19. Organisms and their environment

19.2 Food chains and food webs

Paper 3 and 4

Marking Scheme

Q1.

(a)	banana / plant → (banana) weevil → (tree) frog → snake ;;	**2**	MP1 for organisms in correct order MP2 for arrows in the correct direction
(b)	4 ;	**1**	
(c)	*banana tree:* producer ; *tree frog*: consumer ; carnivore ;	**3**	 in either order
(d)	it takes size of organisms into account / AW ;	**1**	

Q2.

(a)	turtles / large fish / sea urchins / sharks / starfish ; sea cucumbers / small fish / sea urchins ; sea urchins / turtles / large fish / starfish / sharks ; sea urchin ;	**4**	
(b)(i)	energy, transfer / flow ;	**1**	
(b)(ii)	algae / plankton → small fish → starfish → large fish → shark ;;	**2**	
(b)(iii)	photosynthesis ;	**1**	
(b)(iv)	decomposer ;	**1**	
(c)	*any three from:* *turtle population decreases because:* sharks eat more turtles ; because there are fewer, coral grouper / large fish, for sharks to eat ; population of small fish increases ; *idea of* less predation by, coral grouper / large fish / AW ; *idea of* more small fish eating algae / algal population decreases ; less food for sea cucumbers ; so less, food / sea cucumbers, for turtles to eat **or** turtles only eat sea cucumbers ;	**3**	

Q3.

(e)	an animal that gets it energy by eating other animals ;	**1**	

Q4.

(a)(i)	<table><tr><th>organism</th><th>carnivore</th><th>herbivore</th><th>producer</th><th>tertiary consumer</th></tr><tr><td>algae</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>zooplankton</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>shark</td><td>✓</td><td></td><td></td><td>✓</td></tr></table>	**3**	one mark for each correct row **R** each additional tick
(a)(ii)	algae → limpet → octopus → shark **or** phytoplankton → mussel → octopus → shark ;;	**2**	MP1 for correct organisms MP2 for correct order of organisms and arrows in the correct direction
(a)(iii)	sardine ;	**1**	
(b)	decomposer ;	**1**	
(c)	(the) Sun ;	**1**	
(d)	*any three from:* overharvesting (of food species) / AW ; hunting / poaching ; pollution / pesticides ; habitat destruction ; introduction of new species ; extinction ; AVP ;	**3**	

Q5.

(a)(i)	banana (plant) / pineapple (plant) ;	**1**	
(a)(ii)	howler monkey / golden lion tamarin / sloth ;	**1**	
(a)(iii)	3 ;	**1**	
(a)(iv)	banana /pineapple (⟶ howler monkey) ; (howler monkey) ⟶ ocelot ⟶ jaguar ;	**2**	
(a)(v)	(anacondas decrease because) there is less food ; (sloths increase because) there is more food ;	**2**	
(a)(vi)	(the) Sun ;	**1**	

(b)(i)	2.6 (cm) ;	**1**	
(b)(ii)	primary consumer bar is the widest **and** all four feeding levels are in the correct order ; bars are of equal height ; width of the bars is drawn to match the values in the third column of Table 4.1 ; each bar is labelled with the feeding level ;	**4**	ecf from **4(b)(i)**

Q6.

(a)(i)	<table><tr><th>organism</th><th>number</th></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**	
(a)(ii)	bird / snake ;	**1**	
(b)	increases **and** predation ; decreases **and** predation ;	**2**	one mark for each correct sentence
(c)	energy ; organic ;	**2**	
(d)(i)	8 ;	**1**	

(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

Q7.

(a)	animal that gets its energy ; by eating plants ;	**2**	

Q8.

(a)	food chain starting with fig tree **and** ending with hawk ; caterpillar before blackbird ; three correct arrows ;	**3**	fig tree → caterpillar → blackbird → hawk = 3
(a)(ii)	(the) Sun ;	**1**	
(a)(iii)	decomposer(s) ;	**1**	

Q9.

(d)	*any three from:* **1** phytoplankton are, producers / first trophic level / autotrophs ; **2** converts (sun)light (energy) into chemical energy ; **3** provide / source of, (named) food for, primary consumers / herbivores / second trophic level ; **4** make energy available to, (all) other trophic levels / (rest of) food web / food chain ; **5** ref to conversion of (water and) carbon dioxide to glucose ; AVP ; e.g. release / AW, nutrients when decompose	**3**	

Q10.

