

## B3.2 Mastery Quiz: Human Interaction

### Mark Scheme

#### Section A

Qu	Answer	Marks	Supporting information for fix-it tasks
1	C	1	<p>Answering A suggests that there is a misconception that biodiversity refers simply to the numbers of species. <i>To fix it, ask students to describe how they would compare the biodiversity of two fields using random sampling.</i></p> <p>Answering B suggests students have confused ecosystems and biodiversity. <i>To fix it, reteach the key definitions: ecosystem, species, biodiversity. Then ask students to write definitions using a desert habitat and desert organisms as examples.</i></p>
2	C	1	<p>Answering A suggests the misconception that selective breeding programmes increase biodiversity when they actually reduce biodiversity. <i>To fix it, reteach the why selective breeding is useful but how it also reduces genetic diversity in populations. Then ask students to state one advantage and one disadvantage of selective breeding programmes.</i></p> <p>Answering B suggests students may have the misconception that peat being used for compost, and therefore promoting growth of some plant species in different environments, is sufficient to counteract the habitat destruction caused by removing the peat bogs. <i>To fix it, ask students to explain why destroying peat bogs reduces the biodiversity there.</i></p>
3	A	1	<p>Answering B or C suggests a confusion about the causes and effects of global warming <i>To fix it, give students a mixed-up list of causes and effects of global warming and ask them to sort them into these two columns.</i></p>
4	B	1	<p>Answering A suggests a gap in knowledge about leaching of excess fertilisers into waterways. <i>To fix it, ask students to write out the steps in eutrophication.</i></p> <p>Answering C suggests a gap in knowledge about the pollution caused by rubbish in landfill sites. <i>To fix it, ask students to list three sources of pollution, including landfill, then describe the effect each one has on the ecosystem.</i></p>
5	A	1	<p>Answering B suggests a misconception about the use of a transect/systematic sampling. <i>To fix it, ask students to explain the difference between systematic and random sampling, and then explain why using a transect is an example of systematic sampling.</i></p> <p>Answering C suggests a confusion of the terms random sampling and systematic sampling. <i>To fix it, ask students to</i></p>

			<i>explain why this investigation needs systematic sampling and why random sampling is inappropriate.</i>
6	B	1	<p>Answering A suggests an understanding of the uses of peat but shows a gap in knowledge about the importance of obtaining data as evidence for a scientific claim.</p> <p>Answering C suggests an understanding of the importance of calculating mean biodiversity, but shows a gap in knowledge about why these measurements are important.</p> <p><i>To fix it, ask students explain what would happen if a scientist made a claim that the biodiversity was decreasing in the peat bog without measuring any biodiversity data.</i></p>
7	A	1	<p>Answering B suggests a misconception that taking more readings is representative (in this case, applying the mean number to total area is representative). <i>To fix it, ask students to describe a method to measure the total number of daisies in a field.</i></p> <p>Answering C suggests a gap in knowledge about what representative data is. <i>To fix it, reteach what it means when data is representative and then give some examples to students who should then evaluate whether the data is representative or not.</i></p>
8	C	1	<p>Answering A suggests that students know sustainability is important for the future of the Earth, but not explicitly why this is important for human survival. <i>To fix it, ask students to explain what food security is and then state the effect of reducing biodiversity on food security.</i></p> <p>Answering B suggests that students are aware that humans need a variety of food sources but not understood the relationship between this and biodiversity. <i>To fix it, show students a food web that shows humans to exemplify how reductions in species populations could affect the amount of food available for humans. Then ask students to explain why biodiversity is so important for food security.</i></p>
9	C	1	<p>Answering A or B suggests that students have a gap in knowledge about the fact that indicator species can either thrive in polluted conditions or unpolluted conditions. <i>To fix it, ask students to explain the reason indicator species are used in measure levels of air pollution.</i></p>
10	B	1	<p>Answering A suggests the misconception that adding a non-indigenous species increases diversity (in fact it usually decreases biodiversity because it competes with indigenous species). <i>To fix it, ask students to define non-indigenous and indigenous species and then explain why it is a risk to biodiversity to accidentally introduce a non-indigenous species.</i></p> <p>Answering C suggests a gap in knowledge about the problems with non-indigenous species out-competing or eating indigenous species. <i>To fix it, ask students to suggest how the non-indigenous grey squirrel causes a reduction in the population number of the indigenous red squirrels.</i></p>

