

	Answer	Marks	Guid for Examiners															
1 (a)	<table border="1"> <thead> <tr> <th data-bbox="324 278 602 376">pollutant</th> <th data-bbox="602 278 996 376"></th> <th data-bbox="996 278 1321 376">effect on the environment</th> </tr> </thead> <tbody> <tr> <td data-bbox="324 376 602 567">heavy metals, e.g. lead and mercury</td> <td data-bbox="602 376 996 567">factories / industries / mining / exhaust from transport / chemical plants / sewage (sludge) ;</td> <td data-bbox="996 376 1321 567"></td> </tr> <tr> <td data-bbox="324 567 602 665">phosphate</td> <td data-bbox="602 567 996 665">fertiliser / detergents / sewage ;</td> <td data-bbox="996 567 1321 665"></td> </tr> <tr> <td data-bbox="324 665 602 866">sulfur dioxide</td> <td data-bbox="602 665 996 866">(combustion of) coal / oil / factories / power stations / chemical plants / exhaust from transport ;</td> <td data-bbox="996 665 1321 866"></td> </tr> <tr> <td data-bbox="324 866 602 1067">ionising radiation</td> <td data-bbox="602 866 996 1067">nuclear fall-out / radioactive waste / nuclear industries / nuclear power plants / uranium / plutonium / X-rays</td> <td data-bbox="996 866 1321 1067">mutations / cancers ; A changes genes / changes DNA</td> </tr> </tbody> </table>	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	[5]	
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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 ; <i>idea of</i> international treaty for reducing emissions ;	max [2]	

2 (a)	<ol style="list-style-type: none"> 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) <u>diffuses</u> (through stomata) ; 6 <u>transpiration</u> ; 	max [4]	
(b)	<ol style="list-style-type: none"> 1 water moves through the xylem ; 2 <u>transpiration pull</u> ; 3 water column under tension / negative / less, pressure (in leaves) ; 4 cohesive forces between water molecules ; 5 lowers water <u>potential</u> / water <u>potential</u> gradient from root to leaves ; 6 adhesive forces between water molecules and xylem (wall) ; 	max [4]	Ignore water concentration
(c)	<ol style="list-style-type: none"> 1 <u>osmosis</u> ; 2 down a <u>water potential</u> gradient ; 3 into the root hairs ; 4 through a partially permeable membrane ; 	max [3]	Ignore water concentration

2 (d)	<ol style="list-style-type: none"> 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 <u>anaerobic</u> decomposers / <u>anaerobic</u> digestion ; 6 (water) treated with, chlorine / ozone / UV (light) ; 7 distillation / collection of water from evaporator ; 	max [3]	
(e)	<ol style="list-style-type: none"> 1 kill <u>other</u> 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)	<p>1 kills / damages (named) plants ;</p> <p>2 (acidic) soil leaching AW ;</p> <p>3 released (named) metals ; e.g. aluminium</p> <p>4 nutrients in soil no longer available to plants ;</p> <p>5 prevents decomposition ;</p> <p>6 dissolves limestone / marble / sandstone AW ;</p> <p>7 acidification of lakes ;</p> <p>8 (fresh water) fish / invertebrates die ;</p>	[max 3]	
	(c)	<p>1 scrubbers / flue gas desulfurisation, in power stations/ chimneys / neutralise waste gases with lime ;</p> <p>2 desulfurisation of coal / oil ;</p> <p>3 use less fossil fuels ;</p> <p>4 use low sulfur, fuel / petrol / diesel ;</p> <p>5 use alternative / renewable / sustainable / green sources of energy ;</p> <p>6 A gas-to-liquid (methane to petrol / diesel) catalytic</p> <p>7 converters / use electric cars ;</p> <p>8 any one method to reduce demand for energy ; idea of international treaty for reducing emissions ;</p>	[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 ; <i>idea that</i> percentage standardises changes in tissue concentration for comparison ;	[ma 2]	
			[Total: 12]	

Question		Marks	Additional Guidance
4 (a)	<p>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;</p> <p>9 (named) products respired; 10 using oxygen; 11 carbon dioxide released;</p> <p>12 ammonia produced; 13 AVP; ref to nitrification</p>	max 5	<p>A pepsin</p> <p>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</p>
(b)	<p>(chlorine) kills bacteria / acts as a disinfectant; R 'remove bacteria'</p> <p>(some) bacteria may, cause disease / be pathogenic;</p> <p>so water is not harmful to the environment / does not kill (named) organisms;</p>	max 2	<p>A microorganisms</p> <p>I harmful unqualified</p> <p>I makes the water safe unqualified</p> <p>kills, pathogenic / disease-causing, bacteria = 2</p>
		[Total: 7]	