Organisms and their Environment

Mark Scheme 1

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Organisms and their Environment
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 1

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 **(a (i)**	willow (tree) and / or aquatic plants → moose → wolf arrows point from food to feeder ; organisms are in the correct order in the food chain ;	**[2]**	**ignore** the Sun at the start of the food chain
(ii)	*the three organisms can be in any order in the table* willow tree / aquatic plants / shoots / plants – producer / 1st / 1 ; moose – primary consumer / 2nd / 2 ; wolf – secondary consumer / 3rd / 3 ;	**[3]**	**ignore** autotroph **ignore** herbivore **ignore** carnivore / top consumer
(iii)	competition ; food supply / food for moose / food for wolves ; water ; shelter / 'nest' sites / space / territory ; mates ; competition with other types of predators ; disease / parasites ; hunting / poaching ; pollution ; rate of reproduction ; habitat, loss / destruction ; AVP ;	**[max 2]**	**A** intraspecific competition **A** numbers of other competitors **A** interspecific competition **R** predation / new predator

Question	Answers			Marks	Additional Guidance
1 (b) (i)	*two marks for the correct answer* *if no answer or incorrect answer, one mark for correct working*				
	answer for two marks	1.3 **;;** **A** 1.30	1.4 **;;** **A** 1.42		
	working for one mark	*either* $\frac{56\,000}{4\,320\,000}$ (x 100) *or* **A** 1.296 / 1.2963, etc. **ignore** 1.29	*either* 4 320 000 – 380 000 = 3 940 000 *or* = $\frac{56\,000}{3\,940\,000}$ (x100) *or* **A** 1.421 / 1.4213, etc.	**[2]**	

1 **(b) (ii)**	*this question can be answered in terms of energy flow (left column) or predator-prey relationships (right column)* energy is lost, between / within, trophic levels / along food chain ; **A** from moose to wolf energy lost, in respiration / as heat / in metabolism ; use of figure with units from Table 6.2 to illustrate / 1.3% / 1.4% ; **A** ecf from (b)(i) energy used in maintaining body temperature ; moose / wolf, is an, endotherm / homeotherm ; energy lost in movement ; energy used in muscle contraction ; energy in food, not eaten / egested / passed out in faeces ; energy lost in, excretion / urine ; wolves not very successful at catching prey ; more energy available for moose (than for wolf) ; no other source of food for wolves but, moose ; AVP ; e.g. some / AW, energy is not used for growth	low numbers of wolves ; **A** wolves die little predation ; more moose, reach reproductive age / have offspring ; numbers of moose increase ; more food for wolves ; more wolves, reach reproductive age / have offspring ; numbers of wolves increases ; more predation ; greater competition between wolves ; *idea that* wolf population reaches carrying capacity / reaches maximum for resources available ; **A** not enough energy available for more than 50 wolves **[max 5]**	
		[Total: 14]	

Question		Expected Answers	Marks	Additional Guidance
2 (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]	

3	**(a)**	1.8 / 1.83 / 1.825, mm **;**	[1]	
	(b)	nitrogen fixation **;** convert nitrogen into, ammonia / NH_3 / ammonium ions / NH_4^+ **;** convert ammonia to amino acids **;**	max [2]	
	(c) **(i)**	photosynthesis **;** carbon dioxide + water / CO_2 + H_2O **;** use of, <u>light</u> (energy) / <u>sunlight</u> **;**	max [2]	
	(ii)	translocation / mass flow **;** phloem **;** as sucrose **;** from, source / leaf **;** then from phloem to root nodule by diffusion **;**	max [2]	
	(d)	active, transport / uptake **;** use of, energy / ATP (from respiration) **;** use of, proteins / carrier molecules, in membrane **;**	max [2]	

		Answer	Marks	Guidance for Examiners
4	(a)	**V** – lag (phase) ; **W** – log phase / exponential (phase) ; **X** – stationary / plateau (phase) ;	[3]	
	(b)	temperature ; pH ; oxygen concentration ; consistency / turbidity / density ;	max [2]	
	(c)	*(Penicillium)* has no (individual) cells / has hyphae ; measuring mass is easier (compared with counting) ; measuring mass is more accurate / valid (compared with counting) ;	max [1]	
			[Total:6]	