A Level OCR Biology

25 Ecosystems, populations, and sustainability – answers

Question	Answers	Extra information	Mark	AO Spec reference
1(a)(i)	**W** nitrifying bacteria / *Nitrobacter* ✓ **X** denitrifying bacteria ✓		2	AO1 6.3.1(c)
1(a)(ii)	NO_3^- ✓		1	AO1 2.1.2p 6.3.1(c)
1(a)(iii)	urea ✓		1	AO1 6.3.1(c)
1(a)(iv)	Any three from: two molecules of ammonia / NH_3 ✓ (combine with) CO_2 ✓ water released / (also) formed ✓ (occurs) in the liver ✓		3 max	AO1 5.1.2(b)(i)
1(b)	**Level 3 (5–6 marks)** Describes the role of plants in the carbon cycle, with correct biochemical details from respiration and photosynthesis. *There is a well-developed line of reasoning, which is clear and logically-structured and uses scientific terminology at an appropriate level. All the information presented is relevant and forms a continuous narrative.* **Level 2 (3–4 marks)** Describes some roles of plants in the carbon cycle, with some biochemical details. *There is a line of reasoning presented with some structure and use of appropriate scientific language. The information presented is mostly relevant.* **Level 1 (1–2 marks)** Describes some roles of plants in the carbon cycle. *The information is communicated with only a little structure. Communication is hampered by the inappropriate use of technical terms.*	**Indicative content**: • Photosynthesis (including details of the Calvin cycle, such as carbon fixation by RuBP, catalysed by Rubisco) • Carbon storage in plants (e.g., starch) and other uses of the fixed carbon (e.g., sucrose, amino acids, cellulose) • Respiration (including details of carbon dioxide release during the link reaction and Krebs cycle) • Decomposition of dead plants by decomposers	6	AO1 5.2.1(e) 5.2.2(c) 5.2.2(d) 5.2.2(e) 6.3.1(c)

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	0 marks No response or no response worthy of credit.	• Consumption of organic carbon by animals		
2(a)	***M*** *represents conservation because* ecosystem is being managed ✓ ***N*** *represents preservation because* there is no interference in the ecosystem ✓	Accept alternative wording	2	AO3 6.3.2(c)
2(b)	**Level 3 (5–6 marks)** Describes the conservation methods used in a named ecosystem, with no/few errors or omissions. *There is a well-developed line of reasoning, which is clear and logically-structured and uses scientific terminology at an appropriate level. All the information presented is relevant and forms a continuous narrative.* **Level 2 (3–4 marks)** Describes the conservation methods used in a named ecosystem, with some errors or omissions. *There is a line of reasoning presented with some structure and use of appropriate scientific language. The information presented is mostly relevant.* **Level 1 (1–2 marks)** Describes aspects of conservation methods, but without correct links to a named ecosystem. *The information is communicated with only a little structure. Communication is hampered by the inappropriate use of technical terms.* **0 marks** No response or no response worthy of credit.	**Indicative content**: Named ecosystems may include: • Masai Mara (including ecotourism and legal hunting) • Terai region of Nepal (including sustainable forest management and irrigation schemes) • The Galapagos islands (including tourism management and controls on introduced animals) • Antarctica (including management of tourism and protected areas) • Snowdonia national park (control of tourism, promotion of biodiversity, and compromise over the placement of a hydroelectric power station) The Lake District (tourism management and planting of native trees)	6	AO1 6.3.2(e)