(b)(i)	4 ;	**1**	
(b)(ii)	(reef) shark ;	**1**	
(b)(iii)	4 ;	**1**	
(b)(iv)	no arrows pointing to phytoplankton / AW ;	**1**	

(b)(v)	*any three from:* 1 *idea that* energy transfer along a food chain is inefficient ; 2 **and** 3 named examples of causes of inefficient energy flow between trophic levels ;; 4 energy to, decomposers / decomposer food chain(s) ; 5 limited / not enough, energy to support another trophic level ;	**3**	

Q11.

(d)(i)	bacteria ⟶ *Paramecium* ⟶ *Didinium* ;	**1**

Q12.

(a)

trophic level	description	example from Fig. 3.1
herbivore	feeds on, (named parts of) plants / producers / / autotrophs	collared peccary / lowland tapir / red harvester ants / termites ;
producer	makes own food / photosynthesis / autotrophic	muhly grass / Peruvian feather grass ;
quaternary / 4° / fourth / 4th, consumer	feeds on tertiary consumers	great horned owl ;
secondary consumer	gets energy from / feeds on, primary consumers / herbivores	long-tailed weasel / bobcat / jaguar / nine-banded armadillo / hooded skunk ;

4 one mark per correct row

(b)(i) (named) decomposers ; **1**

(b)(ii)

1 *idea that* small percentage of energy from sun is 'fixed' by photosynthesis ;
2 most energy from sun not available / reference to wrong wavelength / AW ;
3 energy is lost, between / within, trophic levels / along food chain ;
4 ref. to 10% energy transfer / ORA ;
5 ref. to material that is, inedible / not digestible / egested / not absorbed / not consumed ;
6 energy lost, in respiration / heat / movement / (named) metabolic process ;
7 ref. to energy loss to (named) decomposers ;
8 ref. to (small) total percentage reaching fourth trophic level ;
or
not enough energy (in fourth trophic level) to support, 5th / another, level ;
9 would be very small population of predators in fifth trophic level / (population of) predators in fifth trophic level unlikely to survive ;
10 fifth trophic level may be parasites which are very small ;

4

Q13.

(c)(i)	block added to the top of the pyramid that is 4 small squares wide ; labelled carnivores ;	2	
(c)(ii)	(detritivores) eat (mainly), plants / producers ; (detritivores) feed, at second trophic level / as primary consumers ; detritivores are eaten by, third trophic level / secondary consumers ;	1	
(c)(iii)	little energy is transferred from one trophic level to the next ; **ora** not all of the organisms are, eaten / digested / absorbed ; named example of energy loss ; *idea that* not enough energy to support higher trophic levels ;	2	

(c)(iv)	*idea that* in a pyramid of numbers one large individual is shown in the same way as one very tiny individual ; **ora** biomass indicates how much food there is, available / left ; biomass is an indicator of the energy available ; pyramid of biomass is pyramid shaped whereas a pyramid of numbers is not always ; **ora** AVP ;	3	

Q14.

(a)(i)	sun / light ;	1	
(a)(ii)	**C** ;	1	
(a)(iii)	ingestion / feeding / AW ;	1	
(a)(iv)	energy is lost (from the food chain as it is transferred from one trophic level to the next) / energy decreases up the trophic levels ; only 10% energy transferred ; ora energy is lost as heat / in respiration / in (named) metabolic processes / movement ; not all organisms (in one trophic level) are eaten / not all parts of the organisms are eaten ; not all nutrients in the organisms are, eaten / digested / absorbed some energy is lost in, excretion / urine / faeces ; some energy is transferred to decomposers ;	3	**A** energy transfer is inefficient **A** egestion

Q15.

(a)

	name of an organism from Fig.1.1
producer	algae / (phyto)plankton / clover / grass ;
secondary consumer	marsh rice rat / (stone) crab / mycid shrimp / blenny / (bald) eagle ;
an animal that feeds at two trophic levels	(bald) eagle / blenny / (spotted) sandpiper ;

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