

1(a)(i)	The only correct answer is D <i>A is incorrect because NADP is not oxidised</i> <i>B is incorrect because reduced NADP is not produced in cyclic photophosphorylation</i> <i>C is incorrect because the NADP is not oxidised</i>		(1)
1(a)(ii)	C is from {carbon dioxide / CO₂} H is from {water / H₂O} O is from {carbon dioxide / CO₂}	One or two correct = 1 mark All three correct = 2 marks DO NOT ACCEPT any other molecule or incorrect formula DO NOT ACCEPT any other molecule or incorrect formula DO NOT ACCEPT any other molecule or incorrect formula	(2)
1(b)(ii)	- values for R₂₀ and R₁₀ read from the graph (1) - Q₁₀ given as 4 (1)	6 and {21.5 / 22} DO NOT ACCEPT with units IGNORE a.u. Bald answer of 4 = 2 marks Bald answer between 3.583 and 3.667 = 1 mark	(2)

2(a)(i)	The only correct answer is D. <i>A is incorrect because cutting grass is biotic and competition is biotic</i> <i>B is incorrect because cutting grass is a biotic factor</i> <i>C is incorrect because cutting grass is biotic</i>		(1)
2(a)(iii)	An answer that includes two of the following points: - in the cut field the grass is faster growing reducing the light available to other plants (1) - in the cut field the grass is faster growing and absorbing {water / mineral ions / named mineral ion} (1) - bushes are slower growing so have not got time to grow before they are cut back (1) - bushes damaged during the cutting process (1)	ACCEPT bushes become established and shade the grass ACCEPT bushes become established and take up the {mineral ions / water}	(2)
2(b)(ii)	2		(1)

3(a)(i)	1.27 / 1.33 (1)	DO NOT ACCEPT 1.33 recurring	(1)
3(b)(i)	The only correct answer is B. <i>A is incorrect because S is the oldest ring</i> <i>C is incorrect because P is the newest ring and S is the oldest ring</i> <i>D is incorrect because P is the newest ring and S is the oldest ring</i>		(1)

3(b)(iii)	A description that includes the following points: • measure the height (of the whole tree) (1) • height divided by the {(total) number of rings / age} (1)	ACCEPT length for height measure {radius / diameter / total width of rings} at bottom (of tree) ACCEPT {radius / diameter} at bottom of tree divided by {number of rings / age} CE from mp 1	(2)
------------------	---	---	------------

4(a)	• $3.2 \times 10^7 / 3.18 \times 10^7$ (1)		(1)
4(b)(i)	The only correct answer is A <i>B is incorrect because glycosidic bonds are in carbohydrate molecules</i> <i>C is incorrect because hydrogen bonds are between water molecules</i> <i>D is incorrect because there are no ionic bonds in water</i>		(1)

:)	Indicative content: Diagram 1: • seaweed taking up space of other organisms • {fish / sea mammals} could get caught up in wires • could prevent {fishing / water sports / water activities / shipping} Diagram 2: • seaweed could reduce {food / habitat} of water animals • seaweed could compete with other (wild) aquatic plants for light • could provide labour for local population • increasing the economy of the area • increase in carbon dioxide removed from {atmosphere / water} / reduces greenhouse effect • machinery used to {grow / harvest} seaweed might disturb other organisms • causing them to {move away / be stressed} • interrupting food chain • presence of seaweed might provide {food source / habitat} for different species • which would compete with current species • interrupting food chain • increase biodiversity • machinery used to {transport / process} seaweed will burn fossil fuels Other ideas: • maybe other organisms brought into area on the seaweed • which would compete with other species for {food / habitat} • could bring in diseases • that could weaken or kill other species • will Europe have high enough {temperature / light levels} to sustain growth	Level 1: Simple comments about aspects 1 mark = one relevant comment 2 marks = simple comments relating to at least three aspects Level 2: discussion about aspects linked to at least one diagram / idea 3 marks = at least one aspect discussed in more detail 4 marks = at least two aspects discussed in more detail Level 3: detailed discussion about aspects from both diagrams 5 marks = at least three aspects discussed in more detail 6 marks = at least four aspects discussed in more detail which includes an idea not included in the diagram	(6)
----	--	--	------------