PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 10: ECOSYSTEMS

HUMAN EFFECTS ON ECOSYSTEMS

SCORE	PERCENTAGE
/116	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
	The only correct answer is: B correlation coefficient *A is incorrect because chi squared compares frequencies* *C is incorrect as standard deviation is a measure of dispersion* *D is incorrect as t-test compares mean values*		1 comp

Q2.

Question Number	Answer	Additional Guidance	Mark
(a)	A ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
*(b)	QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence 1. idea that biofuel production may (overall) results in more carbon dioxide in the atmosphere ; **OR** idea that carbon neutral means that the carbon dioxide produced equals the carbon dioxide used ; 2. idea of forests as carbon {sinks / eq} ; 3. idea that {clearing land / deforestation} results in (net) increase in carbon dioxide (in atmosphere) ; 4. (less plants means) less carbon dioxide {removed / used / eq} by photosynthesis ; 5. {burning / eq} trees produces carbon dioxide ; 6. idea that (increased) decomposition produces carbon dioxide; 7. idea of using {(fossil) fuels / petrol / diesel} by {lorries / machinery / eq}produces carbon dioxide ; 8. {burning /eq} of biofuels produces carbon dioxide ;	**QWC emphasis is clarity of expression** **Accept** stores / sumps	**(5)**

Question Number	Answer	Additional Guidance	Mark
(c)	1. reference to production of {greenhouse gases / named greenhouse gas} ; 2. idea that these gases {build up/ remain / form a layer} in (upper) atmosphere; 3. which {absorb / trap / eq} {heat energy / infra-red / IR / eq} ; 4. reflected from earth's surface ; 5. idea that increased levels of these gases increase the greenhouse effect ; 6. idea that (mean) temperature of earth's {surface / atmosphere} is increasing ;	**Accept** carbon dioxide, water vapour, sulphur dioxide, oxides of nitrogen **Not** methane **Accept** long wavelength light	**(4)**

Q3.

Question Number	Answer	Additional Guidance	Mark
(a)(i)	**C** ; The number of fires in Mato Grosso each year is always higher than other areas ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
* (a)(ii)	(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence 1. reference to {fires / burning / eq} produces carbon dioxide ; 2. which is a greenhouse gas ; 3. idea that these gases {build up / remain / form a layer / increase} in (upper) atmosphere ; 4. which {absorb / trap / eq} {heat energy / infra red / IR / eq} ; 5. reflected from earth's surface ; 6. idea that increased levels of these gases increase the greenhouse effect ; 7. idea that (mean) temperature of earth's {surface / atmosphere} is increasing ; 8. idea that less carbon dioxide {removed / used / eq} by photosynthesis ;	**QWC emphasis clarity of expression** **1. Accept** carbon dioxide, water vapour, sulphur dioxide, oxides of nitrogen **Not** methane **2. NB** do not penalise ref to methane twice **4. Accept** long wavelength light	**(5)**

Question Number	Answer	Additional Guidance	Mark
(b)(i)	1. reference to biofuels being (possibly)carbon neutral ; 2. idea that {plants / crops} are used for biofuels ; 3. idea that carbon dioxide used for photosynthesis (by plants / in production of biofuels) ; 4. idea of using biofuels to replace fossil fuels ;	**Ignore carbon unqualified** **1. Accept** idea of no (net) change in carbon dioxide levels in atmosphere	**(3)**

Question Number	Answer	Additional Guidance	Mark
(b)(ii)	1. land has to be cleared to grow plants for biofuels / eq ; 2. burning produces carbon dioxide / the plants growing there would have been {photosynthesising / using carbon dioxide} / machinery uses fossil fuels / loss of habitat ; OR 3. decomposition of dead plant material (after clearing) / eq ; 4. produces carbon dioxide / eq ; OR 5. idea that the land could have been used for food production ; 6. less food produced / eq ; OR 7. ref to use of fertilisers ; 8. idea of eutrophication OR use oil-based products ;	**Mark as pairs** **1 Accept** reference to deforestation of land to grow plants for biofuels **6 Accept** shortage of food, contributes to world hunger, idea of causing starvation	**(2)**

Q4.

