OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B6.4 HOW IS BIODIVERSITY THREATENED AND HOW CAN WE PROTECT IT? (HIGHER)

SCORE	PERCENTAGE
/54	%

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Question			Answer/Indicative content	Marks	Guidance
1	a		**Any three from** Use a line transect **AND** quadrat ✓ Running from the sea up the shore ✓ To take many samples ✓ Repeat at different parts of the shore ✓	3	
	b	i	8 ✓	1 2	
		ii	**FIRST CHECK THE ANSWER ON THEANSWER LINE IF** (45 + 47 + 49) / 3 ✓ 47 ✓		answer = 47 award 2 marks
	c		limpets will decrease in numbers ✓ ~~as more are eaten ✓~~ **OR** crabs will increase ✓ as more food ✓	2	**ALLOW** any correct species with correct ~~explanation~~
	d		**Any two from**idea of interdependence ✓example of interdependence e.g. food /shelter / reproduction ✓maint		
	e		Advantage: (can be) fast / no need to find a mate ✓ Disadvantage: lack of genetic diversity / are all genetically identical ✓	2	MP2 **ALLOW** are clones **DO NOT ALLOW** are all identical
	f	i	✓ Enzymes will become denatured	1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
		ii	✓ Some cells may burst	1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
			Total	14	

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Question			Answer/Indicative content	Marks	Guidance
2			**[Level 3]** Answer includes causes AND explanations including a level 3 adaptation explanation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer includes several causes and a level 2 explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer includes only causes OR explanations. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	• environmental conditions changed / natural disaster • example of environmental change (e.g. climate change) • example of consequences of environmental change (e.g. different vegetation, affecting diet) • idea that the change was long-term / temporary) *introduction of:* • a new competitor of the Neanderthals / example • a new predator of the Neanderthals / example • a new pathogen / disease / example **accept** increase in number of competitors / predators / pathogens *disappearance of another species:* • another species disappeared / died out / declined • idea that the Neanderthals ate / depended upon this species **Explanations:** **Level 1/2** • the Neanderthals could not reproduce (successfully) • not enough food • conditions too cold / too hot for them **Level 3**

This question is targeted at grades up to C

Indicative scientific points may include:

Causes

environmental conditions:

Explanations

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>• the Neanderthals were not well adapted to the new conditions
• the Neanderthals (species) did not adapt quickly enough

ignore ‘suited’ for adapted

Use the L1, L2, L3 annotations in Scoris;

do not use ticks.

Examiner's Comments

It was encouraging to see very detailed descriptions about the possible causes of extinction of the Neanderthals.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
<tr><td>3</td><td>a</td><td></td><td>meeting the needs of the people today (1)
without damaging the Earth for future generations (1)</td><td>2</td><td>Examiner's Comments
The best responses could define sustainability clearly and succinctly.</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><td>The size and shape of the bag.</td><td></td></tr><tr><td>The cost of making the bag</td><td></td></tr><tr><td>The materials used to make the bag.</td><td>✓</td></tr><tr><td>The colour of the bag.</td><td></td></tr><tr><td>The energy used to make the bag.</td><td>✓</td></tr><tr><td>The pollution created when the bag is made.</td><td>✓</td></tr></table></td><td>2</td><td>all 3 correct = two marks
2 correct = one mark
More than 3 boxes ticked, negate 1 mark for each additional tick.

Examiner's Comments

Most candidates could give the three best factors which need consideration when producing shopping bags sustainably.</td></tr>
<tr><td></td><td>c</td><td></td><td><table><tr><td>Biodegradable bags need energy to be transported to the shops.</td><td>✓</td></tr><tr><td>Biodegradable bags don’t look as good as standard plastic bags.</td><td></td></tr><tr><td>Biodegradable bags need oxygen to break down.</td><td></td></tr><tr><td>Biodegradable bags are not expensive to make.</td><td></td></tr></table></td><td>1</td><td>If more than 1 box is ticked, no mark awarded.

Examiner's Comments

Many Candidates were not secure in selecting the best explanation for why we should reduce the use of biodegradable bags.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
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Question			Answer/Indicative content	Marks	Guidance
4	a	i	……there were fewer species so there were fewer to become extinct. ……human activity was less damaging to plants and animals. ✓ ……humans were eating all the plants and animals. ……life on Earth began. .....there is not much evidence written down about the plants and animals. ✓	2	deduct 1 mark for each additional incorrect answer Examiner's Comments Most candidates were able to give the 2 correct responses required.
		ii	40000 and above	1	Examiner's Comments It was encouraging to see that most candidates could interpret the graph correctly.
		iii	extinctions are (rapidly) increasing (exponentially) **and** are due to human activities / increasing human population	1	allow positive correlation for the trend For second half allow examples of human activity, e.g. pollution, deforestation, habitat destruction, industrialisation Examiner's Comments The best responses were able to describe the correct tend and explain it in relation to human activities.
	b	i	captive breeding programmes / protected areas / tracking animals / seed or gene banks / zoos / cloning	1 2	allow prevent introduction of new species into environment / elimination of alien species Examiner's Comments Most candidates were able to identify a relevant method to prevent extinction of species.
		ii	**Any 2 from:** maintains (bio) diversity / food webs orchains / maintains ecosystems (1) provide us with valuable		Ignore references to crops Examiner's Comments The best responses were able to produce two reasons why preventing extinctions is important to the environment.

