

Biology GCSE Revision

Topic 7

Ecology

Booklet 3 of 3

- Human Impact on the Environment

Mark Scheme

Question	Answers	Extra information	Mark	AO / spec ref.
1(a)(i)	76.0 / 76	correct answer with or without working gains 2 marks allow 76.04 for 2 marks allow 76.04 with extra decimal places eg 76.042 for 1 mark $\frac{465}{611.5}$ for 1 mark	2	AO2 3.4.4c
1(a)(ii)	mass of fish declines (until 2008) (due to an) increase in fishing / overfishing and then rises (until 2010) (which could be due to) quotas / net restrictions working	ignore use of numbers allow number of fish decline (until 2008) allow any reasonable suggestion, such as countries swapping quotas or restrictions on fishing during breeding seasons ignore less fishing if no other marks awarded allow 1 mark for a decrease in mass and an increase in mass if answer relates to sustainable fishing	1 1 1 1	AO2 / AO3 3.4.4c
1(a)(iii)	(this is due to) public awareness / demand	allow legislation / rules	1	AO3 3.4.4c
1(b)	fishing quotas / bans (small) net / mesh size	if size of net is stated then it must be smaller if size of mesh is stated then it must be larger	1 1	AO1 3.4.4c

1(c)	(fish) cannot move freely / as much		1	AO1 / AO2 3.4.4b
	(therefore) less <u>energy</u> loss from the fish	do not allow 'no energy is lost' ignore references to less heat loss though controlling body temperature ignore references to respiration	1	
	(there is) more food available / better quality food / fed more often	accept 'high-protein food for making cells'	1	
	(so) there is more energy for growth or (more food) is converted to biomass		1	
Total			13	

Question	Answers	Extra information	Mark	AO / spec ref.
2			6	AO1 3.3.1
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.				
0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)	
No relevant content	There is at least one reason for deforestation or an attempt at a description of at least one way deforestation is affecting the atmosphere.	There is at least one reason for deforestation and a description of the way deforestation is affecting one gas in the atmosphere or the process that causes an effect.	There are reasons for deforestation and a clear description of the way deforestation is affecting one gas in the atmosphere and the process that causes this.	
examples of the points made in the response Reasons for deforestation <ul style="list-style-type: none"> timber for construction / furniture / boat building / paper production growing plants for biofuels for motor fuel / aviation / lawnmowers use of wood as a fuel land for building or agriculture to provide food, such as rice fields and cattle ranching Effects of deforestation <ul style="list-style-type: none"> increase in carbon dioxide in atmosphere <ul style="list-style-type: none"> due to burning due to activities of microbes less carbon dioxide taken in / locked up (by trees) less photosynthesis increase in methane in atmosphere due to rice production / cattle 		extra information ignore references to oxygen accept explanations of the effect of water (vapour)		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	any two from: <ul style="list-style-type: none"> • (volume of) peat compost has been steady and then declined or volume of peat compost has declined since 2005 • (volume of) peat-free compost has increased (since 1999) • (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat) • total volume of peat and peat-free compost has increased 	allow 2007 instead of 2005 allow 2007	2	AO2 342d
3(b)	increases carbon dioxide (in the atmosphere)	ignore methane	1	AO1 342
3(c)	any one from: <ul style="list-style-type: none"> • reduces biodiversity • destruction of habitats • disruption of food chains 		1	AO1 342b
Total			4	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	forest at the edges (of the island) has been removed	allow centrally the forest remains	1	AO3 3.4.2
	an appropriate area on the island is identified eg south east or bottom right		1	
4(a)(ii)	any two from: <ul style="list-style-type: none"> • (to provide land) for farming / agriculture • (to provide land) for quarrying • (to provide land / wood) for building • to provide fuel • to produce paper 	allow to provide timber allow forest fires	2	AO2 3.4.1c 3.4.2c
4(b)	any two from: <ul style="list-style-type: none"> • decreased biodiversity • loss of habitats • increased carbon dioxide (concentration) • global warming 	allow effects of global warming eg flooding / rise in sea level allow soil erosion	2	AO3 3.4.1c 3.4.2a/b/c
Total			6	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	less CO ₂ absorbed / taken in (by trees from the atmosphere)	allow release / increase of CO ₂ from burning / use of (heavy) machinery ignore less photosynthesis unqualified	1	AO1 3.4.2a
1(b)(i)	0.8		1	AO2 3.4.2
1(b)(ii)	anywhere in range: 3(.0) – 3.4		1	AO2 3.4.2
1(c)	microorganisms respire and release CO ₂	allow bacteria / fungi / decomposers allow anaerobic decay / respiration releases methane	1 1	AO1 3.4.2a
Total			5	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	(rapid) growth in population (size) increase in the standard of living	accept description of increased standard of living, eg more packaging, more food thrown away or overbuying resources	1 1	AO1 341a
4(b)(i)	41.5	allow 1 mark for $9733 \div 23454$ or allow 1 mark for 0.415 or allow 1 mark for 41.49 or 41 or 41.4	2	AO2 341
4(b)(ii)	any four from: arguments for: <ul style="list-style-type: none"> there has been a reduction in total waste there has been an increase in (total mass of) recycling there has been an increase in the percentage of waste recycled it (may) not be possible to achieve zero waste arguments against: <ul style="list-style-type: none"> there is still a lot of waste (not recycled) there has only been a small reduction in total waste there was one year (2006) where total waste went up the rate of increase of percentage recycled is slowing down no information on materials reused no information on waste from factories / industry 	max 3 marks for a one sided argument allow as reason against if clear allow still more than half or 56.8% of waste (not recycled)	4	AO3 341

