A Level OCR Biology
12 Biodiversity – answers

Question	Answers	Guidance	Marks	AO Spec reference
1(a)	Any three from: sampling tray / frame net / hand lens / plastic spoon / pipette ✓ any control variable from: kicking strength / length of time kicking / area of stream (sampled) ✓ hold the net in the direction facing the stream ✓ kick the bottom of the stream (using your foot) ✓		3 max	AO1 4.2.1(b)
1(b)	risk of water-borne diseases ✓ so, cover up cuts with plaster / use hand sanitiser / gloves ✓ **OR** risk of drowning ✓ ensure safety around water ✓	Allow a correctly named water-borne disease Allow a specific water safety feature, such as ensure the water is not too deep where sampling and not working alone	2 max	AO3 4.2.1(b) 4.1.1(a)
1(c)	Any three from: pH nearer to neutral because this high concentration of hydrogen ions likely to be toxic ✓ higher temperature because *idea of* this allows more rapid metabolism faster growth / movement (e.g., for hunting) ✓ high numbers of other invertebrate species because these are prey for the dragonfly nymph ✓ few / no parasitic worms because this reduces / avoids death / slow growth due to parasitic worm infestation ✓		3 max	AO3 4.2.1(b) 6.3.2(a) 6.3.2(b)
1(d)	$\dfrac{20}{6}$ ✓ 4 beetles collected min^{-1} ✓		2	AO2 4.2.1(c)
2(a)	number of individuals in the same place at the same time of one species ✓		1	AO1 6.3.2(a)

Question	Answers	Guidance	Marks	AO Spec reference
2(b)	reduce international trade (of elephants) ✓ keep the elephants in their (natural / undisturbed) habitats ✓	Allow banned international trade	2	AO2 4.2.1(i)
2(c)	Any two from: people ignoring CITES ✓ tusks still in high demand ✓ elephants destroy crops so are killed ✓ poaching / hunting for food / tusks / for money ✓ (idea of) a punishment is not a deterrent ✓		2 max	AO2 4.2.1(f) 6.3.2(a) 6.3.2(b)
2(d)	70% ✓ ✓	$\left(\dfrac{19}{27}\right) \times 100$	2	AO2 4.2.1(c)
3(a)	317% ✓ ✓	$25 - 6 = 19$ $\left(\dfrac{19}{6}\right) \times 100$	2	AO2 4.2.1(c)
3(b)	0.74 ✓ ✓ ✓	$\dfrac{n}{N}$ column = 0.39, 0.05, 0.16, 0.18, 0.23 $\sum\left(\dfrac{n}{N}\right)^2 = 0.26$ $1 - 0.26$	3	AO2 4.2.1(d)
3(c)	**Level 3 (5–6 marks)** Full and detailed comparison between the data, including which area is more biodiverse (linked to data). *There is a well-developed comparison. The information presented is relevant and clearly explained.* **Level 2 (3–4 marks)** Response gives at least two comparisons between the data.	**Indicative content:** • both areas have the same total number of butterflies • both areas have the same species richness • higher species evenness in area **B** • area **B** has a higher index of diversity	6	AO3 4.2.1(c)

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Question	Answers	Guidance	Marks	AO Spec reference
	There is a reasonable comparison and sequence. The information presented is in the most-part relevant and well-explained. **Level 1 (1–2 marks)** Response is aware of the area that is more biodiverse with one brief reason given. *The information is basic and communicated in an unstructured way. The information is supported by limited method which may be unclear.* **0 marks** No response worthy of credit.	• area **B** is more biodiverse for butterflies • no data to compare habitat biodiversity • no data to compare genetic diversity		
4(a)	number of different species in a community ✓		1	AO1 4.2.1(a)
4(b)	Any two from: removes natural habitats ✓ removes food sources for animals ✓ destroys hedgerows ✓ chemicals are used to kill non target species ✓		2 max	AO2 4.2.1(f)
4(c)	Any two from: conservation ✓ description of a conservation technique ✓ encourage hedgerow planting ✓ grants to pay for conservation ✓	A credible example, such as limiting the percentage of land that could be taken up for farming/avoiding chemical use	2 max	AO2 4.2.1(h)
4(d)	**Level 3 (5–6 marks)** Full and detailed explanation of how both human population growth and climate change can negatively affect biodiversity. *There is a well-developed explanation. The information presented is relevant and clearly explained.*	**Indicative content:** *Human population growth* • less area to grow crops per additional human	6	AO2 4.2.1(f)

Question	Answers	Guidance	Marks	AO Spec reference
	Level 2 (3–4 marks) Response gives a brief explanation for how human population growth and climate change can negatively affect biodiversity or a detailed explanation of one of these areas. *There is a reasonable explanation and sequence. The information presented is in the most-part relevant and well-explained.* **Level 1 (1–2 marks)** Response gives a brief explanation for either how human population growth or climate change can negatively affect biodiversity. *The information is basic and communicated in an unstructured way. The information is supported by limited method which may be unclear.* **0 marks** No response worthy of credit.	• increased transport and therefore increased carbon footprint/burning fossil fuels • increase waste – need land for disposal • increase building / housing / roads, less area for crop growth • increase in intensive farming to feed a growing population • increase use of monoculture / GM crops to achieve higher yields <u>Climate change</u> • reduces habitat diversity • less crop species survive • more species migrate due to higher temperatures • reduces species richness • reduces species evenness • traditional crops may not tolerate the new conditions and will therefore not be planted in the future		
5(a)	Left column: Kingdom, phylum, class, order, family, genus ✓ Right column: Anthus, *Anthus nilghiriensis* ✓		2	AO2 4.2.2(a)
5(b)	the number of different alleles in a population ✓ in each gene ✓	Allow number of different alleles per gene locus for 2 marks	2	AO1 4.2.1(e)

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Question	Answers	Guidance	Marks	AO Spec reference
5(c)	Any three from: the scientist is not correct ✓ proportion of Sharpbill is 71% ✓ (whereas) proportion of Superb Lyrebird is 87% ✓ *idea of* only a small sample of the genes (in any species) has been checked so proportion across whole genome could be different ✓	Allow other correct representations of proportion	3 max	AO3 4.2.1(e)
6(a)	Any three from: the percentage similarity / difference of the base sequence of DNA ✓ the percentage similarity / difference of the base sequence of mRNA ✓ the percentage similarity / difference of amino acid sequence of a protein ✓ observable characteristics ✓		3 max	AO2 4.2.1(e)
6(b)	(genetic) mutation ✓		1	AO1 6.1.1(a)
6(c)	species 3 ✓ species 3 has (only) one different amino acid whereas species 2 and 4 have more/three and two (respectively) ✓	Accept reverse argument	2	AO3 4.2.1(e)
6(d)	Any three from: plasmid and isolated gene cut ✓ using the same restriction endonuclease ✓ gene and plasmid have complementary sticky ends which anneal ✓ the gene and plasmid are joined with ligase ✓		3 max	AO1 6.1.3(f)

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Skills box answers

Question	Answer
1	diversity index for habitat **Y** = 1.62
2	Habitat **X**
3	Habitat **X** is most likely to be the meadow. Habitat Y is most likely to be the farmers field because it has the highest number of wheat individuals and the lowest species evenness