



# Mark Scheme (Results)

January 2024

Pearson Edexcel International Advanced  
Subsidiary Level In Biology (WBI13)  
Paper 01: Practical Skills in Biology I

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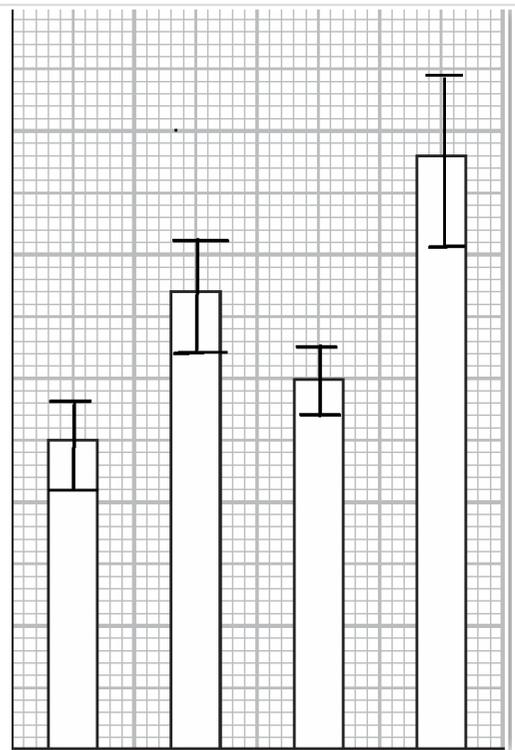
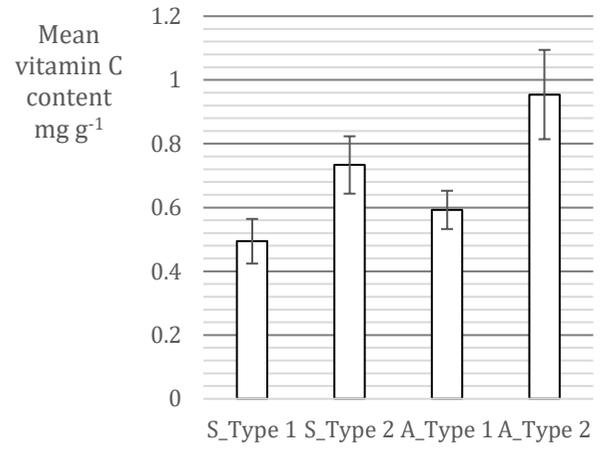
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Question Number	Answer	Additional Guidance	Mark
1(a)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>• because the antioxidants will {reduce (the action of) / stabilise} free radicals / reduce oxidative stress (1)</li> <li>• therefore damage to {(endothelial) cells / endothelium} will be reduced (1)</li> <li>• so there will be less chance of plaque build-up / formation of atheroma (1)</li> </ul>	<p>accept attack, remove free radicals</p> <p>accept (endothelial) lining of BV</p> <p>not atherosclerosis</p>	(3)

Question Number	Answer	Additional Guidance	Mark
1(b)	<p>A description that includes the following points:</p> <ol style="list-style-type: none"> <li>1. use equal {size pieces / masses} of spinach (for both plants) (1)</li> <li>2. standard extraction method described (1)</li> <li>3. measure out {equal / same / stated} volume of (standard) DCPIP solution (1)</li> <li>4. add spinach (extract) until no blue colour remains / becomes colourless / decolourises (1)</li> <li>5. record volume of extract used (1)</li> <li>6. use of calibration curve / standard solutions (1)</li> </ol>	<p>e.g. grinding time / volume of water</p> <p>measure out {equal / same / stated} volume of spinach extract</p> <p>add DCPIP solution until becomes permanently blue</p> <p>record volume of DCPIP used</p> <p>e.g mass of vitamin C in fruit juice sample = mass of vitamin C to decolourise 1cm<sup>3</sup> of DCPIP × volume of sample required to decolourise 1cm<sup>3</sup> of DCPIP</p>	(5)