Question Number	Indicative content	
*	Answers will be credited according to candidate's deployment of knowledge and understanding ofmaterial in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all thematerial which is indicated as relevant. Additional content included in the response must be scientific and relevant. **Descriptions** • crop yield is highest between 5 m and 10 m from hedgerow D • crop yield is lowest next to the hedgerow / crop yield is lower than the centre of the field upto 2.5 m • crop yield increases up to between 5 m and 10 m from the hedge and then decreases D • wind speed is lowest by the hedge D • wind speed increases with distance from the hedge D • temperature is higher by hedgerow / falls with distance D • hedgerows can increase crop yields, but fields need to be smaller D • hedgerows can take up land that could be used to grow crops D **Abiotic Explanations** • humidity is higher by the hedgerow A • reduced wind speed (by the hedge) increases the temperature A • transpiration /water loss / evaporation will be lower around hedgerow A • hedgerow acts as a wind break A • less than 2m from hedgerow productivity is lower due to competition / shading reducingphotosynthesis A • between 5m and 15 m, higher temperature will increase	**6**

	photosynthesis rate A • higher temperature is closer to optimal enzyme temperatures A • wind can affect crops pollinated by wind A **Biotic Explanations** • pollinating species and predators increase productivity B • predators consume herbivores / pests B • pollinators are essential for seeded crops / example B • hedgerow may compete for nutrients / water / light B • less need for pesticides to be used when predator species live in hedgerows B		
Level	**Marks**		
Level 0	Marks	No awardable content	
Level 1	1-2	Limited scientific judgement made with a focus on mainly just one method, with a fewstrengths/weaknesses identified. A conclusion may be attempted, demonstrating isolated elements of biological knowledge and understanding but with limited evidence to support the judgementbeing made. **Descriptions of factors** **one mark: any two from D** **two marks: three from D**	
Level 2	3-4	A scientific judgement is made through the application of relevant evidence, withstrengths and weaknesses of each method identified. A conclusion is made, demonstrating linkages to elements of biological knowledge andunderstanding, with occasional evidence to support the judgement being made. **Descriptions and explanations** **three marks: any four points from D, A or B** **four marks: any five points from D, A or B and**	
Level 3	5-6	A scientific judgement is made which is supported throughout by sustained applicationof relevant evidence from the analysis and interpretation of the scientific information. A conclusion is made, demonstrating sustained linkages to biological knowledge andunderstanding with evidence to support the judgement being made. **Detailed explanation of all factors and how use of hedges can be beneficial** **Descriptions and explanations** **five marks: any six points from D, A and B** **six marks: any seven points from D, A and B**	

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	A description that makes reference to two of the following: • CITES prevents {exploitation / hunting / sale / trade / poaching} (1) • by countries that sign up to the treaty (1) • by {protecting / conserving} endangered species (1)		(2)

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to two of the following: • (genetic / population) bottleneck (1) • causing reduced {genetic diversity / gene pool / number of different alleles} (in populations) (1) • therefore the chance of inheriting two harmful recessive alleles increases (1)	**Accept** small / restricted gene pool	(2)

Q6.

Question Number	Indicative content
*	Answers will be credited according to candidate's deployment of knowledge and understanding of material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • with increasing snow depth, there is higher survival of grey owls / fewer brown owls survive / more grey owls D • snow depth has decreased over time D • the percentage of brown owls has increased over time / percentage of grey owls has decreased D For • with less snow, more ground is visible / uncovered / more twigs and trees visible E • with less snow, grey owls more obvious (to predators / prey) / less camouflaged E • with less snow, natural selection would favour brown owls / more brown (advantageous) alleles passed on / fewer grey alleles passed on / brown owls outcompete grey owls E • enhanced greenhouse effect due to carbon dioxide emissions reflecting radiation back / absorbing radiation (causing melting) E Against • no direct measure of greenhouse gas / temperature / fossil fuel emissions A • graphs show correlations not causal links A • data for owl survival with snow depth is scattered / gaps in data / weak correlation A • data for mean snow depth has many outliers / anomalies / not all points are around line / data is scattered A • other factors (named factors) could be affecting the owl population A • reduced snow may not be due to greenhouse gas release A

	• data for owl survival with snow depth is scattered / gaps in data / weak correlation A • data for mean snow depth has many outliers / anomalies / not all points are around line / data is scattered A • other factors (named factors) could be affecting the owl population A • reduced snow may not be due to greenhouse gas release A

