Mark scheme

Organisms and their environment

Biology 0610 · Questions from Paper 3 and Paper 4

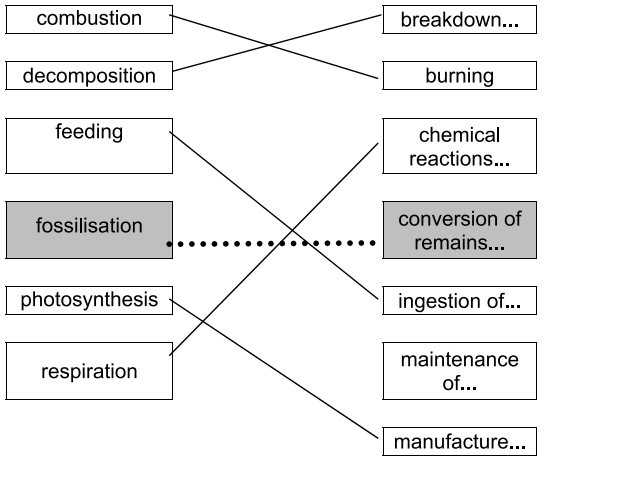
Total marks

90

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
5	8	9	12	8	7	8	9	11	13	**90**

Question 1 [5]

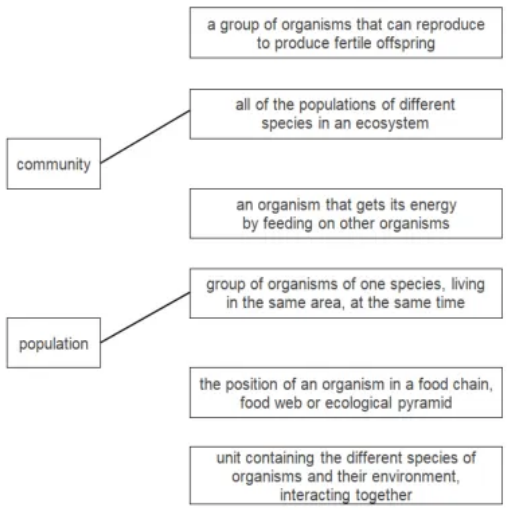
1	 ;;;;;	5

Question 2 [8]

2	**(a)**	food chain shows energy transfer from one organism to next organism; food web shows energy transfer through an ecosystem;	[2]	A – only one organism at each (trophic) level A – can have more than one organism at (trophic) levels A – food web is a network of linked food chains
	(b)	**(i)** snake / lizard / bat / badger / eagle / coyote / mountain lion;		
		(ii) producer – sage brush / prickly pear (cactus) / (desert) flowers;		A – bushes, cactus
		(iii) rabbit / insects / deer (and other grazers) / squirrel (and other small rodents);	[3]	
	(c)	(no mountain lions / extinction) leads to increase in numbers of deer (and other grazers); more food for coyotes; leads to increase in numbers of coyotes;	[3]	A – alternative routes that lead from mountain lion to coyotes via deer, producers, insects, lizards, etc. A – less competition for food
			[Total: 8]	

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Question 3 [9]

3(a)		2	**R** each additional line
3(b)(i)	**A** lag **B** exponential **C** stationary **D** death ;;	2	all correct = 2 marks any 1 correct = 1 mark
3(b)(ii)	1000 ; 2.5 ; **C** ; **D** ; (named) nutrients / oxygen ;	5	

Question 4 [12]

4(a)(i)	<table><tr><td>organism</td><td>number</td></tr><tr><td>producers</td><td>2</td></tr><tr><td>herbivores</td><td>3 ;</td></tr><tr><td>primary consumers</td><td>3 ;</td></tr><tr><td>carnivores</td><td>5 ;</td></tr></table>	3	
4(a)(ii)	bird / snake ;	1	
4(b)	increases **and** predation ; decreases **and** predation ;	2	one mark for each correct sentence
4(c)	energy ; organic ;	2	
4(d)(i)	8 ;	1	
4(d)(ii)	correct order – caterpillar above cabbage and bird above caterpillar ; correct block width – caterpillar 40 small square wide and bird 4 small squares wide ; three correct name labels that match the block size ;	3	ecf from 5(d)(i) for bird

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Question 5 [8]

5(a)	lightning / root nodules ; nitrate ; urea ; nitrate ; denitrification ;	**5**	
5(b)	*any two from:* decomposition / decay ; feeding ; excretion ; AVP ;	**2**	**A** in any order
5(c)	(the) Sun ;	**1**	

Question 6 [7]

6	**(a)**	group of organisms of the same species ; in the same area / at the same time ;	[2]	**A** 'of a kind' / a species **A** same habitat / ecosystem / community
	(b) (i)	greater predation by owls / more predators / more owls; lack of food / starvation / more competition for food ; adverse (named) weather condition (s) ; disease / sickness / illness; emigration ; AVP ; habitat destruction	max [3]	**R** climate change
	(ii)	**1** owl population increases, after / AW, vole population increases ; **2** owl population crashes (in year 7) ; **3** immediately after crash in vole population ; **4** vole population crashes / decreases (in year 6) ; **5** when there are most owls ; **6** if owls ate (much) other prey there would not be a close relationship / AW ; **7** ref to numbers of owls from the graph ;	max [2]	**if MP1 and MP2** not given accept the idea that 'owl population follows changes in vole population' if answer does not refer to the increase or decrease
			[Total:7]	

