OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B3.4 HOW ARE POPULATIONS AFFECTED BY CONDITIONS IN AN ECOSYSTEM? (HIGHER)

SCORE	PERCENTAGE
/37	%

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Question			Answer/Indicative content	Marks	Guidance
1			prevent soil erosion ✓ causes water to run off the land prevents light from reaching the ground stops nutrients from soaking into the soil stops fires from spreading prevent extremes of temperature ✓ causes cloud formation ✓	3 3	Deduct one mark for each additional incorrect response. Examiner's Comments Most candidates scored one or two marks and some managed to score all three. Crossing out was common and this made the marking of some candidate's responses more difficult. Candidates should be encouraged to carefully decide their answers before putting the ticks into the boxes.
			Total	3	A wide range of responses were accepted for answers to this question. Good responses included oxygen, carbon dioxide, food, tourism or medicines. Answers that included “clean air” or reference to agriculture were not credited. Examiner's Comments Most candidates scored both marks in this question, with the most common answers including reference to dead or decaying matter, animal waste or oxygen/carbon dioxide.
2	a		*Any three from:* Oxygen / carbon dioxide absorbed; Water / minerals / soil absorbed; Waste / animal waste / dead organisms / pollution / (example of) decay; Ignore “clean air” / soil / agriculture / crops Respiration / photosynthesis; Maintains oxygen / carbon dioxide balance; (Example of) food; Tourism; Medicines;	3	
	b		Any two from: Oxygen; Carbon dioxide; Dead or decaying material or example / methane; Faeces; Urine / urea / ammonia;	2	
			Total	5	

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Question			Answer/Indicative content	Marks	Guidance
3			[Level 3] Includes some indicatives points from all three areas. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] Includes some indicative points from two areas. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] Includes some indicative points from one area 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	• Idea of replace / replant what is taken • Impact on food chain or web / damages ecosystem **ignore habitat** • Reduces biodiversity / fewer **species / extinction** **Indicative scientific points concerning world community may include:** • Provides medical resources • Provides oxygen ORA • Removes carbon dioxide ORA • Ref to Timber • Global warming /climate change **Indicative scientific points for local community may include:** • Fertile soil / sustainability / income / **jobs** • Room to grow crops / livestock • Idea of slash and burn effects eg smoke /pollution / erosion / desertification / floods **Use the L1, L2, L3 annotations in RM** **Assessor; do not use ticks.** **Examiner's Comments** Good answers included points from three different areas. Examiners were looking to credit answers that referred to the ecosystem and biodiversity, answers that referred to the world community such as climate change and production of oxygen, and answers that referred to the local community such as erosion and local jobs. Most candidates scored at least four marks on this question.
			Total	6	

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Question			Answer/Indicative content	Marks	Guidance
4	a		**Level 3 (5–6 marks)** Answer includes points from three areas. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Answer includes points from two areas. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Answer includes points from one area. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted include grades Bup to A*** **Relevant scientific points concerning eutrophication include:** • Idea that **nitrates** cause algal bloom / growth / build up • Algae cut off sun(light) • Less photosynthesis • ….so algae / plants die • (Bacteria) decompose algae • **Bacteria** use up oxygen • Fish / organisms die due to lack of oxygen / need oxygen to survive **Relevant scientific points concerning table** **include:** **(Pond A)** • High level nitrate / 61 • Low level of oxygen / 2 **(Pond B)** • Low level of nitrate / 8 • High level of oxygen / 13 **Relevant scientific conclusions include:** • Pond A / pond with highest nitrates is eutrophic • Pond B / pond with lowest nitrates is healthy / not eutrophic SSU to add more **Use the L1, L2, L3 annotations in Scoris;** **do not use ticks.** **Examiner' Comments** This was the third of the six mark questions and was targeted up to grade A*. Good answers included a very good

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Question			Answer/Indicative content	Marks	Guidance
					account of eutrophication and then went on to relate this information to the data in the table and finally concluding that pond A was eutrophic. The most common error was to fail to use the data in the table and just give an account of eutrophication. Less able candidates often thought that fertiliser was toxic that lead to the direct death of all pond life. These candidates often failed to score on this question.
	b	i	Idea that pesticide could be toxic / poisonous / harmful to people or living things / environment e.g. bioaccumulation / decrease in biodiversity;	1	**Ignore** eutrophication **Ignore** contamination **Examiner' Comments** This was the third of the six mark questions and was targeted up to grade A*. Candidates needed to convey the idea of harm to humans who ate the contaminated crops. However, correct references to harm to the environment or bioaccumulation was also credit. References to eutrophication did not score.
		ii	**How** bad / serious / harmful / damaging / toxic / dangerous the risk / effect is; **Chances / likelihood** of risk happening;	2	**Ignore** any ideas of dosage / numbers of people affected **Examiner' Comments** This was the third of the six mark questions and was targeted up to grade A*. This question was only answered well by the most able candidates. Candidates who stated how serious the risk was, and the chances of it happening, scored both marks.

