
MARINE SCIENCE

9693/02

Paper 2 Data Handling and Free-Response

October/November 2017

MARK SCHEME

Maximum Mark: 50

Published

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Question	Answer	Marks	Guidance																		
1(a)	<table border="1"> <thead> <tr> <th>number (n)</th> <th>$n(n-1)$</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>42</td> </tr> <tr> <td>16</td> <td>240</td> </tr> <tr> <td>11</td> <td>110</td> </tr> <tr> <td>23</td> <td>506</td> </tr> <tr> <td>14</td> <td>182</td> </tr> <tr> <td>3</td> <td>6</td> </tr> <tr> <td>5</td> <td>20 ;</td> </tr> <tr> <td>Total (N) = 79 ;</td> <td>$\Sigma n(n-1) = 1106$;</td> </tr> </tbody> </table>	number (n)	$n(n-1)$	7	42	16	240	11	110	23	506	14	182	3	6	5	20 ;	Total (N) = 79 ;	$\Sigma n(n-1) = 1106$;	3	all values of $n(n-1)$ correct for 1 mark
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Total (N) = 79 ;	$\Sigma n(n-1) = 1106$;																				
1(b)	<p>figures correctly substituted into formula ; $79 \times 78 / 1106$</p> <p>diversity index for shore B = 5.6 ;</p>	2	A ECF from 1(a)																		
1(c)	<p>any 3 of:</p> <p>shore B has a higher biodiversity than shore A ;</p> <p>both shores have the same (7) number of species present / same species richness ;</p> <p>idea that shore B has higher populations of each species than shore A ;</p> <p>total number of organisms greater at shore B / shore B has 29 more organisms ;</p>	3																			

Question	Answer	Marks	Guidance
1(d)	<p><i>any 2 of:</i></p> <p>type / location, of shore ;</p> <p>height / position, on shore ;</p> <p>sampling area ;</p> <p>time of year ;</p> <p>state of the tide ;</p> <p>abiotic factor ;</p>	2	

Question	Answer	Marks	Guidance
2(a)	<p>appropriate linear scale for both axes ;</p> <p>both axes labelled including units ;</p> <p>all points plotted correctly ($\pm \frac{1}{2}$ small square) ;</p> <p>points joined with ruled lines ;</p>	4	plots to cover at least half of the grid
2(b)	<p>as temperature increases, concentration of dissolved oxygen decreases ;</p> <p>use of manipulated figures ;</p>	2	
2(c)(i)	concentration of dissolved oxygen decreases ;	1	
2(c)(ii)	concentration of dissolved oxygen increases ;	1	
2(d)	<p>more, photosynthesis / producers / productivity ;</p> <p>due to, wave action / turbulence ;</p>	2	

Question	Answer	Marks	Guidance
3(a)(i)	all the different, species of organisms / populations ; in a particular, habitat / ecosystem, at the same time ;	2	
3(a)(ii)	rate ; at which, organic material / biomass, is produced ;	2	
3(b)	<p><i>any 5 of:</i></p> <ol style="list-style-type: none"> 1 sandy shores are unstable / continuously shifting / longshore drift / AW ; 2 subject to <u>erosion</u> ; 3 <u>sand</u> has a high porosity / dries out quickly / AW ; 4 lack of suitable substrate for attachment ; 5 no / few, producers for food / lack of photosynthesis / low primary productivity ; 6 no shelter / exposure to predators ; 7 only burrowing animals can live there / idea of, only a small number of species are adapted to live there ; 8 few niches available ; 	5	

Question	Answer	Marks	Guidance
3(c)	<p><i>any 6 of:</i></p> <p>1 reefs, dissipate / reduce, wave <u>energy</u> ;</p> <p>2 slow down / reduce, wave action ;</p> <p>3 protect shores from flooding ;</p> <p>4 reduce coastal erosion ;</p> <p>5 provide protection for (named) coastal habitats ;</p> <p>6 provide protection for coastal, properties / infrastructure ;</p> <p>7 idea of providing safe anchorages ;</p>	6	

Question	Answer	Marks	Guidance
4(a)	<p><i>any 3 of:</i></p> <p>increased evaporation in lagoon ;</p> <p>due to high temperature ;</p> <p>increasing concentration of salt which increases salinity ;</p> <p>idea of, <u>dilution</u> of sea water in an estuary / decrease in concentration of salt ;</p> <p>by <u>fresh water</u> from, rivers / run off, decreases salinity ;</p>	3	
4(b)	<p><i>any 2 of:</i></p> <p>force caused by rotation of the Earth ;</p> <p>idea of <u>deflection</u> of, ocean currents / cyclones / wind direction ;</p> <p>ref. to different direction of spin in northern and southern hemisphere / wind or currents have spiral patterns away from the equator ;</p>	2	

Question	Answer	Marks	Guidance
4(c)	<p><i>any 5 of:</i> decrease in temperature of water at surface ; <i>(leads to upwelling)</i> increase in density ; cold / more dense, water sinks ; replaced by water moving up from below / AW ; ref. to convection ; surface currents are driven by the wind ; surface water moved away from coasts ; ref. to (wind driven) currents deflected by underwater ridges causing them to move upwards ; ref. to global conveyer belt / deep water currents, being temperature driven / start at the poles ;</p>	5	

Question	Answer	Marks	Guidance
4(d)	<p><i>any 5 of:</i></p> <ol style="list-style-type: none">1 carbon / carbon dioxide, used to synthesise organic compounds / absorbed by producers / for photosynthesis ;2 magnesium for chlorophyll ;3 phosphorus for, DNA / bones ;4 nitrogen for, amino acids / proteins / DNA ;5 calcium for, bones / teeth / skeleton ;6 nutrients are incorporated into food chains ;7 (loss by) harvesting ;8 (loss by) dead organisms / faeces, sinking to sea floor ;9 (loss by) incorporation into coral reefs ;	5	