

Module 3: Biodiversity and Evolution

2.3.4 Maintaining Biodiversity

Questions

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| (a) outline the reasons for the conservation of animal and plant species, with reference to economic, ecological, ethical and aesthetic reasons |
| (b) discuss the consequences of global climate change on the biodiversity of plants and animals, with reference to changing patterns of agriculture and spread of disease |
| (c) explain the benefits for agriculture of maintaining the biodiversity of animal and plant species |
| (d) describe the conservation of endangered plant and animal species, both <i>in situ</i> and <i>ex situ</i> , with reference to the advantages and disadvantages of these two approaches |
| (e) discuss the role of botanic gardens in the <i>ex situ</i> conservation of rare plant species or plant species extinct in the wild, with reference to seed banks; |
| (f) discuss the importance of international cooperation in species conservation with reference to The Convention in International Trade in Endangered Species (CITES) and the Rio Convention on Biodiversity |
| (g) discuss the significance of environmental impact assessments (including biodiversity estimates) for local authority planning decisions |

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Mark Scheme

June 2012

Question	Answer	Marks	Guidance
6 (a)	<p>1 <u>artificial selection</u> / <u>selective breeding</u> ;</p> <p>2 select (male and female) sheep that are, larger / woollier / meatier/ have desired characteristics ;</p> <p>3 crossbreed / breed (together) / mate (together) / interbreed ;</p> <p>4 select , best / AW, offspring ;</p> <p>5 <i>idea of breeding</i> (and selecting) for , many / several , generations ;</p>	3 max	<p>2 ACCEPT 'large / woolly / meaty, male and female that can produce healthy offspring' ;</p> <p>2 'sheep' can be inferred from 'individuals' as it is in the stem of the question</p> <p>3 ACCEPT 'reproduce'</p> <p>5 IGNORE traits passed on through generations, answers must imply breeding and selection</p>
(ii)	<p>(use of) (named) antibiotics ;</p> <p>(use of) (named) pesticides / insecticides / fungicides ;</p> <p>cloning / genetic modification / AW ;</p> <p>artificial insemination / AI / IVF / marker-assisted selection ;</p> <p>hormones ;</p> <p>vaccinations ;</p>	1 max	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE refs to 'fertiliser' etc., as 'sheep' is in question stem</p> <p>IGNORE refs to diet</p> <p>ACCEPT 'steroids' / 'growth supplements'</p> <p>IGNORE 'better veterinary care'</p>

Question		Answer	Marks	Guidance
6	(b)			
	(i)			
	1	broken down by, decomposers / bacteria / fungi ;	3 max	
	2	add (named) mineral(s) <u>to soil</u> ;		2 IGNORE nutrients ACCEPT ions
	3	nitrate and phosphate and potassium / NPK ;		3 ACCEPT nitrogen , $\text{NO}_3^{(-)}$, $\text{PO}_4^{(3-)}$, $\text{K}^{(+)}$ NH_3 , $\text{NH}_4^{(+)}$, ammonium, ammonia 3 IGNORE phosphorous, P , N_2
	4	specific use of (any) named mineral ;		4 eg nitrate or nitrogen for protein, magnesium for chlorophyll, etc. 4 DO NOT CREDIT vague uses like 'nitrate for growth'
	5	lack of (named) , mineral(s) / nutrient(s) / ion(s), is <u>limiting factor</u> (for growth) ;		
	6	<i>example of way</i> in which soil quality is improved ;		6 ACCEPT for example change in pH / crumb size / air content / moisture content / less leaching of minerals / increased humus / presence of (named) detritivores / less risk of soil erosion

Question	Answer	Marks	Guidance
6 (b) (ii)	<p>1 (fertiliser) promotes growth of, one / few, (plant) species ;</p> <p>2 other (plant) species, out-competed / AW (as a result of competition from crop species) ;</p> <p>3 idea of disruption of food chains ;</p> <p>4 idea of reduction in, soil quality / humus, over time so plants cannot grow ;</p>	2 max	<p>1 ACCEPT 'once species might grow more than another'</p> <p>1 IGNORE 'yield'</p> <p>2 IGNORE fertilisers / eutrophication, killing other plants</p> <p>2 ACCEPT 'other plants die' in the context of their being out-competed by the crop plant</p> <p>3 DO NOT CREDIT in the context of biomagnification / eutrophication</p> <p>4 ACCEPT 'might change soil pH so some plants can't grow'</p>
(iii)	<p>1 loss of genetic, diversity / variation (in wild population) ;</p> <p>2 environment / agricultural requirements, may change (in future) ;</p> <p>3 (lost) genes / alleles, may have been useful ;</p> <p>4 e.g. of gene useful to agriculture ;</p> <p>5 fewer pollinators ;</p> <p>6 loss of (pest) predators ;</p>	3 max	<p>IGNORE answers in the context of genetic variation within the domestic population. For example, 'if one plant is susceptible to a disease then they might not all die.'</p> <p>1 ACCEPT small / reduced, gene pool</p> <p>3 ACCEPT 'potential genetic resource may have been lost'</p> <p>4 e.g., gene for pest resistance / disease resistance / heat tolerance / drought tolerance ;</p> <p>4 DO NOT CREDIT immunity to diseases</p>
Total		12	

