

19. Organisms and their environment

19.3 Nutrient cycles

Paper 3 and 4

Marking Scheme

Q1.

(a)(i)	letter in Fig. 3.1	name of the process	3	
	Q	photosynthesis ;		
	R	combustion ;		
	S	feeding ;		
(a)(ii)	arrow drawn in the correct direction from 'carbon in herbivores' box to 'carbon in the atmosphere' box ;		1	

Q2.

(a)(i)	arrow drawn from carbon compounds in plants to carbon dioxide in the atmosphere ;	1	R if no arrowhead shown
(a)(ii)	J – combustion ; L – feeding ; M – decomposition ;	3	

Q3.

(c)(i)	respiration ; decomposition / decay ;	2	
(c)(ii)	photosynthesis ;	1	A fossilisation / carbon capture (technology)

Q4.

	combustion decomposition feeding fossilisation photosynthesis respiration breakdown... burning chemical reactions... conversion of remains... ingestion of... maintenance of... manufacture... 	5	
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(a)(i)	K ; M ;	2	
(a)(ii)	combustion ;	1	
(a)(iii)	arrow drawn from carbon compounds in plants to carbon compounds in animals ;	1	

(a)	nitrate / ammonium / phosphate(s) / ions ; algae / plants / producers ; light ; photosynthesis ; (aerobic) respiration ; dissolved ;	6	
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(a)	lightning / root nodules ; nitrate ; urea ; nitrate ; denitrification ;	5	
(b)	<i>any two from:</i> decomposition / decay ; feeding ; excretion ; AVP ;	2	A in any order

(d) <i>any three from:</i> nitrogen fixation ; decomposition / decay ; nitrification ; denitrification ; deamination ; fermentation ; AVP ;;	3 <i>e.g. nitrogen cycle / carbon cycle / <u>aerobic</u> or <u>anaerobic</u> respiration</i>
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Q9.

(a)	<i>any five from:</i> 1 protein, broken down / digested / decomposed, to amino acids ; 2 by decomposers / fungi / bacteria in terms (in context of breakdown of manure / protein) ; 3 ref to use of proteases ; 4 deamination (of amino acids / proteins) / described ; 5 production of, ammonia / ammonium ions / NH_3 / NH_4^+ ; 6 ammonium (ions), converted to, nitrite / nitrate (ions) / NO_3^- / NO_2^- ; 7 ref. to, <u>nitrification</u> / <u>nitrifying</u> bacteria ; 8 AVP ; e.g., nitrite to nitrate ions	5	points must be given in a correct context
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Q10.

(d)	1 = nitrogen fixation ; 2 = deamination ; 3 = nitrification ;	3	
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Q11.

(b)	<i>any five from:</i> 1 protein, broken down / digested / decomposed, to amino acids ; 2 ammonification / mineralisation ; 3 amino acids converted to, ammonium (ions) / NH_4^+ ; 4 by, decomposers / fungi / bacteria ; <i>if linked to MP1, MP2 or MP3</i> 5 ammonium (ions) / NH_4^+ , converted / oxidised to, nitrate (ions) / NO_3^- ; 6 nitrification / nitrifying bacteria ; 7 plants, absorb / use, nitrate (ions) (and ammonium ions) ; 8 AVP ; e.g. deamination of amino acids	5	MP5 A nitrite converted to nitrate if ammonium not given
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Q12.

(c)(i)	protein / urea / amino acid ;	1	
(c)(ii)	nitrification ;	1	
(c)(iii)	plants absorb (nitrogen as) nitrate (ions) ; needed to make, amino acids / (named) proteins ; to make DNA / RNA / nucleotides / bases ; protein / DNA, is needed for, growth / cell division / mitosis ;	3	

Q13.

(a)(i)	(named) bacteria ; lightning ; AVP ;	2	
(a)(ii)	<i>process A</i> denitrification ; <i>process B</i> nitrification ;	2	
(a)(iii)	ammonia / ammonium (ions) ;	1	A nitrite (ions)

Q14.

(a)	letter on Fig. 6.1	name of the process in the carbon cycle	4	
	A	photosynthesis ;		
	B	combustion ;		
	C	respiration ;		
	D	fossilisation ;		

Q15.

(b)(i)	organisms that get energy from dead / waste, (organic) material ;	1	
(b)(ii)	respiration ;	1	