PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 9: ECOSYSTEMS AND MATERIAL CYCLES (PACK 1)

SCORE	PERCENTAGE
/63	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Mark
(i)	B high pollution The only correct answer is **B** high pollution A is incorrect because bloodworms are not found in unpolluted water C is incorrect because there are only low levels of bloodworms in areas of some pollution D is incorrect because there are only low levels of bloodworms in areas of low pollution	**(1)** **AO 2.1**

Question number	Answer	Additional guidance	Mark
(ii)	Stone fly (1) Freshwater shrimp (1) Accept phonetic misspellings	answers can be in either order	**(2)** **AO 2.1**

Q2.

Question Number		Indicative Content	Mark
QWC	*	An explanation to include some of the following points • mutualism involves organisms living closely with each other • both organisms benefit oxpeckers • relationship with large herbivores in Africa • oxpecker feeds off of the parasitic insects that live on the herbivore • disease reduced in herbivores from parasitic insect removal cleaner fish • relationship with ocean species such as sharks and large fish • cleaner fish eats the dead skin and parasites on the large fish or sharks • large fish / sharks have disease reduced by removal of parasites nitrogen fixing bacteria • relationship with leguminous plants such as beans • bacteria live inside root nodules • bacteria fix nitrogen for the plant to use • bacteria obtain nutrition from the plant and are protected from the environment chemosynthetic bacteria • relationship tubeworms in deep sea vents • lack of light so no photosynthesis • tubeworm gathers chemical substances needed by the bacteria for chemosynthesis / provide protection from heat • bacteria produce chemicals for the tubeworm	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• a limited explanation of at least one example of mutualism or definition of mutualism • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• a simple explanation of at least two examples of mutualism or a detailed explanation of one • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• a detailed explanation of at least three examples of mutualism including nitrogen fixing bacteria or chemosynthetic bacteria • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Q3.

Question number	Answer	Additional guidance	Mark
(i)	Substitution 27 000 - 9 500 = 17 500 (1) Evaluation (17 500 ÷ 9 500) x 100 = 184.2 / 184 (%)	award full marks for correct answer with no working accept answer to any number of decimal places rounded correctly from: 184.2105263158	**(2)** AO 2 1

Question number	Answer	Mark
(ii)	An explanation including the following: • (the number chipmunks in the wild have increased) {so the ticks have more food /there are more ticks} (1) • so humans are more likely to be bitten (and contract Lyme disease) (1)	**(2)** AO 2 1

Q4.

Question number	Answer	Mark
(i)	2108 (g)	**(1)** AO2 1

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • population of earthworms will decrease (1) • because more earthworms will be eaten by hedgehogs (1)	 accept earthworms will die out accept hedgehogs have only one food source accept population of earthworms will increase as more {food/cabbages} available (2 marks)	**(2)** AO2 1

Question number	Answer	Additional guidance	Mark
(iii)	A description including: • use of quadrat / belt transect (1) • count the number of slugs in the sampled area (1) • multiplication factor to make the estimate (1)	 accept description of quadrat 1m x 1m / 1m^2 accept calculate the mean numbers of slugs from all the samples	**(3)** AO3 3a

Q5.

Question number	Answer	Additional guidance	Mark
(i)	• 2.1 x 10^4 = 21 000 x 0.1 = 2 100 in the water beetle (1) • 210 J in the bird (1)	award full marks for correct numerical answer without working	**(2)**

Question number	Answer	Mark
(ii)	it limits the length of the food chain	**(1)**

Q6.