Question	Answer	Marks	Guidance
5 (a)	41 667 ; ;	2	Award 2 marks for a correct answer, even if no working shown. ALLOW 1 mark for 41 666.666, 41 666.7, 41 666.67, 41 666.667, 41 670, 41 700, 41 666, 41668 or 42 000. If the answer is incorrect ALLOW 1 mark for $\frac{2500 \times 100}{6}$
(b)	<ol style="list-style-type: none"> 1 part of <u>ecosystem</u> / <u>habitat</u> for other organisms ; 2 part of food, chain / web ; 3 wood useful for specific purpose ; 4 (potential) source of medicine ; 5 genetic resource ; 6 aesthetic value / give pleasure / beautiful trees ; 7 ethical reason / moral responsibility ; 8 resource for (non-medical) scientific research ; 	3	<p>Mark the first three reasons regardless of lines</p> <p>1 IGNORE maintains biodiversity</p> <p>2 ACCEPT food source</p> <p>2 IGNORE home</p> <p>3 e.g. making , fences / furniture / boundary marker</p> <p>5 ACCEPT description or example but must refer to genes</p> <p>6 ACCEPT tourism</p> <p>7 ACCEPT <i>idea that they have a right to existence</i></p> <p>7 DO NOT CREDIT 'playing God'</p>

Question	Answer	Marks	Guidance
(c)	not in, natural / normal, habitat / environment ;	1	
	<p>(ii)</p> <p>1 most plants produce an excess ;</p> <p>2 (so) can be collected (from wild) without damaging (wild) , plants / organisms / population / habitat ;</p> <p>3 take up little space ; ora</p> <p>4 able to store, large numbers / more species ; ora</p> <p>5 easy / cheaper, to transport / AW ; ora</p> <p>6 idea of remaining viable for long periods ; ora</p> <p>7 less susceptible to, disease / pests / environmental change ; ora</p>	4 max	<p>5 ACCEPT can easily be sent where wanted</p> <p>6 Answers must have some reference to survival, not just 'can be stored for a long time'</p> <p>7 IGNORE recovery / survival , from disease</p> <p>7 CREDIT answers that describe (greater) disease resistance as a property of the seeds themselves or that the seed bank is a (more) protected environment for the seeds IGNORE cheaper unqualified</p>

Question		Answer	Marks	Guidance
5	(c)	1 (maintain / increase) genetic variation / <u>gene pool</u> ;	3 max	1 ACCEPT different alleles 1 DO NOT CREDIT different genes 2 ACCEPT 'so if one dies from a disease some might survive' 2 ACCEPT 'to get some plants that are resistant to different diseases' 4 IGNORE variation unqualified
		2 reduced chance of (future), disease / environmental change, affecting (whole) population ;		
		3 reduces chance of <u>inbreeding</u> ;		
		4 maintain, <u>geographical</u> variation / varieties / races / strains / subspecies ;		
		Total	13	

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June 2011

Question	Expected Answers	Mark	Additional Guidance
8 (a)	<p>1 different species ;</p> <p>2 different genus ;</p> <p>3 genetically incompatible ;</p> <p>4 (may have) different number of chromosomes ;</p> <p>5 physical / behavioural , reason for reproductive incompatibility ;</p>	2 max	<p>3 ACCEPT 'DNA sufficiently different' IGNORE refs to meiosis</p> <p>4 IGNORE refs to meiosis</p> <p>5 e.g. eggs remain unfertilised / different incubation patterns IGNORE refs to fertility of offspring</p>
8 (b)	<p>(i) Convention (on) <u>International Trade</u> (in) <u>Endangered Species</u> ;</p>	1	<p>ACCEPT Commission / Conference / Congress ACCEPT Trading DO NOT CREDIT Conservation / Countries</p> <p>Mark the first two answers only. IGNORE trafficking throughout (as in stem)</p>
8 (b) (ii)	<p>1 regulate / monitor , <u>trade</u> in selected , species / animals / plants / animal products ;</p> <p>2 <u>idea of ensuring trade does not put wild populations at risk ;</u></p> <p>3 <u>idea of prohibiting commercial trade in wild plants ;</u></p> <p>4 <u>idea of allowing trade in artificially propagated plants ;</u></p> <p>5 <u>idea of allowing trade in less endangered species subject to permit ;</u></p>	2 max	<p>1 ACCEPT idea of species being on a list ACCEPT endangered ACCEPT prevent IGNORE illegal IGNORE animals / plants unqualified</p> <p>3 ACCEPT endangered plants</p>

