

Question	E Answers	Marks	Additional Guidance
1 (a)	(both have a) lag phase ; (both have an) exponential / log, phase ; (exponential / log phase) not yet ended / AW ; no, deceleration phase / stationary phase / plateau ; no, decline / death, phase ;	[max 3]	credit use of the terms lag and log / exponential if the comparison is implied  do not credit description of data in Fig 4.1 if no attempt at comparison
(b) (i)	<i>award two marks if correct answer (8.1) is given, if no answer given or answer is incorrect or answer given to more than one decimal place, award one mark for working</i>  520 – 478 / 520 x 100  8.1 ;;	[2]	
(ii)	<i>clear land for</i> housing / buildings ; farms ; roads ;  fuel ; paper ; AVP ; e.g. building materials	[2]	<b>R</b> logging unqualified

Question	E Answers	Marks	Additional Guidance
1 (c)	<p style="text-align: center;"><i>2 marks max per aspect of environment to total max of 8</i></p> <p><b>number of species</b> loss of habitat ; loss of species / decrease / extinction / endangered ; AVP ; e.g. less food available / disruption to food chain</p> <p><b>soils</b> increase in water content / waterlogging ; increase in flooding ; soil erosion / described ; loss of, <u>top</u>soil / nutrients ; <b>A</b> soil becomes less fertile AVP ;</p> <p><b>rivers</b> soil washed into rivers ; more silt ; more nutrients ; rivers flood ; AVP ;</p> <p><b>atmosphere</b> drier / less water vapour ; less transpiration ; more carbon dioxide ; trees are burnt ; less oxygen ; ref. to photosynthesis (in context of carbon dioxide or oxygen) ; less rainfall ; global warming / climate change qualified ;</p>	[max 8]	AVP – <b>A</b> correct ref. to eutrophication but ignore further detail
(d)	<p><b>1</b> <i>idea of</i> limited resources ;</p> <p><b>2</b> less, mining / plastic manufacture / deforestation ;</p> <p><b>3</b> less waste to, land fill / rubbish tips ;</p> <p><b>4</b> recycling uses less energy than, making paper / making plastic / mining / smelting ;</p> <p><b>5</b> ref. to pollution qualified e.g. toxic gases from burning plastic ;</p> <p><b>6</b> AVP ;</p>	[max 3]	<b>A</b> qualified ref. to global warming
<b>[Total: 18]</b>			

- 2 (a) community / (all) organisms / animals and plants / (all) species / (all) populations / AW ;  
 (living together) in same, area / place / environment ; **R** habitat  
 many habitats ;  
 interacting / interdependent / AW ; **A** food chains / food web  
 (together with) abiotic / physical / non-living, factors / features ; [max 2]
- (b) they provide excellent food for humans ;  
 they provide, sport / fishing, for tourists ; [2]
- (c) (producer) ;  
 (herbivore) cichlid fish + prawns ;  
 (carnivore) Nile perch + humans ; [3]
- (d) 1 algae grow / plants grow ; **A** algal bloom  
 2 less light for, plants / photosynthesis ; **A** more competition for light  
 3 (therefore) plants die ;  
 4 plants stop producing oxygen ;  
 5 (aerobic) bacteria / decomposers, feed on dead plants ;  
 6 use up oxygen (in respiration) / ref to aerobic ;  
 7 low levels of oxygen cause fish to, die / suffocate ; **A** not enough oxygen to breathe /  
 AW  
 8 bacteria produce toxins which cause fish to die ; [max 4]

**[Total: 11]**

Question		Marks	Guidance Notes
3 (a) (i)	testes ;	[1]	<b>A</b> adrenal gland / ovaries
(ii)	increases, muscle mass / strength / power ; improved recovery of muscle damage / promotes protein synthesis ; increase, competitive drive / aggression / AW ; increases bone, density / mass ;	[max 1]	
(iii)	maintains, uterine lining / endometrium ; inhibits, FSH / LH (release) ;	[max 1]	<b>R</b> uterus wall. <b>I</b> thickens lining
(iv)	oestrogen ;	[1]	
(b)	<b>A is most polluted because:</b> greater (overall) concentration of hormones ; all hormones at higher concentration except oestrogen ; comparative data quote with units ; (but) similar levels of oestrogen / (natural) progesterone (to <b>B</b> ) ;  <b>B is most polluted because</b> more oestrogen (than <b>A</b> ) ; more <u>types</u> of hormones ;	[max 3]	
(c) (i)	<b>Lake B</b> oestrogen decreases (slightly) ; progesterone / testosterone, increases (slightly) ; <b>Lake A or Lake B</b> <u>no/little</u> , effect on oestrogen / progesterone / testosterone <u>without</u> ozone ; <b>Lake A</b> chlorine <u>with ozone</u> caused, decrease in testosterone / synthetic progesterone / increase in natural progesterone ;	[max 2]	<b>A</b> mp 1, 2, 4 as data quotes  <b>R</b> little effect on testosterone <u>with ozone</u>
(ii)	make the water safe, to return to the environment / for human use ; kill, pathogens / (harmful) microorganisms / bacteria ;	[1]	<b>I</b> germs <b>A</b> disinfectant / sterilisation

Question		Marks	Guidance Notes
3 (d)	<p><u>eutrophication</u> ;</p> <p>(aquatic) plants, die/cannot photosynthesise (due to blocked light) algae/ (aquatic) plants/organic material, decayed by bacteria ;</p> <p>(aerobic) respiration (by bacteria/decomposers) ; decreased pH / increased acidity (due to low oxygen) ;</p> <p>oxygen concentration decreases (due to bacteria /decomposers) ; (aquatic) animals/ fish, migrate/die, due to lack of oxygen ;</p> <p>disrupted/ altered, (aquatic) food chains/habitats ; more, flies/mosquitoes ; (more) waterborne (named) disease ; e.g. cholera/typhoid smelly/visual pollution ; toxicity / mutations caused, by heavy metals/sewage ;</p> <p>(female contraceptive) hormones cause feminisation of (aquatic) organisms ; (female contraceptive) hormones cause reduced sperm count (in aquatic animals) ;</p>	[max 6]	<p>I marine and other non-lake ecosystems I unqualified death /extinction throughout</p> <p><b>A</b> growth of, floating aquatic plants / algae / algal bloom <b>A</b> nutrients in sewage as organic material <b>A</b> microorganisms/ decomposers for bacteria</p> <p>I <u>all</u> oxygen used up</p> <p><b>A</b> diseases /pathogen in humans or aquatic organisms</p> <p><b>A</b> biomagnification/ bioaccumulation / death of (aquatic) organisms by, heavy metals / toxins / poisons, in sewage</p> <p><b>A</b> hormone may cause gender change in fish</p>
		<b>[Total : 16]</b>	