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)	*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* 520 – 478 / 520 x 100 8.1 ;;	[2]	
(ii)	*clear land for* housing / buildings ; farms ; roads ; fuel ; paper ; AVP ; e.g. building materials	[2]	**R** logging unqualified

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Question	E	Answers	Marks	Additional Guidance
1 (c)		*2 marks max per aspect of environment to total max of 8*		
		number loss of habitat **;** **of species** loss of species / decrease / extinction / endangered **;** AVP **;** e.g. less food available / disruption to food chain **soils** increase in water content / waterlogging **;** increase in flooding **;** soil erosion / described **;** loss of, topsoil / nutrients **; A** soil becomes less fertile AVP **;** **rivers** soil washed into rivers **;** more silt **;** more nutrients **;** rivers flood **;** AVP **;** **atmosphere** 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 **;**	[max 8]	AVP – **A** correct ref. to eutrophication but ignore further detail
(d)	1 2 3 4 5 6	*idea of* limited resources **;** less, mining / plastic manufacture / deforestation **;** less waste to, land fill / rubbish tips **;** recycling uses less energy than, making paper / making plastic / mining / smelting **;** ref. to pollution qualified e.g. toxic gases from burning plastic **;** AVP **;**	[max 3]	**A** qualified ref. to global warming
			[Total: 18]	

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]	**A** 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]	**R** uterus wall. **I** thickens lining
		(iv)	oestrogen ;	[1]	
	(b)		*A is most polluted because:* 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 is most polluted because* more oestrogen (than **A**) ; more <u>types</u> of hormones ;	[max 3]	
	(c)	**(i)**	*Lake **B*** oestrogen decreases (slightly) ; progesterone / testosterone, increases (slightly) ; *Lake **A** or Lake **B*** <u>no / little</u>, effect on oestrogen / progesterone / testosterone <u>without</u> ozone; *Lake **A*** chlorine <u>with ozone</u> caused, decrease in testosterone / synthetic progesterone / increase in natural progesterone ;	[max 2]	**A** mp 1, 2, 4 as data quotes **R** 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]	**I** germs **A** disinfectant / sterilisation

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