

**Biology**

Advanced GCE **2805/03**

Environmental Biology

# **Mark Scheme for June 2010**

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Question			Expected Answers	Marks
1	(a)		fertilizers / named fertiliser / organic waste / sewage / farm waste / slurry / fish waste / AW ;  1  cause algal bloom / AW ; increases amount of organic waste / more dead plants ; leads to increased levels of decomposition (by bacteria) ;     3 max <u>aerobic</u> , decomposers / bacteria ; bacterial populations increase ; <u>more</u> oxygen removed from water ;	max 4
	(b)	(i)	allows calculation of mean BOD ; <b>A</b> Average <b>Ignore</b> 'Fair Test' mean more reliable than single sample / AW ; <b>A</b> ref to anomalies	2
		(ii)	Winkler method ; detail ; e.g. titration <b>or</b> probe ; detail ; e.g. calibration, use of data-logging software	max 2
		(iii)	prevent photosynthesis ; by algae / photosynthetic organism(s) ; which would produce oxygen / increase oxygen levels / AW ;	max 2
		(iv)	standard / valid comparison for different samples ; provides optimum temperature ; for (bacterial) respiration ;	max 2
		(v)	standard length of time for different samples / same for all samples / AW ; allows time for (significant) decrease in oxygen levels ; easier to measure larger decreases with accuracy ;	max 2
				[Total:14]

Question			Expected Answers	Marks
			<i>Credit answers that imply positive contributions of rainforests</i>	
2	(a)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	<i>idea of <b>carbon sinks</b> / reservoirs ;</i> <i>destruction contributes to <b>global warming</b> ;</i> <i>idea of rainforests having a high (plant) <b>productivity</b> ;</i> <i>less carbon dioxide is used in <b>photosynthesis</b> ;</i> <i>more carbon dioxide is released (as a result of burning) ;</i> <i>less photosynthesis also means less oxygen production ;</i> <i><b>transpiration</b> contributes to atmospheric water content ;</i> <i>destruction will lead to a, reduction in rainfall / disruption of water cycle ;</i> <i>idea of species richness / high <b>biodiversity</b> ;</i> <i>moral responsibility to later generations to maintain biodiversity / AW ;</i> <i>can supply <b>sustainable</b> crops ;</i> <i>example of crop, e.g. nuts / rubber / fruits / plant oils / timber / AW ;</i> <i>may supply new drugs / useful compounds / named drug or non food compound</i> <i>;</i> <i>destruction of rainforests leads to <b>soil erosion</b> (on sloping sites) ;</i> <i>idea of importance for human communities / indigenous people ;</i> <i>AVP ;</i>	   <

Question			Expected Answers	Marks
3	(a)		size needs to be appropriate to species under investigation ; sample with increasing size of quadrats ; record number of species in each ; choose minimum quadrat size to include a majority / 80 per cent of species ;	max 3
	(b)		yarrow ; yarrow is found in more quadrats than salad burnet ; yarrow is in 16 / 20 quadrats / frequency is 80 per cent ; salad burnet is in 12 / 20 quadrats / frequency is 60 per cent ;	max 3
	(c)		14 ; ; <b>A</b> 13.8  <i>if answer incorrect give 1 mark for calculation getting 3.45 per quadrat or multiplying whatever they have got per quadrat by 4 /AW</i> 69 / 20 = 3.45 per quadrat 3.45 x 4 / 3.45 ----- 0.25	2
	(d)	(i)	weigh sample of soil ; heat at 60 – 105 <sup>0</sup> C ; <b>R</b> qualitative descriptions, temperatures above 106 until no further loss in mass / constant mass ; water content = initial mass – final mass / initial mass x 100 % ; repeat (and average) ;	max 3
		(ii)	take and weigh dried soil sample / AW ; heat strongly till no further loss in mass ; organic content = initial mass – final mass / initial mass x 100 % ; repeat (and average) ;	max 3
				<b>[Total:14]</b>

