Human Influences on Ecosystems

Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Human Influences on Ecosystems
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 3

Time Allowed: **58 minutes**

Score: **/48**

Percentage: **/100**

	Answer	Marks	Guid for Examiners
1 (a)		[5]	

pollutant		effect on the environment
heavy metals, e.g. lead and mercury	factories / industries / mining / exhaust from transport / chemical plants / sewage (sludge) ;	
phosphate	fertiliser / detergents / sewage ;	
sulfur dioxide	(combustion of) coal / oil / factories / power stations / chemical plants / exhaust from transport ;	
ionising radiation	nuclear fall-out / radioactive waste / nuclear industries / nuclear power plants / uranium / plutonium / X-rays	mutations / cancers ; A changes genes / changes DNA

1	(b)	1 2 3 4 5 6 7 8 9	growth of algae / algal bloom ; light blocked (by algae) ; reduced / no, photosynthesis ; (so) algae / (fixed) water plants, die ; less / no, oxygen released by plants ; algae / plants, fed on / decayed / decomposed, by bacteria ; bacteria, multiply / increase / grow / divide ; (aerobic) respiration ; low levels of oxygen cause, death / suffocation / migration, of, (named) fish / animals / invertebrates / (aquatic) creatures / organisms / consumers ;	max [5]	
	(c)	1 2 3 4 5 6 7	add lime(stone) / calcium carbonate / $CaCO_3$ / alkali, to, lakes / rivers / soils ; use less fossil fuels ; **ignore** stop using fossil fuels use low sulfur fuels ; **A** stop using sulfur fuels desulfurisation of, coal / oil ; flue gas desulfurisation / 'use (wet) scrubbers' / neutralise waste gases with lime ; catalytic converters / use electric cars ; *idea of* international treaty for reducing emissions ;	max [2]	

2 **(a)**	**1** diffusion / osmosis / move, from cell (to air space) **;** **2** (water moves) through cell wall / membrane **;** **3** evaporates into the air spaces (inside the leaf) **;** **4** water vapour moves out through the stomata **;** **5** (vapour) diffuses (through stomata) **;** **6** transpiration **;**	max [4]	
(b)	**1** water moves through the xylem **;** **2** transpiration pull **;** **3** water column under tension / negative / less, pressure (in leaves) **;** **4** cohesive forces between water molecules **;** **5** lowers water potential / water potential gradient from root to leaves **;** **6** adhesive forces between water molecules and xylem (wall) **;**	max [4]	**Ignore** water concentration
(c)	**1** osmosis **;** **2** down a water potential gradient **;** **3** into the root hairs **;** **4** through a partially permeable membrane **;**	max [3]	**Ignore** water concentration

2	(d)	**1** filtration / screening to remove large pieces of waste ; **2** flocculation / coagulation to separate suspended particles from water / sedimentation to settle particles ; **3** digestion by, bacteria / fungi / decomposers / microorganisms ; **4** with aeration (tank) / trickle filter / activated sludge ; **5** sludge treated with anaerobic decomposers / anaerobic digestion ; **6** (water) treated with, chlorine / ozone / UV (light) ; **7** distillation / collection of water from evaporator ;	max [3]	
	(e)	**1** kill other plants that are not weeds ; **2** harms, insect / animals ; **3** bioaccumulation / AW ; **4** loss of biodiversity / destroy habitat ; **5** run off into, streams / rivers / lakes ; **6** selects for herbicide, resistance / tolerance ; **7** weeds become more difficult to control / AW ;	max [3]	
			[Total:17]	

3 (a)	NO_x / nitrogen dioxide / nitrous oxide / NO_2 / NO_3 ; carbon dioxide ;		[ma 1]	
(b)	1 2 3 4 5 6 7 8	kills / damages (named) plants ; (acidic) soil leaching AW ; released (named) metals ; e.g. aluminium nutrients in soil no longer available to plants ; prevents decomposition ; dissolves limestone / marble / sandstone AW ; acidification of lakes ; (fresh water) fish / invertebrates die ;	[max 3]	
(c)	1 2 3 4 5 6 7 8	scrubbers / flue gas desulfurisation, in power stations / chimneys / neutralise waste gases with lime ; desulfurisation of coal / oil ; use less fossil fuels ; use low sulfur, fuel / petrol / diesel ; use alternative / renewable / sustainable / green sources of energy ; A gas-to-liquid (methane to petrol / diesel) catalytic converters / use electric cars ; any one method to reduce demand for energy ; idea of international treaty for reducing emissions ;	[max 3]	
(d) (i)	sharp decrease in both, until 1997 ; more gradual decrease in both, since 1997 ; both follow same trend ; comparative use of data ;		[ma 3]	
(ii)	fresh mass changes with water content ; dry mass is less variable / more consistent, for comparison ; dry mass is a measure of growth ; *idea that* percentage standardises changes in tissue concentration for comparison ;		[ma 2]	
			[Total: 12]	

Question		Marks	Additional Guidance
4 (a)	**1** secrete / make / use, enzymes; **2** breakdown <u>insoluble</u> substances to <u>soluble</u> substances; **3** (named) protease; **4** breaks down protein to amino acids; **5** amylase / carbohydrase; **6** breaks down starch to, glucose / maltose / sugar; **7** lipase; **8** breaks down fat to fatty acids and glycerol; **9** (named) products respired; **10** using oxygen; **11** carbon dioxide released; **12** ammonia produced; **13** AVP; ref to nitrification	**max 5**	**A** pepsin e.g. glucose / sugars / fatty acids / amino acids **MP9**, **MP10** and **MP11** can be taken from a word equation **MP9** can be awarded for $C_6H_{12}O_6$ in a chemical equation **MP10** and **MP11** can be taken from a correctly balanced chemical equation
(b)	(chlorine) kills bacteria / acts as a disinfectant; **R** 'remove bacteria' (some) bacteria may, cause disease / be pathogenic; so water is not harmful to the environment / does not kill (named) organisms;	**max 2**	**A** microorganisms **I** harmful unqualified **I** makes the water safe unqualified kills, pathogenic / disease-causing, bacteria = 2
		[Total: 7]	