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	<p>A calculation with the following steps:</p> <ul style="list-style-type: none"> <li>• correct calculation of numerator and denominator (1)</li> <li>• correct division of numerator by denominator and square root found (1)</li> <li>• answer correctly rounded to two decimal places (1)</li> </ul>	<p>Allow ecf</p> <p>0.2 and 11 (accept 12-1)</p> <p>0.0181 and 0.13483</p> <p>0.14, allow 0.13</p>	(3)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	<p>A graph showing the following features:</p> <ul style="list-style-type: none"> <li>• y axis with fully labelled linear scale (1)</li> <li>• x and y axes correctly labelled with names of variables in each case, and units on y. X could be labeled using a key (1)</li> <li>• SDs plotted correctly (1)</li> </ul>	<p>Scale values should be indicated at equal increments, minimum 1</p> <p>Allow <math>\frac{1}{2}</math> square tolerance</p>	



Question Number	Answer	Additional Guidance	Mark
1(c)(iii)	<p>An answer including the following points:</p> <ul style="list-style-type: none"> <li>• a correct comparison of means for both {soil types / seasons} / all means different (1)</li> <li>• difference between soil types is significant as SDs do not overlap (for both seasons) (1)</li> <li>• difference between seasons for same soil type are not significant as SDs overlap (1)</li> </ul>	<p>e.g. autumn higher than spring (for both types) / type 2 higher than type 1 (in both seasons)</p> <p>ecf if SD for Autumn type 2 is <b>plotted</b> too big</p> <p>ecf if SD for Autumn type 2 is <b>plotted</b> as too small if they say autumn diff is significant due to overlap</p>	(3)

Question Number	Answer	Additional Guidance	Mark
2 (a)	<p>Any three from:</p> <ul style="list-style-type: none"> <li>• phospholipid</li> <li>• protein</li> <li>• cholesterol</li> <li>• glycoprotein</li> <li>• glycolipid</li> </ul>	<p>The following answers, all 3 correct for 2 marks, 1 or 2 for one mark:</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2 (b)	<p>An answer that includes three of the following points:</p> <ul style="list-style-type: none"> <li>• the substances are {non-polar / hydrophobic} (1)</li> <li>• there is a positive correlation / as solubility increases so does permeability (1)</li> <li>• because the membrane is less permeable to less hydrophobic substances (1)</li> <li>• therefore membranes contain (phospho)lipids (1)</li> </ul>	<p>Accept reverse argument Not just ref to A and E only</p> <p>linear increase</p> <p>ora {fatty acid tails / membranes} are (only) permeable to non-polar substances / non-polar substances move across membrane by dissolving in lipids</p> <p>Accept if implied</p>	(3)

Question Number	Answer	Additional Guidance	Mark
2 (c)(i)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>• increase in {membrane permeability / pigment release / colour intensity} as temperature increases (1)</li> <li>• the change in permeability (between 15 and 20 °C) is due to increased {kinetic energy / movement} of (phospho)lipids (1)</li> <li>• which would cause {phospholipids to move away from each other / a more fluid membrane / a membrane with bigger gaps} (1)</li> <li>• levels off (after 20 °C) because all {pigment / colour} released (1)</li> </ul>	DO NOT ACCEPT effect of temperature on transmission of light	(3)

Question Number	Answer	Additional Guidance	Mark
2 (c)(ii)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>• {equal sized / same shaped} pieces of (beetroot) tissue cut (1)</li> <li>• washed in water (until no more pigment lost) (1)</li> <li>• placed in (same / stated) volume of water (1)</li> <li>• placed in a range of temperatures 5 °C to 30 °C (1)</li> <li>• left for {stated / suitable / same} time (1)</li> <li>• samples of the liquid (around the discs) were removed (and placed in colorimeter cuvette) (1)</li> <li>• repeat (at each temperature) {to get mean / SD} (1)</li> </ul>	<p>NOT mass on its own</p> <p>15 mins &lt;=24 hours</p> <p>accept beetroot removed from test tube</p>	(5)

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	Biuret	Accept copper sulfate and sodium hydroxide (sodium potassium tartrate)	(1)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	Blue to {mauve / lilac / purple}		(1)