Level 0	Marks	No awardable content
Level 1	1-2 (1-3)	Limited scientific judgement made with a focus on mainly just one method, with a few strengths/weaknesses identified. A conclusion may be attempted, demonstrating isolated elements of biological knowledge and understanding but with limited evidence to support the judgement being made . **1 mark : any 1 from D, E, A** **2 marks : any 2 from D, E, A**
Level 2	3-4 (4-6)	A scientific judgement is made through the application of relevant evidence, with strengths and weaknesses of each method identified. A conclusion is made, demonstrating linkages to elements of biological knowledge and understanding, with occasional evidence to support the judgement being made. **D and, E OR A** **3 marks : at least 3 points. Any combination of D, plus E, or A** **4 marks : at least 4 points. Any combination of D, plus E, or A**
Level 3	5-6 (7-9)	A scientific judgement is made which is supported throughout by sustained application of relevant evidence from the analysis and interpretation of the scientific information. A conclusion is made, demonstrating sustained linkages to biological knowledge and understanding with evidence to support the judgement being made. **D, E, AND A** **5 marks : at least 5 points. Must have combination of D, E, and A** **6 marks : at least 6 points. Must have combination of D, E, and A**

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to two from the following: • a genetic bottleneck has occurred (1) • resulting in a smaller gene pool (1) • so the probability of receiving two recessive alleles is higher (1)	 **Accept** lower genetic diversity **Accept** inbreeding / higher chance of two organisms have similar alleles	**2**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to three from the following: • therefore animals from different populations can move across territories / forest to forest (1) • therefore increasing genetic diversity / widens gene pool / increased allele number (1) • and balances the needs of local people with conservation / retains jobs for local people (1) • local people are more likely to maintain the bridges (1)	**Accept** animals from different forests can move in / more outbreeding	3

Question Number	Answer	Additional Guidance	Mark
(iii)	An answer that makes reference to one from the following: • {banning export / import trade of species} preventing {poaching / illegal trapping} (1)	**Accept** {countries} sign treaty / agree preventing {poaching / trapping / exports / imports / trade}	1

Q8.

Question Number	Answer	Additional Guidance	Mark
(i)	**Effects on plants:** 1. { loss / eq } of (existing) species / extinction ; 2. idea of changes in distribution (of plants / species) ; 3. idea of changes in {numbers / size / growth / eq } (of plants / species) ; **Explanations (max 3):** 4. idea that there will be changes in rainfall patterns ; 5. idea of a change in growing seasons ; 6. idea that temperature may become too hot for some species OR credit a link made between temperature and enzyme activity ; 7. idea of increased carbon dioxide results in more {photosynthesis / GPP / NPP / biomass / eq} ; 8. idea of fall in pH in {oceans / rivers / eq} ;	**NB** any link to an affect must be correct 4 **ACCEPT** droughts 5 **ACCEPT** flowering times	**(4)**

Question Number	Answer	Additional Guidance	Mark
(ii)	1. idea of reduction of {herbivore / primary consumer} ; 2. idea that this would result in a reduction of {predator / secondary consumer / tertiary consumers} ; 3. idea that a change in {distribution / numbers / types / eq} of plants could result in a change in distribution of {herbivores / eq} ; 4. idea of loss of {habitat / eq} decreasing {breeding rate / numbers / eq } ; 5. idea of loss of {shelter / camouflage / eq} provides more food for predators so they would increase in {size / number} ;	**ACCEPT** converse for increase in plant {number / size / eq} 1 **ACCEPT** idea of loss of animals because of reduction in food supply 2 **ACCEPT** idea of loss of animals that feed on the herbivores 4 **ACCEPT** named example e.g. nesting place	**(3)**

Q9.

Question Number	Correct Answer	Additional guidance	Mark
(a)	An answer that makes reference to one of the following: • poached by humans for their horn (1) • *Arenga pinnata* outcompetes the food source/less food for rhino (1) • disease (1)		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
(b)	An explanation that makes reference to two of the following: • difficulty in finding mates (1) • so population growth is affected (1) **or** • loss of genetic diversity / small gene pool (1) • so less resistance to environmental change (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
(c)	An answer that makes a reference to two of the following: • habitat maintenance / restoration / clearing *Arenga pinnata* (1) • locate breeding sites for reproduction (1) • protect the rhinos from poachers (1) • ensuring that the food source is maintained/plant more food source (1) • breeding programme outside of national park (1)		**(2)**

Q10.