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Question			Answer/Indicative content	Marks	Guidance
		iii	Benefits are high or example of benefit (e.g. increased yield / increased profit); Risk is low;	2	Benefits outweigh risk = 2 marks Accept have confidence in scientists or farmers = 1 mark Examiner' Comments This was the third of the six mark questions and was targeted up to grade A*. In order to score both marks for this question required candidates to give an advantage of using the pesticide, such as improved crop yield, and also state that the risk was quite small. Answers that referred to having confidence in scientists or farmers scored one mark, Answers that stated the benefits outweighed the risks, scored both marks.
			Total	11	
5			Any two from sewage kills mayfly (nymphs) / AW (1) idea of sewage concentration reduces further do	2	Ignore observations as the question is asking for co the more sewage there is, the more the mayfly (nymphs) die scores 2 as it covers mp1 and mp3 Examiner's Comments This was a challenging question with the majority of candidates providing just observations and not conclusions about the data.
			Total	2	

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Question			Answer/Indicative content	Marks	Guidance
6			**Level 3 (5–6 marks)** A good description of **all three** pieces of equipment. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** A good description of **two** pieces of equipment **OR** a basic description of **all three** pieces of equipment. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** A good description of **one** piece of equipment **OR** a basic description of **two** pieces of equipment. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Quadrats** • a quadrat is a square frame / defined area • put quadrat on ground • plant counts in quadrat • random / grid distribution of quadrats • use of a transect line • estimate % plant cover • take several readings in / across the two areas **Light meter** • measures light levels / intensities • hold equipment at ground level • take a reading • take several readings in / across the two areas **Identification key** • compare plants seen to description / image in key • use to find names / species of plants • in each quadrat • compare plant types / species between the two areas • binary / dichotomous choices within key **Additional scientific point** • use a statistical test to support differences • data processing / graphs / mean values **Use the L1, L2, L3 annotations in Scoris; do not use ticks.** **Examiner's Comments** This was the first of the six-mark extended-writing questions. This question was generally answered well with correct

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Question			Answer/Indicative content	Marks	Guidance
					references to all three pieces of equipment. It was clear that some candidates had actively taken part in fieldwork and appreciated features such as the use of a transect for quadrat application.
			Total	6	

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Question			Answer/Indicative content	Marks	Guidance
7			(capture a sample of woodlice from an area and) mark the individuals ✓ release the individuals ✓ collect a second sample and count the number of marked individuals ✓ use the equation estimated population size = (number of) individuals given mark × (number of) individuals recaptured ÷ (number of) recaptured individuals that have a mark ✓ OR randomly place **quadrat** ✓ count number of woodlice (in the quadrat) ✓ repeat procedure **and** work out mean number of woodlice in one quadrat ✓ correct description of how to process data to calculate population in whole area ✓	4 (~~AO 2.2~~ x 4)	~~ALLOW mark, release, recapture or~~ capture - mark - recapture for 2 marks ALLOW (number in) 1st sample x (number in) 2nd sample / (number in) 2nd sample marked ALLOW average ALLOW correct description of how to calculate mean Examiner's Comments This question tested candidate's knowledge of and exposure to fieldwork activities. It required them to use their experiences and to apply their knowledge to a new and potentially unfamiliar situation. Ideally the method that would be used in this scenario would be mark-release -recapture and many candidates gave thorough and well thought out answers, describing clearly and concisely how this could be achieved. Those that opted for the quadrat route often did not score as highly, frequently missing out the need for placement of the quadrats to be random or that many quadrats would be needed. Some candidates missed out on marks for discussing the use of systematic sampling using line transects. Regardless of the route taken, the marking point that was credited less frequently was the final point explaining how the data

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					collected would allow the student to work out the population size. Centres may find it helpful when teaching this area of the specification to present candidates with several examples of fieldwork that could be conducted to demonstrate the range of techniques used and consider the appropriateness of each technique in a number of different settings.
			Total	4	

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