

	Answers	Marks	Guidance for Examiners
1 (a) (i)	amino acid / protein / RNA / DNA / AW;	[1]	A named protein, both plant and animal
(ii)	secondary (consumer) / carnivore / predator ;	[1]	R third / tertiary
(iii)	excretion ;	[1]	
(iv)	nitrification ;	[1]	A oxidation
(b)	<p>1 <i>idea that</i> (fixed) nitrogen is in limited supply ;</p> <p>2 <i>idea that</i> if not recycled is not available for plants to absorb ;</p> <p>3 needed for many biological compounds ;</p> <p>4 (required by organisms to make) amino acids / proteins / DNA / chlorophyll ;</p> <p>5 for growth / for repair / for enzymes / for genes / AW ;</p>	[max 3]	
(c)	<p>1 not ideal habitat / not well adapted to habitat / conditions not favourable ;</p> <p>2 any suitable reason ; e.g. too dry / wrong soil / wrong pH / wider leaves / larger leaf surface (area)</p> <p>3 (seedlings) eaten by impala / herbivores ;</p> <p>4 much tastier than grass / better nutritional content ;</p> <p>5 competition with grasses ;</p> <p>6 for any resource ; e.g. light / nutrients / minerals / water</p> <p>7 slow growing ;</p> <p>9 AVP ; e.g. few seeds produced, lack of suitable pollinators, lack of suitable / required symbiont, soil contains plenty of nitrate (so no advantage to being a nitrogen fixer, because of much animal dung) / poor seed dispersal</p> <p>8 Connection...lightning and nitrogen in soil ;</p>	[max 3]	<p>I competition with self</p> <p>A lack of light / minerals / water</p>

	Answers	Marks	Guidance for Examiners
1 (d)	<p>1 <i>general idea of energy loss (in food chain) ;</i>  2 cheetahs are at a higher trophic level (than impala) / impala are the primary consumers / prey ;  3 each cheetah eats many impala;  4 large population of cheetahs cannot be sustained / number of impala controls or determines the number of cheetahs ;</p> <p>5 hunted / poached (for skins) ;  6 killed by local people as they feed on animals ;  7 reference to balanced ecosystem / food chain / food web;  8 cheetahs do not eat, all impalas / all parts of an impala  9 'lose energy', in respiration / as heat to environment ;  10 <i>and in</i> movement / excretion / egestion / reproduction ;  11 offspring killed / die (while growing) by other predators / their prey  12 AVP ;</p>	[max 4]	
(e)	<p>1 <b>idea of</b> interdependence ;  2 if one species is lost others may become extinct ;  3 rely indirectly on plants ;  4 impala eat a variety of plants ;  5 cheetahs eat a variety of other prey animals ;  6 <i>idea of</i> conserving habitats ;  7 to ensure species continue for future generations to, enjoy / use ;  8 biodiversity reference;</p>	[max 3]	<p>A idea of knock-on effect / AW</p> <p>A tourism</p>
		[Total:17]	

Question	E answers	Mark	Additional Guidance
2 (a)	unsegmented ; <b>A</b> no segments soft bodies ; (muscular) foot ; <b>ignore</b> feet mantle ; visceral mass ; AVP ;	[max 2]	<b>ignore</b> no (exo)skeleton no backbone no bones radula bilaterally symmetrical shell / exoskeleton
(b)	(8) legs / tentacles / arms / limbs / ; (large) eye ; has a head ; no shell / (completely) soft body / no exoskeleton / no external skeleton ; suckers (on tentacles) ;	[max 2]	<b>R</b> any internal features (see the question) <b>R</b> feelers / hands <b>ignore</b> no (muscular) foot / feet  <b>A</b> suction pads
(c)	<i>look for an adaptation for attachment and an adaptation for survival when exposed to air allow ecf from part (a)</i>  <i>attachment</i> threads / (muscular) foot / sticky fluid ;  <i>survival in the air</i> <i>either</i> shell / exoskeleton, prevents / reduces, water loss /  <i>or</i> shell / exoskeleton, protects against (named) predator(s) ;	[max 2]	<b>A</b> any suitable description of the threads e.g. fibres, projections, extension tentacles, etc. <b>R</b> suckers <b>A</b> slime / mucus for sticky fluid  <b>ignore</b> protection unqualified <b>ignore</b> anything to do with gas exchange <b>ignore</b> camouflage  if named must <b>not</b> be an aquatic predator