11	B	1	<p>Answering A suggests a gap in knowledge about how increasing birth rate increases the threat to food security. Answering C suggests a gap in knowledge about how extreme weather patterns increases the threat to food security. <i>To fix it, ask students to describe what 'food security' is and then list examples of current threats to food security.</i></p>
12	A	1	<p>Answering B suggests a misconception that 90% of biomass is transferred (and only 10% is lost). <i>To fix it, model for students, using data from the pyramids of biomass lesson, why only 10% passes on the next trophic level and show that if it were 90% then it wouldn't be a pyramid shape!</i></p> <p>Answering C suggests a gap in knowledge, since we can approximate the transfer efficiency at 10%. <i>To fix it, ask students to practice interpreting further pyramids of biomass and practice calculating biomass efficiency transfers from these, concluding that the efficiency is usually around 10%.</i></p>
13	A	1	<p>Answering B shows a gap in knowledge about the term 'ethical' since buying antibiotics is a medical and economical implications. <i>To fix it, reteach what ethical concerns are and then ask students to list all the ethical concerns of intensive farming (using small cages, heat lamps and preventing movement).</i></p> <p>Answering C suggests a gap in knowledge about advantages and disadvantages of intensive farming, since being able to transport the animals is an advantage. <i>To fix it, give students a list of mixed-up advantages and disadvantages of intensive farming and ask them to sort them out.</i></p>
14	C	1	<p>Answering A suggests a gap in knowledge about what food security of fish means. <i>To fix it, ask students to define food security.</i></p> <p>Answering B suggests a gap in knowledge about the use of quotas in sustainable fishing. <i>To fix it, ask students to describe what a 'fishing quota' is and then explain why they are enforced over the world.</i></p>
15	B	1	<p>Answering A or C suggests a misconception about why reducing movement of livestock increases the efficiency of food production. <i>To fix it, ask students to explain why chickens grow larger, faster when in a small cage as compared to chickens who are free to roam around a field.</i></p>

## Section B

Qu	Model answer	Supporting information
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		<b>Suggestions for fix-it tasks</b>
1	A quadrat provides a known area in which to count the number of individual organisms.	Although students know that a quadrat is placed on the ground and you count what is inside the frame, they may not link the known area of the quadrat to its function. <i>To fix it, give students a diagram of three different quadrats with different length sides, ask them to calculate the area of each and suggest why there are different sized quadrats in ecological studies.</i>
2	Any <b>one</b> from: <ul style="list-style-type: none"> <li>Humans reduce the amount of land available for biodiversity by: <ul style="list-style-type: none"> <li>- Building</li> <li>- Deforestation</li> <li>- Quarrying</li> <li>- Farming</li> <li>- Waste disposal</li> <li>- Growing biofuels</li> </ul> </li> <li>Destruction of peat bog habitats to extract the peat for compost, which is used for farming and gardening.</li> <li>Introducing non-indigenous species that can reduce biodiversity if the species out-competes or kills indigenous species.</li> </ul>	Students may struggle to link the explanation of the human impact to reduction in biodiversity. <i>To fix it, ask students to explain how these three impacts reduce biodiversity:</i> <ol style="list-style-type: none"> <li>1. Reducing land available</li> <li>2. Destruction of peat bogs</li> <li>3. Introducing non-indigenous species</li> </ol>
3	Data must be measured regularly because it provides evidence for answering the scientific question about how global atmospheric temperature is changing.	The answer should contain the fact that data/measurements collected are evidence to support a scientific claim/investigation. Students may struggle to articulate this because it requires the challenging notion of the 'nature of science'. <i>To fix it, ask students why we couldn't make correct claims about climate change without lots of data.</i>
4	A meat-alternative diet is more sustainable than a meat-based diet because the carbon footprint of tempeh, tofu and Quorn is less than beef. For example, the carbon footprint of tempeh and tofu is 0.7 kg CO <sub>2</sub> / year / kg, whereas beef is 32 kg CO <sub>2</sub> / year / kg. <b>This means that</b> these meat-alternatives contribute less to global warming compared to meat.  Tofu and Quorn have land use of less than 5 m <sup>2</sup> / kg whereas beef uses 325 m <sup>2</sup> / kg. The greater land use of beef reduces	Students may struggle with the cognitive load of analysing this data and comparing it to their scientific knowledge.  Students may struggle to answer an 'explain' extended response question. <i>To fix it, remind students of the success criteria of an 'explain question':</i> <i>To 'explain' your answer should:</i> <ul style="list-style-type: none"> <li>• Begin with a <b>scientific statement</b>.</li> <li>• Use <b>'this means that'</b>, <b>'because'</b> or <b>'so'</b> to link your statement to the question. and then they should peer</li> </ul>



	biodiversity <b>because</b> land is turned into farmland for cows, rather than a habitat for indigenous species.	<i>assess each other's answers using this.</i>
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