Question number	Answer	Additional guidance	Mark
	7 (billion) (1) 0.91 (billion)	 award full marks for answer without working accept 910 000 000 for 1 mark	**(2)** **AO2.2**

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	substitution (12 x 18 ÷10) = 21.6 (1)	award full marks for correct answer with no working	**(3)** **AO2**
	whole organism (1) = 21 / 22	e.c.f. from incorrect substitution **using data from the table**	
	(50 – 21 / 22) = 28 / 29	e.c.f. from incorrect whole organism award two marks for 28.4 or 27.9 or 22 or 21 without working	

Question Number	Answer	Mark
(ii)	Any **two** from: • sample at the (same) time of day (1) • sample for the (same) length of time (1) • use the (same) equipment / techniques (1) • (same) time period between first and second sample (1) • (same) marking process (1) • do not harm organisms when sampling (1)	**(2)** **AO2**

Q8.

Question number	Answer	Additional guidance	Mark
	carbon absorbed 120.1 + 92.8 or 212.9 (1) OR carbon released 119.6 + 90 + 6.4 or 216.0 (1) Evaluation 3.1 (gigatonnes)	award full marks for correct answer with no workings	**(2)** AO2 1

Q9.

Question number	Answer	Additional guidance	Mark
	substitution (from graph) increase = 275 – 225 (= 50) (1) evaluation rate = 50 ÷ 10 = 5	 accept tolerance +/- 2 for graph readings accept values of 4.6 to 5.4 award full marks for answer without working	**(2)** **AO2.1**

Q10.

Question Number	Answer	Additional guidance	Mark
	conversion 60 ÷ 1000 =0.06 (1) evaluation 300 ÷ 0.06 = 5000 (kg)	accept alternative methods of calculation award full marks for correct numerical answer without working	(2)

Q11.

Question Number	Answer	Mark
(i)	**B** ethene	(1)

Question Number	Answer	Mark
(ii)	**A** carbon dioxide	(1)

Q12.

Question Number	Answer	Additional guidance	Mark
	A description including **three** from: • place a quadrat along a {rope / tape} measure (1) • tape measure to measure along the transect (1) • measure light intensity at different distances (from the wood) (1) • measure the stinging nettles {along the transect / at different light intensities} (1) • way of measuring growth of stinging nettles (in the quadrats) (1)	reject quadrant accept good descriptions of quadrats – e.g. ½ metre wire square accept use a light meter/lux meter accept named examples – e.g. {height / mass/ dry mass / number of leaves / number of plants}	**(3)** **AO3 3a**

Q13.

Question number	Answer	Additional Guidance	Mark
	A description including: • decomposers break down waste matter (into ammonia) (1) • nitrifying bacteria convert ammonia / nitrifying bacteria make {nitrites / nitrates} (1) • nitrogen fixing bacteria convert nitrogen into nitrates (1) • denitrifying bacteria {convert nitrates / release nitrogen} (1)	accept dead organisms for waste matter accept nitrification for nitrifying bacteria accept ammonia/nitrogen compounds for nitrates accept denitrification releases nitrogen	**(4)** AO1 1

Q14.

Question number	Answer	Additional guidance	Mark
(i)	Pyramid of biomass • pyramid shape with labels (1) • correct proportions: chipmunks must be {equal to/less than} 50% of the acorns, wild dogs must be {equal to/less than} 50% of chipmunks (1)	 accept names in bars or triangle for this mp must be bars: reject triangle against this mp.	**(2)** AO 2 2

Question number	Answer	Mark
(ii)	An answer that combines **two** of the following points of application and understanding to provide a logical description: • few chipmunks are { eaten / killed } (due to the lack of predators) (1) • so the number of chipmunks (in France) will increase (1) • therefore more chipmunks can reproduce (1)	**(2)** AO 2 1

Question number	Answer	Additional guidance	Mark
(iii)	Substitution 9 7500 ÷ 100 = 975 (1) Evaluation 975 x 9.5 = 9 262.5 (1) Nearest whole number 9 263 (kJ) OR 97500 x 0.095 (1) = 9 262.5 (kJ) Nearest whole number 9 263 (kJ)	award full marks for correct answer with no working	**(3)** AO 1 2

Q15.