Question	Expected Answers	Mark	Additional Guidance
8 (c)	unrelated / AWV, individuals ; health ; of reproductive age ; selecting individuals of opposite sex (for breeding) ; select higher proportion of females ;	2 max	ACCEPT idea of individuals with sufficiently different genes ACCEPT 'whether they are healthy (or not)' ACCEPT fertility of individuals
8 (d)	<ol style="list-style-type: none"> 1 bird(s) healthy / quarantine before release ; 2 adequate (natural) food supply / provide food (if necessary) ; 3 protected reserve / no hunting / no poaching / legal protection ; 4 method to monitor population ; 5 raise public awareness / educate local population / educate collectors ; 6 method to prepare animals for survival in wild ; 7 idea of gradual introduction, e.g via semi-wild habitat ; 	3 max	<ol style="list-style-type: none"> 1 IGNORE refs to ongoing health monitoring 3 ACCEPT ref to controlling predators 4 e.g. tag birds 5 ACCEPT involve local population 6 e.g. raise with minimal human contact, predator awareness training ACCEPT teaching it to find food
Total		3 max	[10]

Question	Expected Answers	Marks	Additional Guidance
4 (a) (i)	likely to become extinct / on the verge of extinction / numbers are not sustainable / numbers too low for survival of species / numbers drop below 10% of (original) population ;	1	DO NOT CREDIT 'may' / 'might' / 'could' become extinct CREDIT 'die out' or 'wiped out' instead of extinct
4 (a) (ii)	133 333 ; ;	2	Award 2 marks for a correct answer, even if no working shown. ALLOW 1 mark for seeing 133 333.3333... if answer is incorrectly rounded or not rounded to a whole number. If the answer is incorrect ALLOW 1 mark for $\frac{4000 \times 100}{3}$
4 (b) (i)	painkiller still being used ; <i>in captivity</i> – allow reverse argument for <i>in the wild</i> fed uncontaminated food / keep away from painkiller ; health of individuals monitored / treated for disease ; eggs (artificially) incubated / young hand reared ; reduced mortality of young ; provision of mate / females breeding can be manipulated ; protection , from hunting / predation ; competition reduced (between , individuals / species) ;	4 max	IGNORE ref to controlling diet or nutrition e.g. hormones / artificial insemination / artificial selection 'safer environment' is not quite enough

Question	Expected Answers	Marks	Additional Guidance
4 (b) (ii)	<p>maintain / increase, genetic variation / gene pool ;</p> <p>reduce risk of , inbreeding / breeding between related birds ;</p> <p>different 'races' of vulture in different areas / geographical variation / different subspecies ;</p> <p>less likely all contaminated with painkiller ;</p> <p>less risk of losing all individuals due to , disease / natural disaster / human action ;</p>	3 max	<p>In the context of the vultures, rather than 'biodiversity'</p> <p>CREDIT different alleles</p> <p>DO NOT CREDIT different genes</p> <p>CREDIT ora for idea of promoting outbreeding</p> <p>ALLOW ref to types of (white-backed) vulture</p>
4 (c)	<p>reason or explanation ; ; ;</p> <p><i>Suitable examples include but are not limited to:</i></p> <ul style="list-style-type: none"> • maintains biodiversity • part of food chain / part of ecosystem / part of food web / scavengers • have a right to existence / moral reason • specific religious reason • give pleasure / beautiful creatures • ecotourism • useful product / source of medicine / medical research • genetic resource • saves clearing up / remove carcasses • prevents disease • keeps , rat / dog , population down 	3	<p>CREDIT any three valid suggestions.</p> <p><i>Ignore the numbers on the answer lines.</i></p> <p><i>Mark as prose and award points as they arise.</i></p> <p>The idea of research must be qualified</p>

