

Question Number	Answer	Additional Guidance	Mark
1(a)	1. dependent variable identified as heart rate ; 2. both pesticides used ; 3. allow <i>Daphnia</i> to {acclimatise / equilibrate / eq} (in the pesticide) ; 4. description of how to obtain quantitative results ; 5. credit one detail of methodology ; 6. take several readings and calculate a mean ;	MP1 ACCEPT 'beats per minute' for heart rate, the DV must be a clear statement MP2 ACCEPT both named pesticides MP3 ACCEPT reference to chemicals MP4 e.g. pencil and dots for set time period, count heart beats for stated time MP5 e.g. controlling temperature, obtaining <i>Daphnia</i> from pesticide free water, use of a cavity slide, immobilising <i>Daphnia</i> with cotton wool, same concentration of pesticides, same size <i>Daphnia</i>	(5)

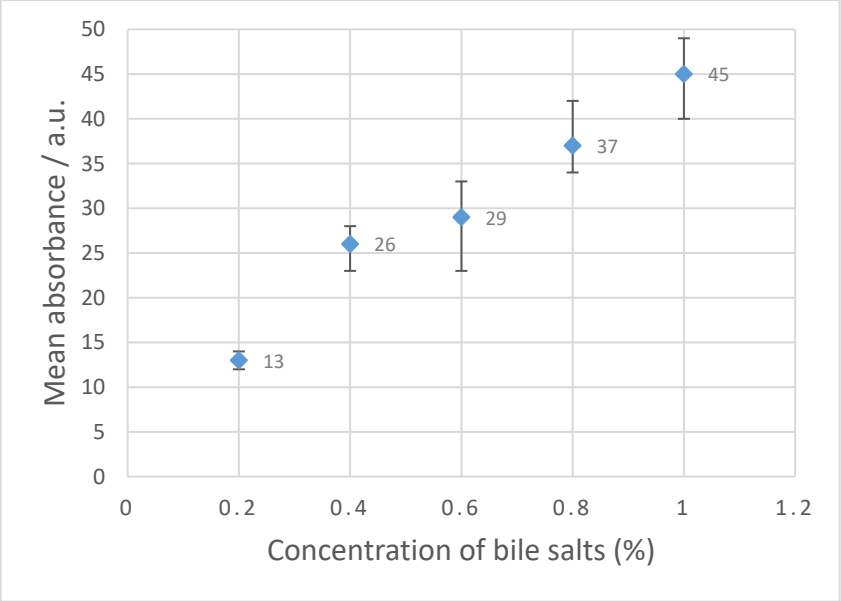
Question Number	Answer	Additional Guidance	Mark
1(b)(i)	Abiotic variables Any one of 1. concentration of pesticide ; 2. pH ; 3. {oxygen / carbon dioxide} concentration ; 4. temperature ; 5. solvent / eq ; Biotic variables Any one of 1. species of <i>Daphnia</i> ; 2. sex of <i>Daphnia</i> ; 3. {mass / size / age} of <i>Daphnia</i> ; 4. {genotype / eq} of <i>Daphnia</i> ;	If the candidate gives both an abiotic factor and a biotic factor (for each), mark = 0	(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. variable with suitable control method described ; 2. results are not valid / description of expected effect on the dependent variable ;	MP1 eg use a thermostatically controlled water bath, temperature controlled room MP2 the effect must be qualified, i.e. a decrease or an increase in heart rate	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)	1. pesticides may be water soluble ; 2. so enter by {diffusion / facilitated diffusion} ; 3. absorbed by heart (muscle) cells / alters nerve function / alters (muscle) contraction / eq ; OR 1. pesticides may be lipid soluble ; 2. so dissolve in lipids in membranes ; 3. absorbed by heart (muscle) cells / alters nerve function / alters muscle contraction / eq ;	MP1 ACCEPT dissolve in water MP2 ACCEPT a description of diffusion, e.g. down a concentration gradient MP3 ACCEPT reference to nerve ganglion / SAN Ignore effect on hormones/protein synthesis MP3 ACCEPT reference to nerve ganglion / SAN Ignore effect on hormones/protein synthesis	(3)

Question Number	Answer	Additional Guidance	Mark
2(a)	1. there will be no significant correlation ; 2. between the concentration of bile salts and the {absorbance / release of pigments / eq} ;	MP1 ACCEPT no significant relationship	(2)