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Question			Answer/Indicative content	Marks	Guidance
			Total	7	

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Question			Answer/Indicative content	Marks	Guidance
5	a		**Level 3 (5–6 marks)** Includes reference to **getting** the gene AND **transferring** the gene AND **expressing** the gene. Quality of written communication does not impede communication of science at this level. **Level 2 (3–4 marks)** Includes reference to **getting** the gene AND **transferring** the gene OR **getting** the gene AND **expressing** the gene. OR **transferring** the gene **AND expressing** the gene. Quality of written communication partly impedes the communication of science at this level. **Level 1 (1–2 marks)** Includes reference to **getting** the gene OR **transferring** the gene OR **expressing** the gene. Quality of written communication impedes the communication of science at this level. **Level 0** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades D to C** **Relevant points include:** **Getting the gene** • identify gene • isolate gene • replicate gene **Transferring the gene** • put gene into vector • example of vector eg virus, aerosol / plasmid / phage • explanation of how insertion occurs **Expressing the gene** • idea that DNA is common in all organisms *in humans* • transferred gene makes Factor 8 *in bacteria* • transferred gene makes Factor 8 • bacteria reproduce • isolate / purify F8 / give people F8 • **If they inject bacteria into human, then max L2** **Use the L1, L2, L3 annotations in Scoris; do not use ticks.** **Examiner's Comments** This six-mark extended-writing question was common with the Foundation Tier.. Examiners were looking for how the gene was obtained, how the gene was transferred and how the gene was expressed. Some candidates went down the route of transferring the gene to a viral vector that could administer the gene to a

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Question			Answer/Indicative content	Marks	Guidance
					human being, others went down the route of transferring the gene to a bacterium that could copy and express the gene such that factor 8 could be isolated and injected into a human being. Both types of answers were credit worthy. However those candidates that confused and mixed up both routes were restricted to Level 2 marks by the Examiners.
	b		idea of need or benefit (1) relevant comparison to UK (1)	2	**Examiner's Comments** Candidates needed to give both points of view to gain the two marks for this question. Good answers referred to countries with high levels of blindness being more inclined to accept the genetically engineered rice, whereas, in the UK we had alternative sources of vitamin A and would be more likely to be concerned with the ethics and dangers of genetically modified food.
	c		sexual reproduction in plants bacterial synthesis of medicines ✓ testing for genetic disorders selective breeding asexual reproduction in animals herbicide resistance in crop plants ✓	2	3 ticks = 1 mark max. 4 or more ticks = 0 marks **Examiner's Comments** Most candidates scored at least one of the two marks available for this question. Incorrect answers were randomly distributed across the remaining distractors. Candidates who gave an additional incorrect response were restricted to one mark.
			Total	**10**	

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Question			Answer/Indicative content	Marks	Guidance
6	a		Resources are not taken from the environment. ☐ Resources are used faster than they are replaced. ☐ Resources are only used if they are urgently needed. ☐ Resources are used at a rate at which they are replaced. ✓ Resources are looked for in new areas. ☐	1	2 or more ticks = 0 marks **Examiner's Comments** This question was extremely well answered with almost all candidates being awarded the single mark.
	b		**any two from:** *idea of restrictions on:* number of fish taken / idea of quotas; size / age / species taken; fishing at certain times / at certain places	2	 **ignore** fish farming **ignore** reference to need **accept** bans **Examiner's Comments** Most candidates scored at least one mark on this question. Credit was given for the idea of restrictions on the number of fish taken, the size, age or species of fish taken, or restricting fishing at certain times or places. References to fish breeding were not credited.
	c		idea that local people need the resources	1	**ignore** want **Examiner's Comments** Most candidates were awarded this mark for the idea that local people needed certain resources from the environment to survive.
			Total	**4**	

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<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7</td><td>a</td><td>i</td><td>D;
has both largest population and greatest number of different species</td><td>2</td><td>mark as independent points

Examiner's Comments

Most candidates recognised Habitat D as having the greatest diversity but related this only to the number of species and not the size of the populations.</td></tr>
<tr><td></td><td></td><td>ii</td><td>A</td><td>1</td><td>Examiner's Comments

This was generally well answered.</td></tr>
<tr><td></td><td></td><td>iii</td><td>genetic variation / variation within a species</td><td>1</td><td>accept DNA differences

Examiner's Comments

That genetic variation plays a role in biodiversity was only known by a few of the best candidates.</td></tr>
<tr><td></td><td>b</td><td></td><td><table>
<tr><td>The ultimate source of energy for food webs is the Sun.</td><td></td></tr>
<tr><td>A new antibiotic is discovered in a rare species of plant.</td><td>✓</td></tr>
<tr><td>A gene is identified that could make crops grow in a drier climate.</td><td>✓</td></tr>
<tr><td>Classification is used to make it easier to identify different organisms.</td><td></td></tr>
<tr><td>Mutations are required for the development of a new species.</td><td></td></tr>
<tr><td>Evidence for evolution comes from the fossil record and from DNA.</td><td></td></tr>
<tr><td>Darwin's theory of natural selection.</td><td></td></tr>
<tr><td>All living organisms are dependent on other organisms for their survival.</td><td>✓</td></tr>
</table></td><td>3</td><td>Examiner's Comments

The majority of candidates knew that “all living things are dependent on other organisms for their survival” and most also correctly identified that finding new antibiotics or new useful genes may depend on maintaining biodiversity and so scored two or three marks.</td></tr>
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Question			Answer/Indicative content	Marks	Guidance
	c		any correct example but must include **cause** and linked **effect**	1	Eg deforestation causes habitat destruction; burning fossil fuels leads to global warming **ignore** unqualified reference to “pollution” **Examiner's Comments** There were many good answers often describing deforestation or monoculture and how they destroy habitats and reduce biodiversity. Weaker candidates tended to give only an example of human activity without explaining its consequences.
			Total	8	

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