Question Number	Answer	Additional Guidance	Mark
3(a)(iii)	>2 but <10	ACCEPT between 2 and 10 a range with any values from >2 to <10	(1)

Question Number	Answer	Additional Guidance	Mark
3(a)(iv)	An answer that includes the following points: <ul style="list-style-type: none"> <li>• use {more concentrations / smaller intervals} (for standards) (1)</li> <li>• between 2 and 10 (1)</li> <li>• use of colorimeter (1)</li> </ul>	Not larger range  Accept 3-9 in any combination (3-10, 2-9, 3-9)	(2)

Question Number	Answer	Additional Guidance	Mark																	
3(b)(i)	<p>A table with the following features:</p> <ul style="list-style-type: none"> <li>suitable table (1)</li> <li>headings with units correct (1)</li> <li>all data correctly entered (1)</li> </ul>	<table border="1"> <thead> <tr> <th rowspan="2">Heating temperature / °C</th> <th colspan="2">Protein content (of the animal feed) as percentage of starting content</th> </tr> <tr> <th>(After) 5 days</th> <th>(After) 7 days</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>67</td> <td>28</td> </tr> <tr> <td>17</td> <td>53</td> <td>26</td> </tr> <tr> <td>27</td> <td>38</td> <td>24</td> </tr> <tr> <td>37</td> <td>25</td> <td>22</td> </tr> </tbody> </table>	Heating temperature / °C	Protein content (of the animal feed) as percentage of starting content		(After) 5 days	(After) 7 days	7	67	28	17	53	26	27	38	24	37	25	22	(3)
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17	53	26																		
27	38	24																		
37	25	22																		

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	<p>A calculation showing the following steps :</p> <ul style="list-style-type: none"> <li>two correct figures from graph, subtracted correctly (1)</li> <li>divided by temperature difference between the two readings (1)</li> <li>correct units, percentage (protein reduction) °C<sup>-1</sup></li> </ul>	<p>accept correct calculation and units on 5 days for up to 2 marks</p> <p>e.g. 28 and 22, 22-28 = (-)6</p> <p>e.g. (-)6 ÷ (37-7) = (-)0.2 / (-)1/5</p> <p>Accept per degree C / per °C, / °C</p> <p>Calculation for 5 days gives 1.4 67-25 = (-)42 (-)42 ÷ (37-7) = (-) 1.4</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	<p>An answer that includes three of the following points:</p> <ul style="list-style-type: none"> <li>• loss of protein as temperature rises (after both 5 and 7 days) (1)</li> <li>• heating for {7 days / longer time} reduces protein content more (at each temperature) than does heating for {5 days / shorter time} (1)</li> <li>• {rate of loss (<math>^{\circ}\text{C}^{-1}</math>) / gradient} is greater after 5 days (than after 7 days) (1)</li> <li>• higher temperature and longer time have same effect / quantity of protein left at 37 <math>^{\circ}\text{C}</math> {same / similar} (for both times) (1)</li> </ul>	<p>ACCEPT negative correlation</p> <p>ACCEPT reverse argument</p> <p>ACCEPT reverse argument</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(b)(iv)	<p>An answer that includes 6 of the following points:</p> <ul style="list-style-type: none"> <li>• make (nutrient) agar {plate / broth} with bacterium (1)</li> <li>• use of (safe) named bacterium / do not use pathogenic (1)</li> <li>• description of how to look for the effect of acid (1)</li> <li>• use of water / range of pH (1)</li> <li>• (both) incubated at {same / suitable/ stated} temperature (1)</li> <li>• (both) incubated for {same / suitable / stated} time (1)</li> <li>• method of assessing bacterial growth (1)</li> <li>• use of an example of aseptic technique (1)</li> </ul>	<p>e.g acid {on filter paper / in well / added to broth}</p> <p>&gt;10 &lt; 30</p> <p>1 - 7 days</p> <p>e.g. measure {zone of inhibition / turbidity}</p> <p>e.g. flame loop etc. / disinfect / lit Bunsen / partial lid lifting gloves, goggles in context of acid ref to safe temperature of incubation / ref to safe temperature</p>	(6)