Question			Expected Answers	Marks
4	(a)	(i)	extensive farm ;	max 1
		(ii)	<i>idea of</i> (proportionally) greater output compared to input / ora ; output : input of intensive farm = 20650 : 10040 / c.2 ; output : input of extensive farm = 3440 : 245 ; / c. 14 ; input of intensive : input of extensive = 10040 : 245 / c. 41 ; output of intensive : output of extensive = 20650 : 3440 / c. 6 ; <b>A</b> any reasonable use of data used comparatively ;	max 3
	(b)		<i>max 2 for each set of statements</i>  <i>(increased use of) fertilizers / pesticides</i>  provides more nutrients for crop plants ; leading to greater yields ; reduces pest damage / loss of yield ;  <i>(increased use of) machinery</i>  allows much larger area to be cultivated ; in a shorter period of time ; reduced human labour costs ;  <i>farm workers / fuel</i>  allows farm machinery to be operated ;  <i>use of electricity</i>  allows buildings to be kept warmer ; so animals lose less energy ; allows plants to photosynthesise for longer / AW ;  <i>(more) feed given to animals</i>  provides more (concentrated) nutrients ; improves growth rates ;  <i>(more) usage of seeds</i>  ref. to high yield strains ; density of seed planting ;  use of antibiotics / growth hormones ; improves animals growth rates ;	max 6

	(c)	legumes possess root nodules ; which harbour <i>Rhizobium</i> bacteria ; <i>Rhizobium</i> fix nitrogen / AW ; convert nitrogen gas to nitrates / ammonium compounds ; when legumes are ploughed into soil it increases nitrogen compound levels ; as a result of decomposition ; (and) nitrification ; taken up by crop plants ; to be built into amino acids / proteins ; increasing rates of growth and productivity ;	max 5
			<b>[Total:15]</b>

Question		Expected Answers	Marks
5	(a)	beautiful scenery / AW ; containing a wide diversity of habitats ; wide diversity of species / high biodiversity ; some rare / endangered ; important migratory / breeding sites ; important geophysical features ; important cultural heritage features ; amenity value ;	max 4
	(b)	large numbers of visitors ; large local population ;	2
	(c)	<i>max 6 for each aspect</i>  <i>problems</i>  <b>P1</b> large number of visitors ; <b>P2</b> traffic congestion ; <b>P3</b> pollution ; <b>P4</b> litter ; <b>P5</b> footpath erosion ; <b>P6</b> harm / disturbance to, wildlife / habitats ; <b>A</b> trampling <b>P7</b> problems associated with industry / mining / farming ; <b>P8</b> AVP e.g. planning / conflicts / financial restrictions ;  <i>solutions</i>  <b>S1</b> restrict access to vehicles ; <b>S2</b> charge entry fee ; <b>S3</b> park and ride scheme / improved public transport ; <b>S4</b> introduce closed seasons ; <b>S5</b> fence off areas ; <b>S6</b> car park facilities ; <b>S7</b> picnic sites ; <b>S8</b> litter bins / 'take litter home' schemes ; <b>S9</b> redirect damaged paths ; <b>S10</b> repair / deck paths ; <b>S11</b> introduce planning controls ; <b>S12</b> wardens / rangers ; <b>S13</b> AVP e.g. visitor centres ;  <b>QWC – legible text with accurate spelling, punctuation and grammar ;</b>	max 8 1
			<b>[Total:15]</b>



Question		Expected Answers	Marks
6	(a)	deforestation ; habitat destruction ; killed / poached / hunted ; AVP e.g. disease ;	<b>max 2</b>
	(b)	inbreeding / inbreeding depression ; increased risk of inheriting two harmful recessive alleles / AW ; risk of genetic disorder ; reduction in variation / reduced gene pool / AW ; <i>idea of selective disadvantage ;</i> <i>idea of limited numbers of offspring ;</i>	<b>max 4</b>
	(c)	away from natural habitat / AW ; idea of diet ; captivity can lead to ill health ; reduced fertility ; mental illness / stress / repetitive behaviour ; lack of compatibility between partners / AW ;	<b>max 2</b>
			<b>[Total: 8]</b>

Question		Expected Answers	Marks
7	(a)	both decline ; both fluctuate ; greater fluctuation in Irish Sea / ora ; comparative data quote ;	max 3
	(b)	food availability ; level of predation ; mortality rate of young fish / reproductive success / AW ; pollution ; disease / parasites ; intensity of fishing / overfishing ;	max 3
	(c)	numbers will increase ; (possibly) reach carrying capacity ; population levels off due to limiting factor ; e.g. lack of food / increased transmission of disease ;	max 3
			<b>[Total: 9]</b>

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