Question 7 [8]

7	**(a)**		log / exponential (phase) ;	[1]	
	(b)	**1** **2** **3** **4** **5**	decomposition of waste ; by bacteria / microorganisms ; reduces oxygen available ; eutrophication / algal bloom ; results in death of (aquatic) plants and animals ;	max [3]	**ignore** pollution / contamination unqualified
	(c)		secondary consumer / third trophic level ;	[1]	
	(d)	**1** **2** **3** **4** **5** **6** **7** **8**	seaweed at a lower trophic level (than salmon) ; **ora** energy is lost, between / within, trophic levels / along food chain ; reference to 10% energy transfer / **ora** ; (energy lost in) respiration / heat / (named) metabolic process ; (energy lost in) movement / muscle contraction ; reference to (more) material that is, inedible / not digestible (in longer food chains) ; (energy lost in) excretion / urine ; *idea that* less fuel required to farm seaweed / AW ;	max [3]	**A** seaweed are producers / first trophic level
				[Total: 8]	

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Question 8 [9]

8	(a)	line at 1 until end of May ; exponential increase from June to 100 000 at beginning of July ; **A** a straight line decrease at end of August to around 10 000 ; remains about 10 000 until beginning of November ;	[max 3]	if points are plotted, but no line or block graph used = max 1
	(b)	eaten by, predator / fish ; not enough food ; too cold ; pollution ; AVP ;	[max 2]	**A** eutrophication
	(c)	**1** *accept ref. to* limiting factor(s) *once in the answer* ; *lag phase* (*March April May*) **2** slow reproduction rate / BR = DR ; **3** no food / too cold / AW ; *exponential / log, phase (June)* **4** reproduction rate increases / BR > DR ; **5** increase in temperature ; **6** food available ; *steady / stationary / AW, phase* (*September October November*) **7** reproduction rate slows / BR = DR ; **8** decline phase ; **9** (reached) carrying capacity / AW ; **10** DR > BR ; **11** predation ; **12** less food / competition for food;	[max 4]	**I** refs. to numbers and descriptions rather than explanations for MP2 – 12 must be clear which period of the graph or phase is being described

[Total: 9]

Question 9 [11]

9	(a) (i)	**L** = (primary) producer(s) ; **N** = secondary consumer(s) ;	[2]	**ignore** (green) plant **ignore** carnivore
	(ii)	energy, of / at, each trophic level ; **A** shows that energy, decreases / is lost (at each trophic level) e.g. '**L** has more energy than **M**'	[1]	**R** biomass / numbers **R** 'production of energy' **ignore** energy passed on – shown by the arrows not the boxes
	(iii)	*idea that* **1** no, energy left ; **2** use figures from Fig. 2.1 to show that all energy to **O** is already **3** little / not enough, energy available from eating, tertiary consumers / **O** / AW ; **4** loss of (90%) energy, at / between, each trophic level / AW ; **5** would be very small population of predators of **O** ; **6** (population of) predators of **O** unlikely to survive ; **7** AVP ; e.g. *idea that* difficult to be a predator of **O** because **O** is likely to be 'large and fierce'	[max 3]	**A** 'needing to eat a lot to get enough energy' MP4 *no need to use the term trophic level if idea is implied*
	(iv)	**1** loss of energy (from, each / all, trophic level(s)) ; **2** (by) respiration ; **3** (to the) environment / atmosphere / surroundings ; **4** as, heat / thermal energy ;	[max 2]	*accept once only*
	(b)	*M is the herbivore* **1** more (biomass of / energy in), producers / **L** ; **2** as fewer / no, herbivores / primary consumers / predators (to eat **L**) / **M** ; **3** fewer / extinction of, carnivores / secondary consumers / **N** ; **4** fewer / extinction of, tertiary consumers / **O** ; **5** as less, food / energy ; **6** more competition ;	[max 3]	**ignore** any changes to decomposers / recycling **A** the argument that more primary consumers will migrate into the ecosystem **ignore** predators / organisms unqualified

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Question 10 [13]

10(a)(i)	Sun ;	**1**	
10(a)(ii)	8 ;;	**2**	MP1 correct calculation to any number of significant figures MP2 correct rounding to one significant figure **ecf** from previous step
10(a)(iii)	*any two from:* (energy lost as) heat / respiration ; (named other) metabolic processes ; (energy lost in) movement / muscle contraction ; not all of the organism is, eaten ; not all of the organism is digested **or** (energy lost in) faeces / egestion ; not every organism in that trophic level is eaten ;	**2**	
10(a)(iv)	*any two from:* more <u>accurate</u> representation of energy, transfer / loss ; *idea of* accounts for (different) rate of reproduction ; *idea of* accounts for (different) life spans ; *idea of* accounts for different, sizes / body composition, of organisms ; *idea of* accounts for, time / seasonal variations ; allows (better) comparisons between ecosystems ;	**2**	
10(b)(i)	area (at the same) time ;	**1**	
10(b)(ii)	*any five from:* 1 (population) increases and plateaus ; 2 birth rate exceeds mortality rate / AW ; 3 plenty of (named) resources / no competition for (named) resources / lack of predation ; 4 (then) slowing / decreasing rate, of population growth ; 5 (named) resources become limited / competition for resources / increased predation / (new) disease ; 6 birth rate and mortality rate become more equal ; 7 AVP ;	**5**	

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