

# Human Influences on Ecosystems

## Mark Scheme 3

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

**Time Allowed:** 58 minutes

**Score:** /48

**Percentage:** /100

	Answer	Marks	Guid for Examiners															
1 (a)	<table border="1"> <tr> <td data-bbox="324 355 602 454">pollutant</td> <td data-bbox="602 355 996 454"></td> <td data-bbox="996 355 1321 454">effect on the environment</td> </tr> <tr> <td data-bbox="324 454 602 646">heavy metals, e.g. lead and mercury</td> <td data-bbox="602 454 996 646">factories / industries / mining / exhaust from transport / chemical plants / sewage (sludge) ;</td> <td data-bbox="996 454 1321 646"></td> </tr> <tr> <td data-bbox="324 646 602 745">phosphate</td> <td data-bbox="602 646 996 745">fertiliser / detergents / sewage ;</td> <td data-bbox="996 646 1321 745"></td> </tr> <tr> <td data-bbox="324 745 602 946">sulfur dioxide</td> <td data-bbox="602 745 996 946">(combustion of) coal / oil / factories / power stations / chemical plants / exhaust from transport ;</td> <td data-bbox="996 745 1321 946"></td> </tr> <tr> <td data-bbox="324 946 602 1147">ionising radiation</td> <td data-bbox="602 946 996 1147">nuclear fall-out / radioactive waste / nuclear industries / nuclear power plants / uranium / plutonium / X-rays</td> <td data-bbox="996 946 1321 1147">mutations / cancers ; A changes genes / changes DNA</td> </tr> </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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<p>1 (b)</p>	<p>1 2 3 4 5 6 7 8 9</p>	<p>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 ;</p>	<p>max [5]</p>	
<p>(c)</p>	<p>1  2 3  4 5  6  7</p>	<p>add lime(stone) / calcium carbonate / <math>\text{CaCO}_3</math> / alkali, to, lakes / rivers / soils ;  use less fossil fuels ; <b>ignore</b> stop using fossil fuels use low sulfur fuels ; <b>A</b> 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 ;</p>	<p>max [2]</p>	

<p>2 (a)</p>	<p>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 <u>transpiration</u> ;</p>	<p>max [4]</p>	
<p>(b)</p>	<p>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) ;</p>	<p>max [4]</p>	<p><b>Ignore</b> water concentration</p>
<p>(c)</p>	<p>1 <u>osmosis</u> ;                  2 down a <u>water potential</u> gradient ;                  3 into the root hairs ;                  4 through a partially permeable membrane ;</p>	<p>max [3]</p>	<p><b>Ignore</b> water concentration</p>

<p>2 (d)</p>	<p>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 ;</p>	<p>max [3]</p>	
<p>(e)</p>	<p>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 ;</p>	<p>max [3]</p>	
		<p><b>[Total:17]</b></p>	

3 (a)	NO <sub>x</sub> / nitrogen dioxide / nitrous oxide / NO <sub>2</sub> / NO <sub>3</sub> ; carbon dioxide ;	[ma 1]	
(b)	<ol style="list-style-type: none"> <li>1 kills / damages (named) plants ;</li> <li>2 (acidic) soil leaching AW ;</li> <li>3 released (named) metals ; e.g. aluminium</li> <li>4 nutrients in soil no longer available to plants ;</li> <li>5 prevents decomposition ;</li> <li>6 dissolves limestone / marble / sandstone AW ;</li> <li>7 acidification of lakes ;</li> <li>8 (fresh water) fish / invertebrates die ;</li> </ol>	[max 3]	
(c)	<ol style="list-style-type: none"> <li>1 scrubbers / flue gas desulfurisation, in power stations/ chimneys / neutralise waste gases with lime ;</li> <li>2 desulfurisation of coal / oil ;</li> <li>3 use less fossil fuels ;</li> <li>4 use low sulfur, fuel / petrol / diesel ;</li> <li>5 use alternative / renewable / sustainable / green sources of energy ;</li> <li>6 A gas-to-liquid (methane to petrol / diesel) catalytic converters / use electric cars ;</li> <li>7 any one method to reduce demand for energy ;</li> <li>8 idea of international treaty for reducing emissions ;</li> </ol>	[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>	<p>max 5</p>	<p>A pepsin</p> <p>e.g. glucose / sugars / fatty acids / amino acids  <b>MP9, MP10</b> and <b>MP11</b> can be taken from a word equation  <b>MP9</b> can be awarded for <math>C_6H_{12}O_6</math> in a chemical equation  <b>MP10</b> and <b>MP11</b> can be taken from a correctly balanced chemical equation</p>
(b)	<p>(chlorine) kills bacteria / acts as a disinfectant; <b>R</b> '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>	<p>max 2</p>	<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>
		<p>[Total: 7]</p>	