Question Number	Answer	Additional Guidance	Mark
(i)	• (index of diversity) takes into account populations (of each species) (1)	**Accept** considers abundance / number of each species **Accept** because an area could have many different species but different populations	1 exp

Question Number	Answer	Additional Guidance	Mark
(ii)	An answer that makes reference to two from the following points: • other species are also conserved (in the ecosystem) (1) • animals are not humanised / behaviours are natural / no change to behaviour (1) • less inbreeding occurs (1)	**Accept** converse for *in situ* **Accept** other species are protected / food webs are maintained / maintains biodiversity / maintains links in ecosystem **Accept** more space for animals **Accept** no need to transport animals **Accept** less inbreeding depression / maintain gene pool	2 grad

Question Number	Answer	Additional Guidance	Mark
(iii)	An explanation that makes reference the following points: • biodiversity has increased (in the paper project area) **more** (than the protected area) (1) • as less / no grassland is burnt / less poaching (1) • (more) niches are available / habitats are not destroyed / elephants transfer plant seeds (1) • local people make money from the paper project / if the elephants are not present, local people lose a source of income (1)	**Accept** biodiversity has increased but {did not increase / went down} in area where people are banned **Accept** grassland burning / poaching still occurs in unprotected area **Accept** converse for protected area **Accept** converse for protected area **Accept** people have a vested interest in the elephants / make a profit	**4 exp**

Q11.

Question Number	Answer	Additional Guidance	Mark
	A description that makes reference to two of the following points: • not all countries sign the treaty / signing the treaty is voluntary (1) • many species move across national boundaries (1) • monitoring is expensive / some countries are too large to monitor / high financial rewards for {poaching / smuggling} / CITES (only) prevents trade (1)	**Accept** the treaty is not legally binding (within nations) **Accept** some species migrate / have very large ranges **Accept** not all species are classed as endangered **Accept** countries may not be able to monitor within their borders **Accept** some poaching will continue	**2 exp**

Q12.

Question Number	Answer	Additional Guidance	Mark
	1. (gradual) increase in {average / eq } temperature ; 2. (of earth's) {surface / atmosphere} (and oceans) ;	**NB IGNORE** any explanations as to the cause **1 IGNORE** warming	**(2)**

Q13.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to the following: • high value of horn incentivised hunters to break the law (1) • because trade ban led to black market and increase in price of horn (1) **OR** • demand for horn remained high (1)		

	• because CITES did not help to educate consumers / increasing disposable income in consuming nations / used for traditional medicine in some cultures (1) **OR** • ineffective enforcement (1) • because large areas of habitat are difficult to police / lack of resources available for enforcement / high value of horn funding bribery or corruption (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following: • fewer alleles in the gene pool due to smaller number of individuals (1) • greater frequency of homozygous genotypes due to mating of related individuals (1)		**(2)**

Q14.

Question Number	Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to three of the following: • the numbers are very small causing a genetic bottle neck (1) • so that variation in the gene pool may have been reduced (1) • causing increased likelihood of inbreeding effects (1) • such as accumulation of disadvantageous mutations (1)	Allow reference to founder effect Allow small gene pool Allow inbreeding depression, Allow early offspring may have comefrom only one male Allow greater chance of receiving tworecessive alleles	(3)

(ii)

Level	Marks	
0	0	No awardable content
1	1-3	Demonstrates isolated elements of biological knowledge and understanding to the given context withgeneralised comments made. Vague statements related to consequences are made with limited linkage to a range of scientific ideas,processes, techniques and procedures. The discussion will contain basic information with some attempt made to link knowledge andunderstanding to the given context.
2	4-6	Demonstrates adequate knowledge and understanding by selecting and applying some relevantbiological facts/concepts. Consequences are discussed which are occasionally supported through linkage to a range of scientificideas, processes, techniques and procedures. The discussion shows some linkages and lines of scientific reasoning with some structure.
3	7-9	Demonstrates comprehensive knowledge and understanding by selecting and applying relevantknowledge of biological facts/concepts. Consequences are discussed which are supported throughout by sustained linkage to a range ofscientific ideas, processes, techniques or procedures. The discussion shows a well-developed and sustained line of scientific reasoning which is clear andlogically structured.

ii **Applying marking points** These are indicative marking pointsand other relevant information should be credited **Level 1** 1 mark: any point 2 marks: any two points3 marks: any 3 points **Level 2** 4 marks: 4 points, must have +and - 5 marks: 5 points, must have +and - 6 marks: 6 points, must have +and - **Level 3** Points must come	**Justification for using poison to kill feral cats** 1. less potoroos killed (+) 2. potoroos less likely to become extinct (+) 3. feral cats are an introduced species (+) 4. there are very large numbers of feral cats (+) 5. increased fungal spread in ecosystem (by potoroos) (+) 6. introduced species will be killed but native species unharmed (+) 7. biodiversity remains higher if native species not killed (+) 8. sausages are designed to target cats (+) 9. native species less likely to become extinct (+)10.poison is biodegradable (+)
	Reasons not to kill feral cats with poison 1. pets may be killed (-) 2. other animals may be killed (-) 3. lots of people object to this (petition) (-) 4. sausages could be attractive to wild species as well (-) 5. government could use other methods to reduce population of feral cats (-) 6. suggested other methods eg spaying, shooting (-) 7. killing cats does not deal with threat from foxes (-) 8. plants / kangaroos are killed to make the poison (-) 9. feral cats are behaving naturally and should not be punished for this (-)