<p>2 (d) 1 2 3 4 5 6 7</p>	<p>has no, competitor(s) / predators (therefore increase in numbers) ; has no, pathogens / parasites / disease-causing organism(s) ; competes with existing species for, food/nutrients/space/oxygen ; could be a, predator / consumer , of other species ;     <b>A</b> feeds on (many) other species could introduce, disease / parasite, for native species cause migration of native species ; AVP ; e.g. reduces <u>biodiversity</u>     causes <u>extinction</u>     decrease in numbers, higher in food web / at higher trophic levels     increase in predators of zebra mussels</p>	<p>[max 3]</p>	
<p>(e) 1 2 3 4 5 6</p>	<p>do not move about / stay in one place, so exposed to pollutant (continuously) ; pollutant, kills them / reduces their numbers / prevents them breeding ; ; so presence / absence, is a good indicator ; pollutant accumulates (in animal's body) ; pollutant, detectable when concentrations are low / no longer present ; ; AVP ; they are filter feeders do not need to know what the pollutant is (as would be the case for a chemical test) no need for lab facilities / no need for equipment / can be done in the field</p>	<p>[max 2]</p>	<p><b>R</b> more accurate</p> <p><b>ignore</b> easy to, see / collect ; quicker to do skills / training needed / cheaper</p>

<p>2 (f)</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p>	<p><i>non-biodegradable plastics</i></p> <p>swallowed / ingested / eaten / cannot be digested ;</p> <p>caught around / trapped / entangled ;</p> <p>choke / blocks gut / smother / suffocate / injure / cut / trap / stuck in / AW ;</p> <p>plastic blocks light for <u>photosynthesis</u> ;</p> <p>may, contain / release, (oil-soluble) toxins / poisons ;</p> <p>large pieces of plastic may block flow of water (in a river) ; that reduce concentration of dissolved oxygen ;</p> <p>effect of loss of organism at a trophic level ;</p> <p>AVP ; e.g. any other consequence for organisms</p>	<p>[max 3]</p>	<p><b>ignore</b> kills / dies unqualified</p> <p><b>A</b> organism is poisoned (by toxins) <b>R</b> 'plastics are toxic'</p> <p><b>A</b> suffocate in <b>MP3</b> as a consequence of <b>MP4</b> <b>MP6</b> and <b>MP7</b> are linked</p>
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Question		E	Answers	Marks	Additional Guidance
3	(a)	1	provide, mineral (elements)/(named) ions/(plant) nutrients ;	[max 3]	<b>MP2 A</b> any reason, e.g. removed in crops at harvest/leached/AW  <b>MP5 R</b> chloroplast
		2	that are in low concentration in soils ;		
		3	(minerals/ions are) limiting factor(s) ;		
		4	for, growth/yield ;		
		5	magnesium (ions) for chlorophyll production ;		
		6	for photosynthesis ;		
		7	nitrogen/nitrate (ions), for making, amino acids/ proteins ;		
	(b)		oxygen ; water/moisture ; suitable/ warm temperature ; AVP ;	[max 3]	<b>ignore</b> humidity unqualified <b>R</b> 'hot', 'heat' examples of AVPs any condition that breaks dormancy, e.g. light/optimum pH
	(c)	1	sulfuric acid has a bigger effect on roots than shoots ;	[max 4]	<i>for MP5 and MP6 see the table of results (results from two rows are required in each case)</i> units must be stated once
		2	0.003 mol per dm <sup>3</sup> sulfuric acid has biggest effect ;		
		3	increase in root growth until 0.003 mol dm <sup>3</sup> sulfuric acid ; <b>ORA</b>		
		4	negligible difference in effect (on root/ shoot) between 0.001 and 0.002 mol dm <sup>3</sup> sulfuric acid ;		
		5	comparative data quote for <u>root</u> growth ;		
		6	comparative data quote for <u>shoot</u> growth ;		
	(d)	1	increase in burning, fossil fuels/named fossil fuel ;	[2]	more is not needed for <b>MP2</b> as question says 150 years
		2	cars/factories/power stations/AW ;		

Question		E Answers	Marks	Additional Guidance
3	(e)	<p><i>effects of sulfur dioxide on organisms and their environment</i></p> <p><b>1</b> plants/leaves/roots/trees/bark, damaged/killed/stunted growth ;</p> <p><b>2</b> plants more likely to get diseased ;</p> <p><b>3</b> inhibits germination ;</p> <p><b>4</b> (sensitive species of ) lichens killed ;</p> <p><b>5</b> microorganisms killed ;</p> <p><b>6</b> soil/lake/river, pH decreases ; AW</p> <p><b>7</b> aluminium ions become mobile ;</p> <p><b>8</b> nutrients/named example(s), leached ;</p> <p><b>9</b> shells damaged ;</p> <p><b>10</b> animals fail to reproduce ;</p> <p><b>11</b> low pH/aluminium ions, toxic to fish ;</p> <p><b>12</b> fish produce mucus which blocks gills ;</p> <p><b>13</b> AVP ;</p>	[max 3]	<p><i>ignore sea</i></p> <p><i>ignore marine (fish)</i></p> <p><i>examples of AVPs for MP13</i>            chemical weathering/dissolve carbonate rocks            respiratory problems in, human/animals            (described) consequence for food chains</p>
			<b>[Total: 15]</b>	