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(c)(i)	any two from: <ul style="list-style-type: none"> • reduce biodiversity or extinction • change in migration patterns • change in species distribution • change in climate 	ignore rise in sea levels ignore temperature change accept correct examples of climate change eg storms, flooding, drought references to weather changing is insufficient allow ice caps melting or habitat destruction	2	AO1 343a
4(c)(ii)	any one from: <ul style="list-style-type: none"> • absorbed by oceans / ponds / lakes • peat bogs 	allow used for skeletons / shells of sea creatures allow in fossil fuels / limestone	1	AO1 343b
Total			11	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	Causes acid rain		1	AO1 3.4.1b
4(b)(i)	66(%) or 65.7(%)	allow 1 mark for 920 or ecf from first line	2	AO2 3.4.1b
4(b)(ii)	it rises and then falls maximum level in 2005 or maximum reached at 400 (thousand tonnes)		1 1	AO2 3.4.1b
Total			5	

Question	Answers	Extra information	Mark	AO / spec ref.
7(a)(i)	(initially there is) oxygen	accept: oxygen hasn't been used up yet (so not anaerobic conditions yet)	1	AO1 / AO2 3.4.3c
	(so) <u>aerobic</u> respiration (by microorganisms)	(because) methane is produced in anaerobic (fermentation)	1	
	producing CO ₂ (which does not burn)	there is no methane ignore inflammable	1	
7(a)(ii)	(peelings had) the most carbohydrate / organic material	answer must be comparative accept contained more microorganisms / decomposers / bacteria ignore water do not allow fat or protein	1	AO3 3.4.3c
7(b)(i)	0.22 / 0.221	correct answer with or without working gains 2 marks allow 0.2 for 1 mark allow 22.1 for 1 mark allow $0.34 \times 65 / 0.65$ for 1 mark	2	AO2 3.4.3c
7(b)(ii)	(sheep manure) produces a higher volume of biogas / almost double or produces 0.27 (m ³ per kg) more	accept 0.408(7) / 0.41 / 0.409 (m ³) from sheep for 2 marks accept 0.1877 / 0.188 / 0.19 (m ³) more than cow's manure for 2 marks	1	AO2 3.4.3c
	(sheep manure) produces biogas with a higher percentage methane or produces 2% more methane	allow correct difference in volume calculated using 0.408(7) / 0.41 / 0.409 minus answer given in 7(b)(i) for 2 marks	1	
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	fungus		1	AO1 344d
1(a)(ii)	oxygen / O ₂	accept air accept O ₂ do not allow O ² / O / O2	1	AO2 344d
1(a)(iii)	glucose (syrup)	allow carbohydrate / sugar ignore food / starch allow oxygen if oxygen / air not given in (a)(ii)	1	AO1 344d
1(b)	any two from: <ul style="list-style-type: none"> • <u>quicker</u> • suitable for vegetarians • <u>cheaper</u> • more efficient or less land / methane 	ignore high in protein ignore sustainability unqualified ignore less pollution unqualified allow less animals harmed / killed allow food chain is shorter or has less trophic levels allow less energy lost (from the food chain) do not allow no energy lost allow low(er) in calories (than some meat) allow low(er) in fat / <u>healthier</u> (than some meat) allow source of fibre / prevent constipation	2	AO3 344a/d
Total			5	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)(i)	fewer cows		1	AO2/3
