

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	C ☒ parasite		(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	<p>A suggestion linking two of the following:</p> <ul style="list-style-type: none"> • suckers on the head /adaptation of the head (1) • attaches to the intestine (1) <p>OR</p> <ul style="list-style-type: none"> • a very long thin shape / large surface area (1) • for absorption (1) <p>OR</p> <ul style="list-style-type: none"> • surface / skin (1) • resistant to enzymes (1) 	<p>Accept hooks, teeth for suckers</p> <p>Reject large intestine</p> <p>Accept long flexible shape</p> <p>Ignore references to resistance to stomach acid</p> <p>Ignore references to larvae, eggs and reproduction</p>	(2)

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	<p>A suggestion including two of the following:</p> <ul style="list-style-type: none"> • cooking meat thoroughly (1) • do not eat meat /become a vegetarian / vegan(1) • destroy/don't eat the cysts in the meat(1) • prevent animals from eating tapeworm eggs (1) • worm the animal (1) 	Accept food/pork for meat	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)	<p>An explanation including three of the following:</p> <ul style="list-style-type: none"> • (chemosynthetic) bacteria live in (the gut of) the tube worms (1) • the bacteria convert sulphurous / hydrogen sulphide compounds (1) • into food for the tube worms (1) • the tube worms provide place for the bacteria to live / provides oxygen for bacteria (1) • this is a mutualistic relationship (1) 	<p>Accept sulphur</p> <p>Accept bacteria make food for worms</p> <p>Accept protection</p> <p>Accept mutualism / mutual benefit / mutual relationship</p>	(3)

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2a(i)	C <input checked="" type="checkbox"/> nitrification		(1)

Question Number	Answer	Acceptable answers	Mark
2a(ii)	<p>an explanation to include the following points</p> <ul style="list-style-type: none"> • used to make protein (1) • for growth (1) 	<p>Ignore references to use as food (plants do not feed)</p> <p>accept amino acids/ chlorophyll /DNA</p> <p>ignore references to photosynthesis / respiration</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2a(iii)	<p>A description linking four of the following points</p> <p>(nitrates) leach/flow into water (1)</p> <p>algae and small plants grow rapidly /algal bloom (1)</p> <p>underwater plants cannot photosynthesise (1)</p> <p>(lack of photosynthesis / sunlight) causes plants to die (1)</p> <p>decomposers / (decomposing) bacteria break down the dead material / plants (1)</p> <p>these bacteria use up oxygen during respiration(1)</p>	accept fertilisers for nitrates	(4)

Question Number	Answer	Acceptable answers	Mark
2(b)	<p>An explanation to include three of the following points</p> <p>bacteria use nitrogen / nitrogen fixing bacteria (1)</p> <p>make ammonia / ammonium / nitrogen compounds / nitrates for use by plants (1)</p> <p>bacteria protected (within the root nodule) (1)</p> <p>bacteria obtain chemical substances / glucose / sugar from the plant (1)</p> <p>this is called a mutualism / symbiosis(1)</p>	<p>Ignore food/nutrients</p> <p>reject parasitism</p>	(3)

Total for question 2 = 10 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	B - eutrophication		(1)

Question Number	Answer	Acceptable answers	Mark
3a(ii)	<p>Any two from the following:</p> <ul style="list-style-type: none"> • (over use of) nitrates / phosphates fertilisers (1) • leaching into the lake(1) • sewage leakage into the lake (1) 	flowing into lakes / washing into lakes (accept streams, rivers for lakes)	(2)

Question Number	Answer	Acceptable answers	Mark
3a(iii)	(plant growth) is increased / protein is made(1)	excessive/overgrowth of algae/plants on the surface	(1)

Question Number	Answer	Acceptable answers	Mark
3b(i)	<p>An explanation linking three of the following points:</p> <ul style="list-style-type: none"> • decomposers /decomposer bacteria (1) • bacteria /they break down dead animal and plant matter in the soil (1) • into ammonia (1) • {ammonia / nitrites} is/are converted into nitrates (1) • by nitrifying bacteria (1) 	ref to nitrogen fixing bacteria (fixing nitrogen) (1)	(3)

Question Number	Answer	Acceptable answers	Mark
3b(ii)	denitrifying (bacteria) (1)	named bacteria e.g <i>Thiobacillus denitrificans</i> , <i>Micrococcus denitrificans</i> , <i>Serratia</i> , <i>Pseudomonas</i> , and <i>Achromobacter</i>	(1)

(Total for question 3 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	substitution (1) $11.8 + 10.3 + 11.2 = 33.3$ evaluation (1) $33.3 / 3 = 11.1(\text{cm})$ (1)	e.c.f if substitution answer is incorrect give full marks for correct answer, no working	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	An explanation linking the following points <ul style="list-style-type: none"> • (plant B) leaves are larger because they have a higher concentration of nitrate (1) • (nitrates are) required for making protein / growth (1) 	mean is higher as plant has more nitrates	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)	D		(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	<p>an explanation linking the following points</p> <ul style="list-style-type: none"> • nitrogen fixing bacteria (1) • fix nitrogen gas for the plant (1) • decomposing bacteria / decomposers (1) • decompose / break down animal / plant matter / protein / urea (1) • into ammonia (1) • (then) nitrifying bacteria (1) • convert ammonia / nitrites into nitrates (1) 	nitrogen fixing bacteria convert nitrogen into nitrates / nitrogen compounds (2)	(4)

Question Number	Answer	Acceptable answers	Mark
4(d)	<p>respiration / respiring / respire</p> <p>decomposition / decomposing / decompose</p>	any reasonable spelling of either term	(1)

(Total for question 4 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	increase in CO ₂ concentration (over time)	positive correlation	(1)

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	355 ppm (1990) – 339 ppm (1980) (1) 16 (1)	Accept: tolerance 14 -18 2 marks for overall correct answer	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	Any three from the following points: <ul style="list-style-type: none"> • seasonal / weather changes (1) • due to less leaves on trees/less plants less photosynthesis and CO₂ removed from the atmosphere (1) • more fossil fuels / wood may be burned during colder weather (1) 	Accept refs to summer / winter more photosynthesis in the summer more car usage in summer / winter	(3)

Question Number		Indicative Content	Mark
QWC	5 (b)	<p>A description including some of the following points:</p> <ul style="list-style-type: none"> • photosynthetic material/plants will remove CO₂ from the atmosphere • these plants will use the CO₂ to make glucose • plant respiration will release CO₂ into the atmosphere • animals will eat the plants- which contain carbon • animals and plants will eventually die and decay due to microbial/bacterial action releasing CO₂ • the combustion/burning of fossil fuels will release CO₂ into the atmosphere • the burning of carbon based products made from trees will release CO₂ into the atmosphere 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> • a limited description of one of the processes of the carbon cycle • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy 	
2	3 - 4	<ul style="list-style-type: none"> • a simple description of two of the processes of the carbon cycle including one method of adding carbon dioxide and one method of removing carbon dioxide • 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	<ul style="list-style-type: none"> • a detailed description of most of the processes of the carbon cycle that releases and removes carbon dioxide • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately to describe the carbon cycle • spelling, punctuation and grammar are used with few errors 	

(Total for question 5 = 12 marks)