Question Number	Answer	Acceptable answers	Mark
(i)	A description including **two** of the following: as pH decreases so do the number of species in the lake (1) all the organisms /species in the lake are found at 6.0/6.5 (1) comment on specific reading from the graph e.g. (only) {frogs / 1 organism} remain at lowest pH. eq. (1)	accept: the more acidic the lake is the lower the number of species {more species / types of organisms} live in more neutral conditions /less organisms live where {low pH /more acidic}	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**D** ☒ sulfur dioxide		**(1)**

Q16.

Question number	Answer	Additional guidance	Mark
(a)(i)	• 107 ÷ 153 (1) • 0.699 3464 × 100 = 70% (1) Answer to 2 significant figures	award full marks for correct numerical answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
(a) (ii)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark): • stream B is more polluted that stream A (1) Plus one from: • (because) stream A contains stonefly larvae/mayfly larvae/caddis fly larvae (which are indicators of clean water) (1) • (because) stream B contains larger numbers of blood worm and sludge worm (which are indicators of polluted water) (1)	accept other correct indicators from the table. accept higher oxygen levels in place of clean water accept lower oxygen levels in place of polluted water	**(2)**

Question number	Answer	Mark
(b)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (3 marks): • plants growing on the bottom of the stream will be unable to receive sunlight due to the thick layer of algae (1) • these plants will not be able to photosynthesise and will die and start to decompose (1) • the microorganisms decomposing the plants will respire, removing oxygen from the water (1) • the stream will become anoxic/oxygen depleted and other respiring organisms (plants and animals) will not be able to survive so biodiversity will be reduced (1)	**(4)**

Q17.

Question Number	Answer	Acceptable answers	Mark
(i)	**A** ☒ autotrophically		**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	7 760 / 97 000 = 0.08 (1) 0.08 x 100 = 8.00 (1) 100 – 8.00 = 92.00 (%) OR 97000 - 7760 = 89240 (1) 89240/97000 = 0.92 (1) X 100 = 92(%)	**Award 3 marks for correct bald answer** **Accept alternate method of calculation**	**(3)**

Question Number	Answer	Acceptable answers	Mark
(iii)	Any two of the following: not all of the organisms are consumed (1) indigestible / **egestion** (1) **excretion** (1) movement (1) heat / respiration (1) reproduction (1)	 hunting / flying	**(2)**

Q18.

Question number	Answer	Additional guidance	Mark
(i)	An explanation including two from: • there is less energy in the cattle than in the plants (1) • not all of the energy from the plants is passed on to the cattle (1) • (because) not all plant material is digested / eaten (1) • (and) some energy is used for respiration / movement / metabolism (1)	accept plants are eaten by cattle accept excretion	(2) AO2.1

Question number	Indicative content	Additional guidance	Mark
(ii)	An explanation linking three of the following: • there will be less food for people to eat (1) • farming meat does not produce as much food (per acre as arable farming) (1) • so more land used for {meat farming / animal feed} (1) • means less {arable land / food (crops) grown for humans} (1)	accept a diet including a large amount of meat has health implications e.g. high cholesterol (1)	(3) AO2.1

Q19.

Question number	Answer	Additional guidance	Mark
	An explanation linking three from: • {squirrels / earthworms / cabbages} release carbon dioxide (1) • from respiration (1) • cabbages take in carbon dioxide (1) • (cabbages) for photosynthesis (1) • when organisms die decomposers release carbon dioxide (1) • {squirrels/earthworms} eat {cabbages / plants} which contain **carbon** (1) • egestion releases **carbon** (into the soil) (1)	accept CO_2 reject CO^2 accept **decomposers** respire accept squirrels eat earthworms which contain carbon accept named methods of egestion	**(3)** AO2 1

Q20.

Question Number	Answer	Additional guidance	Mark
	An explanation linking: • increasing oxygen concentration increases the rate of decomposition (1) • because there is more respiration (1)	 accept reverse argument	**(2)** **AO2 1**