	any one from: <ul style="list-style-type: none">less methaneless CO₂ in the atmosphere because of less deforestation or less plants consumed.	do not allow CH ₄ allow less CO ₂ released into the atmosphere because less fuel used e.g. to heat cowsheds or to transport meat do not allow CO ₂	1	3.4.2c 3.4.3a
9(a)(ii)	any two from: <ul style="list-style-type: none">could be mass produced to feed an increasing populationdisease free meatno / low fatno harm to animals or less intensive farmingantibiotic free meatmore land available for farming crops	allow (may be) suitable for vegetarians allow no energy loss along a food chain	2	AO3 3.4.4a/b
9(b)	fungus / <i>Fusarium</i> with <u>glucose</u> (syrup) in aerobic conditions or in presence of oxygen mycoprotein is harvested / purified	ignore stirring / mixing and temperature		AO1 3.4.4d
			1	
		ignore air	1	
		allow ammonia added (as source of nitrogen)	1	
Total			8	

Question	Answers	Extra information	Mark	AO / spec ref.
3(a)	microorganisms	allow microbes / bacteria / fungi / decomposers	1	AO1 / AO2 1.6.1b
	(microorganisms) respire	do not allow dead plants respire	1	
	(respiration / decay / microorganisms) releases (thermal) energy / 'heat'	ignore produce 'heat' do not allow produce energy do not allow dead plants release 'heat'	1	
3(b)(i)	any three from: <ul style="list-style-type: none"> • (opening) allows oxygen in • microorganisms / eggs need oxygen • oxygen needed for respiration • (opening) allows release of carbon dioxide (from microorganisms / respiration / eggs) • (opening) allows energy / 'heat' to escape • (closing) retains energy / 'heat' if too cool / at night • (closing) retains moisture 	allow air for oxygen allow gaseous exchange (1 mark) of / for microorganisms / eggs (1 mark) if none of first four points given if no mark awarded for either of these points allow 1 mark for vents open in the day to prevent overheating and close at night to prevent it getting too cold allow (opening) releases moisture	3	AO1 / AO2 / AO3 1.6.1b, c, 1.6.2
3(b)(ii)	any one from: <ul style="list-style-type: none"> • maintains sex balance • (survival of species depends on there being) males and females in population 	e.g. equal / best / correct numbers of male and female allow so the offspring are not all the same sex	1	AO3 1.6.1
Total			7	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	any one from: <ul style="list-style-type: none"> continuous readings do not need to be there (more likely to be) accurate reduces human error 	allow automatic readings allow greater resolution do not allow valid allow easier to read	1	AO3 1.6.2
3(b)(i)	microorganisms (microorganisms) respire (respiration / decay / microorganisms) releases carbon dioxide	allow microbes / bacteria / fungi / decomposers for microorganisms, throughout ignore carbon released	1 1 1	AO1 1.6.1a/b / 1.6.2a / 1.5.1c
3(b)(ii)	all grass decomposed / decayed / rotted	allow idea that all microorganisms dead (due to accumulation of waste or lack of oxygen) allow lack of / no oxygen (for respiration of microorganisms)	1	AO3 1.6.1b
Total			5	