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Question	Answers	Extra information	Mark	AO Spec reference
2(c)	coppicing ✓ largest ✓ quotas ✓ food chain ✓	ACCEPT e.g., biggest / largest mass	4	AO1 6.3.2(d)
3(a)	*density-independent factor:* natural disaster / named natural event ✓ *biotic density-dependent factor:* predation / disease / migration ✓	e.g., storm / earthquake	2	AO1 6.3.2(a)
3(b)(i)	*idea of* reduced rate of photosynthesis ✓ *idea of* less growth ✓		2	AO2 5.2.1(c)(i) 5.2.1(d) 6.3.2(b)
3(b)(ii)	*idea of* allelopathic chemicals will enter soil when leaves are eventually lost ✓		1	AO2 5.1.5(b) 6.3.2(b)
3(b)(iii)	*idea of* allelopathic chemicals may remain in the soil and interfere with crop growth ✓		1	AO2 6.3.2(b)
4(a)	100 ($g\,m^{-2}\,yr^{-1}$) ✓ ✓ ✓	$180\,kg \times 1000 = 180\,000\,g$ $\frac{180\,000\,g}{600\,(m^2)} = 300\,g$ $\frac{300\,g}{3\,(years)} = 100\,(g\,m^{-2}\,yr^{-1})$ Award 3 marks for correct answer with no working Accept errors carried forward	3	AO2 6.3.1(b)

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Question	Answers	Extra information	Mark	AO Spec reference
4(b)	15.4 (%) ✓ ✓ ✓	$42 \times 88\,000 = 3\,696\,000$ $\frac{3\,696\,000}{1000} = 3696$ kg $\left(\frac{570}{3696}\right) \times 100 = 15.4$ (%) Award 3 marks for correct answer with no working Accept errors carried forward Accept any correctly rounded % to three significant figures or greater	3	AO2 6.3.1(b)
4(c)(i)	*idea that* (named) reactions or biological processes occur at greater rate ✓ increased growth / yield ✓		2	AO1 6.3.1(b)
4(c)(ii)	more energy used for growth / stored as biomass ✓		1	AO1 6.3.1(b)
5(a)	Any five from: random sampling ✓ (use of) quadrats ✓ (use of) percentage cover / frequency ✓ large sample size ✓ ref. to identification key / method for identifying species ✓ ref. to scaling up observed numbers to estimate population size ✓		5 max	AO1 4.2.1(b) 6.3.1(e)

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Question	Answers	Extra information	Mark	AO Spec reference
5(b)	Any two from: mass of carbon / dry mass of tissue **OR** measure mass of living organisms (for fresh / wet mass) ✓ per given area ✓ dry plant material in an oven / at 80 °C **OR** idea of method for taking into account water content of living organisms (for fresh / wet mass) ✓ ref. to scaling up values to estimate for the field ✓		3 max	AO1 6.3.1(b)
5(c)	416 ✓ ✓	$\frac{(26 \times 32)}{2}$ If the final answer is incorrect, award one mark for 26 × 32 OR division by 2 Award 2 marks for correct answer without working	2	AO2 6.3.1(e)(i) 6.3.1(e)(ii)
6(a)(i)	**D A F B E C** ✓ ✓ ✓	If the order is incorrect, award one mark for: • **D** first and **C** last • **A** before **E**	3	AO2 6.3.1(d)
6(a)(ii)	*Anatomical adaptation:* low-lying or short (to reduce wind exposure) / long roots ✓ *Physiological adaptation* resistant to high light intensity / ability to photosynthesise / ability to fix nitrogen from the atmosphere (due to the lack of soil) / rapid germination of seeds ✓		2	AO2 4.2.2(g) 6.3.1(d)

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Question	Answers	Extra information	Mark	AO Spec reference
6(b)	Any four from: (use of) belt transect ✓ repeat measurements / several transect sites ✓ random selection of transect sites ✓ regular placement of quadrats (along transect) ✓ ref. identification key ✓ ref. biodiversity calculation (e.g., Simpson's index) ✓		4 max	AO2 4.2.1(b) 4.2.1(d) 6.3.1(e)

Skills box answers

Question	Answer
1	**temperature**: carry out investigation in thermostatically controlled water bath **pectinase solution:** volumes constant and use same concentration and stock solution throughout investigation **apple:** use same variety and age of apple throughout; peel and core apple; use same sized pieces **timing**: the time intervals must be constant for all tests
2	**temperature**: carry out investigation in thermostatically controlled water bath **milk**: use same batch throughout (e.g., full-fat UHT); use same volume throughout investigation **lipase, bile salts, phenolphthalein, sodium carbonate:** volumes constant and use same concentration throughout investigation establish colour change end point so the investigation is stopped at the same point for each test (difficult because colour change is subjective; could use pH meter)