Question Number	Answer	Additional Guidance	Mark																														
2(b)	1. suitable table format ; 2. correct column headings with units ; 3. all raw data and means correct ;	Example table <table><tr><th>Concentration of bile salts (%)</th><th colspan="3">Absorbance / a.u.</th><th>Mean</th></tr><tr><td>0.2</td><td>13</td><td>14</td><td>12</td><td>13</td></tr><tr><td>0.4</td><td>28</td><td>27</td><td>23</td><td>26</td></tr><tr><td>0.6</td><td>31</td><td>23</td><td>33</td><td>29</td></tr><tr><td>0.8</td><td>35</td><td>42</td><td>34</td><td>37</td></tr><tr><td>1.0</td><td>49</td><td>46</td><td>40</td><td>45</td></tr></table> MP2 do not accept if units are repeated in the column	Concentration of bile salts (%)	Absorbance / a.u.			Mean	0.2	13	14	12	13	0.4	28	27	23	26	0.6	31	23	33	29	0.8	35	42	34	37	1.0	49	46	40	45	(3)
Concentration of bile salts (%)	Absorbance / a.u.			Mean																													
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Question Number	Answer	Additional Guidance	Mark
2(c)	- axes correct orientation, labelled and linear scale ; - data plotted correctly ; - range bars plotted correctly ;	ALLOW ECF from 2b  IGNORE line of best fit or line joining points	(3)

Question Number	Answer	Additional Guidance	Mark
2(d)	1. there is a significant (positive) {correlation / relationship} between the concentration of bile salts and the absorbance ; 2. the critical value identified as 0.48 ; 3. calculated value (0.95) is greater than the critical value / eq ; 4. therefore reject the null hypothesis ;	MP2 ACCEPT the critical value indicated on the table of values Note: 0.95 > 0.48 gains MP2 and MP3	(4)

Question Number	Answer	Additional Guidance	Mark
2(e)	1. a named beetroot factor may not have been { controlled / measured } ; 2. no information on the source of bile / eq ; 3. volume of solutions not stated ; 4. credit a factor relating to the colorimeter ; 5. idea that there is only limited data / range of concentrations used / mean based on only {three readings / three replicates} ; 6. comment on variability of raw data / no S.D. calculated / (some) range bars overlap / large S.D. / low variability at 0.2% large variability at 0.6% ;	MP1 e.g. beetroot pre-treatment, size of cylinders, age of beetroot, part of beetroot MP4 e.g. wavelength, filter, calibration, use matched cuvettes MP5 IGNORE 'small sample size' unless qualified	(4)

Question Number	Answer	Additional Guidance	Mark
3(a)	1. risk of contact with harmful organisms / eq ; 2. risk that plants may cause allergic reaction / injury / eq ; 3. identify one other sensible risk such as danger from falling ice / remote location / eq ; 4. risk of hypothermia / eq ;	MP1 e.g. insect bites MP2 ACCEPT plants are prickly, have thorns MP3 ACCEPT tripping on rocks, slip on ice MP4 ACCEPT low temperatures, frostbite, exposure to sunlight	(2)

Question Number	Answer	Additional Guidance	Mark
3(b)	1. practise the method to see if it works ; 2. find suitable size of quadrat / eq ; 3. find suitable length for transect to show changes / eq ; 4. identify different plant species / find suitable key ; 5. find a suitable method of measuring abundance ; 6. identify one named factor that needs to be taken into account ;	MP3 ACCEPT determine distance between quadrats, or find a suitable range of distances MP5 ALLOW percentage cover	(3)

Question Number	Answer	Additional Guidance	Mark
*3(c)	QWC -Spelling of technical terms must be correct and answer must be organised in a logical sequence 1. description of method used to collect data ; 2. stated distances from the glacier for the samples ; 3. dependent variable identified as the abundance of plant species ; 4. {count / record} number of { plants / species } / find percentage cover (of each species) ; 5 and 6. two other variables that could affect abundance ;; 7 and 8. description of how these variables are measured ;; 9. description of how to collect repeat data ; 10. means calculated from repeat data ;	MP1 e.g. use of quadrat (of defined size) / transect MP2 e.g. 'every 3 metres' MP3 ACCEPT a suitable statement about what they are going to measure MP4 Accept % frequency MP9 e.g. use a transect parallel to the first / several quadrats at each distance	(10) 8+2 QWC

Level	Mark	Descriptor
Level 1	0	The account is very disorganised and is very difficult to follow. Scientific vocabulary is very limited with many spelling and grammatical errors.
Level 2	1	There is some disorganisation in the account which is not always in the correct sequence. Some relevant scientific vocabulary is used. The account is not always in continuous prose and there are grammatical errors and some important spelling mistakes.
Level 3	2	The account is well organised with no undue repetition and a correct sequence. There is good use of scientific vocabulary in the context of the investigation described. The account is written in continuous prose which is grammatically sound with no major spelling errors.

