Pearson Edexcel

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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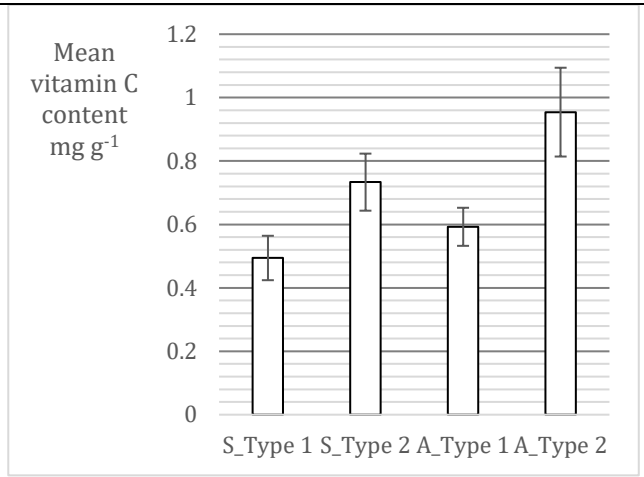
Question Number	Answer	Additional Guidance	Mark
1(a)	An answer that includes the following points: • because the antioxidants will {reduce (the action of) / stabilise} free radicals / reduce oxidative stress (1) • therefore damage to {(endothelial) cells / endothelium} will be reduced (1) • so there will be less chance of plaque build-up / formation of atheroma (1)	accept attack, remove free radicals accept (endothelial) lining of BV not atherosclerosis	(3)

Question Number	Answer	Additional Guidance	Mark
1(b)	A description that includes the following points: 1. use equal {size pieces / masses} of spinach (for both plants) (1) 2. standard extraction method described (1) 3. measure out {equal / same / stated} volume of (standard) DCPIP solution (1) 4. add spinach (extract) until no blue colour remains / becomes colourless / decolourises (1) 5. record volume of extract used (1) 6. use of calibration curve / standard solutions (1)	 e.g. grinding time / volume of water measure out {equal / same / stated} volume of spinach extract add DCPIP solution until becomes permanently blue record volume of DCPIP used e.g mass of vitamin C in fruit juice sample = mass of vitamin C to decolourise 1cm^3 of DCPIP × volume of sample required to decolourise 1cm^3 of DCPIP	 (5)

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	A calculation with the following steps: • correct calculation of numerator and denominator (1) • correct division of numerator by denominator and square root found (1) • answer correctly rounded to two decimal places (1)	Allow ecf 0.2 and 11 (accept 12-1) 0.0181 and 0.13483 0.14, allow 0.13	(3)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	A graph showing the following features: • y axis with fully labelled linear scale (1) • 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) • SDs plotted correctly (1)	 Scale values should be indicated at equal increments, minimum 1 Allow ½ square tolerance	


Mean vitamin C content mg g-1
1.2
1
0.8
0.6
0.4
0.2
0
S_Type 1
S_Type 2
A_Type 1
A_Type 2

(3)

Question Number	Answer	Additional Guidance	Mark
1(c)(iii)	An answer including the following points: • a correct comparison of means for both {soil types / seasons} / all means different (1) • difference between soil types is significant as SDs do not overlap (for both seasons) (1) • difference between seasons for same soil type are not significant as SDs overlap (1)	e.g. autumn higher than spring (for both types) / type 2 higher than type 1 (in both seasons) ecf if SD for Autumn type 2 is **plotted** too big ecf if SD for Autumn type 2 is **plotted** as too small if they say autumn diff is significant due to overlap	(3)

Question Number	Answer	Additional Guidance	Mark
2 (a)	Any three from: • phospholipid • protein • cholesterol • glycoprotein • glycolipid	The following answers, all 3 correct for 2 marks, 1 or 2 for one mark:	(2)