from all threesections 7 marks: 7 points, must have +and - 8 marks: 8 points, must have +and – 9 marks: 9 points, must have +and -	**Wider points** 1. poison made from native plants so less likely to kill native animals (+) 2. biodegradable poison so action now will not affect animals in the future (+) 3. potoroos require special protection as there are such small numbers /endangered (+) 4. idea of balance needed in ecosystem (+) 5. cats have no natural predators in Australia, so it is justified to kill them (+) 6. ethics of government choosing which species to kill (-) 7. government could continue the breeding programme for potoroos (-) 8. effect on food chain of killing 2m feral cats (positive or negative) 9. feral cats may develop resistance to the poison (-) 10. government could try a small-scale trial to find effects of cull (-)

Q15.

Question Number	Answer	Additional Guidance	Mark
	B carbon dioxide and water		**(1)**

Q16.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to four of the following: • mass of wild tuna decreases more steeply (after 2002) (1) • there is a decrease in (wild tuna) caught after 2002 (1) • because farming takes {immature / young} from the wild population that have not reproduced / so breeding of tuna is reduced (1) • farming reduces food available for the wild population (reducing population) (1) • farming has not replaced the catch of wild tuna / consumer demand has risen (1)	**ACCEPT** idea of bigger increase after fish farming started **ACCEPT** total of caught + farmed has increased	**(4)**

Q17.

Question Number	Indicative content
*	Answers will be credited according to candidate's deployment of knowledge and understanding of material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • mistletoe lowers the NPP of apple trees over time (D) • NPP of trees without mistletoe shows an upward trend over 20 years (D) • NPP of trees with mistletoe shows an downward trend over 20 years (D) • mistletoe decreases the transpiration rate of the trees (D) • mistletoe has a higher transpiration rate than the apple tree (D) • higher transpiration rate of mistletoe diverts transpiration stream to mistletoe rather than apple tree / mistletoe takes the water from apple tree (E) • so less minerals are given to the apple tree (E) • less water for photosynthesis (E) • nitrogen content of apple trees is lower (D) • less amino acid / protein synthesis occurs (E) • less enzyme production so less photosynthesis (E) • lowering NPP (due to less enzymes) (E) • less nucleic acid synthesis (E) • less chlorophyll synthesis (E) • calcium content of the apple trees is lower (D) • so there is less production of cell walls / calcium pectate (E) **Level 1: one or two D or E** **Level 2: three or four from both D and E** **Level 3: five or six from both D and E, must explain effect of either low nitrogen / calcium and have no major errors**

Level	Marks	
Level	Marks	
0	0	No awardable content
1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.
2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.
3	5-6	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

Q18.

Question Number	Answer	Additional guidance	Mark
(a)	1. reference to increase in {metabolic rate / enzyme activity / eq} as temperature rises ; 2. reference to increase in {kinetic / eq} energy of molecules (as temperature rises) / eq ; 3. reference to increase in {enzyme-substrate complexes / energy of collisions / eq} (as temperature rises) ; 4. idea of {inactivation at lower temperatures/ denaturation at higher temperatures} of enzymes ; 5. idea that temperature affects {differentiation / growth /division / eq} ;	**1. Accept** converse argument for mp 1 – 3 **2. Accept** movement **4.Accept** the idea that enzyme-substrate complexes cannot be made if denaturing	**(3)**

Question Number	Answer	Additional guidance	Mark
(b)	1. idea that temperature affects {survival / development / growth / metabolism / cell division / eq} ; 2. idea that enzymes affect {development / growth / metabolism / cell division/ eq} ; 3. idea that temperature affects enzymes ; 4. idea that different frogs have different enzymes ;		**(2)**

Question Number	Answer	Additional guidance	Mark
(c)	*sylvatica*, *pipiens*, *palustris*, *clamitans* ; ;	if order correct but reversed = 1 mark	**(2)**

