>three from</i> 1 increased number of concentrations ;  2 between named concentrations or use simple (proportional) dilution ;  3 repeat or replicate ;  4 weigh mass of precipitate ;	<b>3</b>
1(c)(i)	<i>(layout of data)</i>  1 (x-axis) concentration of sucrose solution / mol dm <sup>-3</sup> + (y-axis) water potential / kPa ;  2 correct plotting of five points with a small cross or dot in circle ;  3 five plots joined point to point or as a line of best fit drawn as a ruled thin line ;	<b>3</b>
1(c)(ii)	<i>(interpretation of concentration)</i>  correctly reads value for the water potential of the concentration of sucrose at 0.66 mol dm <sup>-3</sup> + minus sign ;	<b>1</b>

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Question	Answer	Mark
1(c)(iii)	<p><i>(conclusions)</i></p> <p>1 (cells) reference to higher water potential than solution ;</p> <p>2 water moves out of cells ;</p> <p>3 by osmosis ;</p>	2
	<b>Total:</b>	<b>23</b>

Question	Answer	Mark
2(a)(i)	<p><i>(decisions)</i></p> <p>1 same number of drops or stated number of drops or volume (of sample) ;</p> <p>2 add same number of drops or stated number of drops or volume (of iodine) ;</p>	2
2(a)(ii)	<p><i>(recording results)</i></p> <p>1 heading, colour or observation ;</p> <p>2 records colour results for three samples ;</p> <p>3 records <b>P2</b> as darkest blue (or black) ;</p>	3
2(a)(iii)	<p><i>(conclusion)</i></p> <p><b>P2</b> ;</p>	1

<b>Page 5</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
2(b)	<p><i>(plan drawing)</i></p> <ol style="list-style-type: none"> <li>1 large size + no shading ;</li> <li>2 no cells + at least three lines drawn ;</li> <li>3 draws outline of root cap + draws outline of stele ;</li> <li>4 stele shown in correct proportion ;</li> <li>5 uses one label line + one label, the letter <b>T</b>, to region of cortex ;</li> </ol>	<b>5</b>
2(c)(i)	<p><i>(actual width of cells)</i></p> <ol style="list-style-type: none"> <li>1 measures length of scale bar + units ;</li> <li>2 for calculation shows length of scale bar used with measurements of cells ;</li> <li>3 correct answers to calculation for all cells ;</li> </ol>	<b>3</b>
2(c)(ii)	<p><i>(mean actual width of cells)</i></p> <ol style="list-style-type: none"> <li>1 shows addition of five measurements from <b>(c)(i)</b> + divided by 5 ;</li> <li>2 correct answer to appropriate degree of accuracy ;</li> </ol>	<b>2</b>
2(c)(iii)	<p><i>(interpretation)</i></p> <p>one observable difference between the cell <b>D</b> and cell <b>E</b> ;</p>	<b>1</b>
	<b>Total:</b>	<b>17</b>