Question Number	Answer	Additional Guidance	Mark
2 (b)	An answer that includes three of the following points: • the substances are {non-polar / hydrophobic} (1) • there is a positive correlation / as solubility increases so does permeability (1) • because the membrane is less permeable to less hydrophobic substances (1) • therefore membranes contain (phospho)lipids (1)	Accept reverse argument Not just ref to A and E only linear increase ora {fatty acid tails / membranes} are (only) permeable to non-polar substances / non-polar substances move across membrane by dissolving in lipids Accept if implied	(3)

Question Number	Answer	Additional Guidance	Mark
2 (c)(i)	An answer that includes the following points: • increase in {membrane permeability / pigment release / colour intensity} as temperature increases (1) • the change in permeability (between 15 and 20 ºC) is due to increased {kinetic energy / movement} of (phospho)lipids (1) • which would cause {phospholipids to move away from each other / a more fluid membrane / a membrane with bigger gaps} (1) • levels off (after 20 ºC) because all {pigment / colour} released (1)	DO NOT ACCEPT effect of temperature on transmission of light	(3)

Question Number	Answer	Additional Guidance	Mark
2 (c)(ii)	An answer that includes the following points: • {equal sized / same shaped} pieces of (beetroot) tissue cut (1) • washed in water (until no more pigment lost) (1) • placed in (same / stated) volume of water (1) • placed in a range of temperatures 5 ^{o}C to 30 ^{o}C (1) • left for {stated / suitable / same} time (1) • samples of the liquid (around the discs) were removed (and placed in colorimeter cuvette) (1) • repeat (at each temperature) {to get mean / SD} (1)	NOT mass on its own 15 mins <=24 hours accept beetroot removed from test tube	(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: • use {more concentrations / smaller intervals} (for standards) (1) • between 2 and 10 (1) • use of colorimeter (1)	Not larger range Accept 3-9 in any combination (3-10, 2-9, 3-9)	(2)

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(b)(i)</td><td>A table with the following features:

• suitable table (1)

• headings with units correct (1)

• all data correctly entered (1)</td><td>
<table>
<tr><td rowspan="2">Heating temperature / °C</td><td colspan="2">Protein content (of the animal feed) as percentage of starting content</td></tr>
<tr><td>(After) 5 days</td><td>(After) 7 days</td></tr>
<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>
</table>
</td><td>(3)</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(b)(ii)</td><td>A calculation showing the following steps :

• two correct figures from graph, subtracted correctly (1)

• divided by temperature difference between the two readings (1)

• correct units, percentage (protein reduction) $^{o}C^{-1}$</td><td>accept correct calculation and units on 5 days for up to 2 marks

e.g. 28 and 22, 22-28 = (-)6

e.g. (-)6 ÷ (37-7) = (-)0.2 / (-)1/5

Accept per degree C / per ^{o}C, / ^{o}C

Calculation for 5 days gives 1.4
67-25 = (-)42
(-)42 ÷ (37-7) = (-) 1.4</td><td>(3)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	An answer that includes three of the following points: • loss of protein as temperature rises (after both 5 and 7 days) (1) • heating for {7 days / longer time} reduces protein content more (at each temperature) than does heating for {5 days / shorter time} (1) • {rate of loss ($^{o}C^{-1}$) / gradient} is greater after 5 days (than after 7 days) (1) • higher temperature and longer time have same effect / quantity of protein left at 37 ^{o}C {same / similar} (for both times) (1)	ACCEPT negative correlation ACCEPT reverse argument ACCEPT reverse argument	(3)

Question Number	Answer	Additional Guidance	Mark
3(b)(iv)	An answer that includes 6 of the following points: • make (nutrient) agar {plate / broth} with bacterium (1) • use of (safe) named bacterium / do not use pathogenic (1) • description of how to look for the effect of acid (1) • use of water / range of pH (1) • (both) incubated at {same / suitable/ stated} temperature (1) • (both) incubated for {same / suitable / stated} time (1) • method of assessing bacterial growth (1) • use of an example of aseptic technique (1)	e.g acid {on filter paper / in well / added to broth} >10 < 30 1 – 7 days e.g. measure {zone of inhibition / turbidity} 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	(6)

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