Question Number	Answer	Additional guidance	Mark
(d)	1. idea that different species are reproductively isolated ; 2. idea of different breeding {times / seasons / eq} ; 3. idea of different {breeding / courtship / eq} {behaviour / rituals / displays / colour / songs / croaks / eq} ; 4. idea that population at {northerly / southerly} limit of range may not develop (to adulthood) ; 5. idea that breeding between different species results in infertile offspring ;	**3. Accept** idea of incompatible {genitalia / gametes}	**(3)**

Question Number	Answer	Additional guidance	Mark
(e)	1. idea that global warming will increase the temperature (at the latitudes) ; 2. idea that temperatures (at these latitudes) may become too high for any of the species ; 3. idea that new temperature may be above the maximum to complete development or above the upper lethal limit ; 4. idea that species move {north / to cooler regions / eq} ; 5. ref to change in {food source / predators / competition / eq} ;	**2.Accept** become extinct	**(3)**

Q19.

Question Number	Answer	Additional Guidance	Mark
	Level 1: links information given to effect on dung beetles as below (up to 3 points from anywhere) Level 2: links information given to effect on dung beetles as below (up to 3 points from one category and up to 3 points from either one or two other categories Level 3: links information given to effect on dung beetles as below (up to 3 points from one category and up to 3 points from each of the other 2 categories No credit for points quoted from information given without qualification **Indicative content** **Threats to dung beetles (T points)** • (less grazing animals on land) so less dung available ie reduced food source • (farmland used for building / development) so reduced habitat • (animals kept in sheds overwinter) so food source unreliable / not constant • (routine use of anti-parasitic drugs) so drugs in animal faeces which kill dung beetles • (isolated populations of dung beetles) so genetic diversity is reduced • (isolated populations of dung beetles) - small populations of dung beetle species have a small gene pool, so allele frequencies can change rapidly • (many) dung beetles feed specifically on the dung of particular species, so reduction in species of grazing animals decreases diversity		
	Benefits of dung beetles (B points) • (remove dung from fields) so more access for grazing by animals • (remove dung from fields) so less chance of parasites living in dung and reinfecting cattle • (bury dung underground) so decomposers can break it down • decomposition of dung is faster if dung beetles are present • (decomposed dung) increases mineral content of soil • (eaten by birds etc) so provide food for other animals / loss of dung beetles could lead to collapse of food chains **Wider points and consequences to farming (W points)** • climate change may be having an effect on decline eg rise in temperatures, changed rainfall patterns • if farming practices change animals will suffer • if farming practices change, less economically viable to farm • if farming practices change, less food produced • adding fertilisers disrupts dung beetle life cycle • ploughing pasture disrupts dung beetle life cycle • small populations much more vulnerable to disease • pesticides may affect other animals in food chain: accumulation • (digging tunnels) improves soil structure by aeration • dung beetles may be involved in seed dispersal (seeds in faeces being moved around by beetles) • (routine use of anti-parasitic drugs) kill other beneficial invertebrates (as well as dung beetles) • No evidence or stats to prove or disprove • A new predator might be responsible for decline • Parasite numbers would increase if treatment stops • Cattle contribute to global warming, so better not to farm cattle • Urbanisation might be causing change, not farming practices		

Benefits of dung beetles (B points)

- (remove dung from fields) so more access for grazing by animals
- (remove dung from fields) so less chance of parasites living in dung and reinfecting cattle
- (bury dung underground) so decomposers can break it down
- decomposition of dung is faster if dung beetles are present
- (decomposed dung) increases mineral content of soil
- (eaten by birds etc) so provide food for other animals / loss of dung beetles could lead to collapse of food chains

Wider points and consequences to farming (W points)

- climate change may be having an effect on decline eg rise in temperatures, changed rainfall patterns
- if farming practices change animals will suffer
- if farming practices change, less economically viable to farm
- if farming practices change, less food produced
- adding fertilisers disrupts dung beetle life cycle
- ploughing pasture disrupts dung beetle life cycle
- small populations much more vulnerable to disease
- pesticides may affect other animals in food chain: accumulation
- (digging tunnels) improves soil structure by aeration
- dung beetles may be involved in seed dispersal (seeds in faeces being moved around by beetles)
- (routine use of anti-parasitic drugs) kill other beneficial invertebrates (as well as dung beetles)
- No evidence or stats to prove or disprove
- A new predator might be responsible for decline
- Parasite numbers would increase if treatment stops
- Cattle contribute to global warming, so better not to farm cattle
- Urbanisation might be causing change, not farming practices