

Q1. (June 2019)

D

Q2. (June 2019)

(b)	quadrat ✓	1	1.2
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Q3. (June 2019)

(c)	(i)	FIRST CHECK ANSWER ON THE ANSWER LINE If answer = 0.1 (%) award 3 marks 10x0.25 or 2.5 (m ²) ✓ 2.5 ÷ 2500 / 0.001 ✓ = 0.1 (%) ✓	3	2 x 2.2 1.2	ALLOW correct conversion of the fraction of the area sampled into a percentage
	(ii)	(student A): has taken more samples/quadrats than B ✓ has sampled all over/spread out/ random over the marsh ORA ✓ samples more likely to be representative / not bias / valid ✓	3	3.1a x2 3.2a	If student B chosen = No marks IGNORE A = 10 and B = 8 samples IGNORE plants more spread out
	(iii)	Any two from: wash hands (after sampling) ✓ not to eat / do not put hands to mouth (whilst sampling) ✓ protective clothing (whilst sampling) ✓	2	3.3b	ALLOW sterilise equipment after use

Cover cuts with plasters ✓

Q4. (June 2019)

(d)	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Provides a detailed explanation for the uses for the land. AND Provides a detailed explanation how preserving the salt marsh will maintain biodiversity.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Provides a detailed explanation for the uses for the land. OR Provides a detailed explanation how preserving the salt marsh will maintain biodiversity. OR Provides a basic explanation for the use for the land. AND Provides a basic explanation how preserving the salt marsh will maintain biodiversity.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Provides a basic explanation for the use for the land. OR</p>	6	1.1 x2 2.1 x4	<p>AO1.1 Demonstrates knowledge and understanding of land use and the need to maintain biodiversity</p> <ul style="list-style-type: none"> land may be used for growing crops/biofuels/ grazing animals/renewable energy protecting the salt marsh will maintain biodiversity/ecosystem/number of species/habitats/food chains ORA <p>AO2.2a Applies knowledge and understanding of land use and the need to maintain biodiversity</p> <ul style="list-style-type: none"> increases in population mean that land is needed to supply more food / biofuel/renewable energy farmers will gain more money from more food production increased demand for renewable energy resources to reduce climate change the salt marshes are rare habitats/species avoid species becoming extinct/endangered ORA maintaining biodiversity can provide medicines ORA pollinators are crucial in maintaining biodiversity ORA
	<p>Provides a basic explanation how preserving the salt marsh will maintain biodiversity.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks No response or no response worthy of credit.</p>			

Q5. (June 2019)

(b)	<p>(i) correctly chosen axes, labelled with units ✓</p> <p>suitable scale for the number of bird boxes ✓</p> <p>bars correctly drawn ✓</p> <p>suitable key ✓</p>	4	2.2	<p>height (m) must be on x-axis</p> <p>DO NOT ALLOW scale that use less than half the grid</p> <p>ALLOW +/- half a square</p> <p>IGNORE –touching adjacent bars</p>
(ii)	<p>Any three from: great tits (nest) higher (in the trees) / ORA ✓</p> <p>this protects them from weasels who live mainly on the ground / ORA ✓</p> <p>idea flycatchers (nest) at all heights ✓</p> <p>as pine martens can move up and down/climb the tree ✓</p>	3	3.2b	<p>ALLOW weasels can't reach them/great tits</p> <p>ALLOW fewer great tits lower down as weasels eat them = 2</p> <p>ALLOW flycatchers can get killed anywhere in tree by pine marten</p> <p>IGNORE pine martens eat flycatchers and live in the trees</p>

Q6. (June 2022)

C

Q7. (June 2022)

A

Q8. (June 2022)

22	(a)	<p>Any two from:</p> <p>Use a quadrat ✓</p> <p>Positioned at random / use of several (quadrats) ✓</p> <p>Count the number (of thistle in a quadrat) ✓</p> <p>AND</p> <p>Any one from:</p> <p>Idea of scaling up a smaller area of quadrat to the number in 1m² ✓</p> <p>Work out the mean (of the 1m² quadrat) ✓</p>	3	3 x 1.2	<p>DO NOT ALLOW transect line. Max 1 mark from this section.</p> <p>IGNORE quadrant</p> <p>ALLOW random number generator/use co-ordinates to generate positions</p> <p>IGNORE count the organisms/percentage cover</p>
	(b)	<p>FIRST CHECK THE ANSWER ON ANSWER LINE</p> <p>If answer = 1.8 award 2 marks</p> <p>36/20 ✓</p> <p>OR</p> <p>$\frac{36}{(1/2 \times 10 \times 4)} \checkmark$</p> <p>1.8 ✓</p>	2	2 x 2.2	<p>ALLOW work out the average/divide number of thistle plants by number of quadrats</p> <p>ALLOW rounding to 2 for 2 marks</p>
	(c)	<p>Will receive more light ✓</p> <p>Will be able to photosynthesise more/faster ✓</p> <p>Produce more sugars/glucose/raw material (for growth) ✓</p>	3	<p>2.1</p> <p>1.1</p> <p>2.1</p>	<p>Assume answer refers to thistles after mowing</p> <p>ALLOW ORA for before mowing</p> <p>ALLOW less competition for light</p> <p>IGNORE less competition for space/water/minerals</p> <p>IGNORE sun</p> <p>ALLOW more sunlight for photosynthesis = 2 marks</p> <p>IGNORE respire faster</p> <p>IGNORE produce more food</p> <p>At least one marking point must be comparative to score any marks</p>

Q9. (June 2023)

B

Q10. (June 2023)

B

Q11. (June 2023)

19	(a)	<p>Any two from: Use a quadrat ✓ Place at random ✓ Count plants ✓</p> <p>AND Idea of scale up for the whole area ✓</p>	3	3 x 1.2	<p>DO NOT ALLOW transect line IGNORE quadrant ALLOW use a random number generator / use coordinates to generate positions</p>
	(b)	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Identifies both positive and negative actions of buddleia. and a detailed explanation of how the actions effect other organisms.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Attempts to identify positive or negative action of buddleia and a simple explanation of how the actions effect other organisms.</p> <p>OR Identifies both positive and negative actions of buddleia.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p>	6	3 x 2.1 3 x 3.1b	<p>AO2.1 Applies knowledge and understanding of scientific ideas to identify the actions of buddleia in the habitats.</p> <p>Friend</p> <ul style="list-style-type: none"> butterflies depend on buddleia for food foxes and badgers depend on buddleia for cover <p>Pest</p> <ul style="list-style-type: none"> buddleia outcompetes other plants buddleia has reduced biodiversity <p>AO3.1b Evaluates information in the passage to explain why buddleia effects other organisms.</p> <ul style="list-style-type: none"> buddleia are the producers in food chains (without them) birds and bats would not have enough food (without buddleia) foxes and badgers would be more vulnerable to weather/predators
		<p>Level 1 (1–2 marks) Attempts to identify a positive or a negative action of buddleia.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks No response or no response worthy of credit</p>			<ul style="list-style-type: none"> other plants have decreased because they would lack light/water/minerals/space (less biodiversity because) there is less variety of (types of) butterflies/plants

Q12. (June 2023)

(b)	(i)	pH (of the pondwater) ✓	1	2.2	
	(ii)	4.5 ✓	1	2.2	DO NOT ALLOW more than 1 tick
	(iii)	Repeat beaker 4 / 14 ✓ The result in jar 4 was an anomalous result/outlier/did not fit the pattern ✓	2	2 x 3.3b	
	(iv)	Acid pollution causes the enzymes (in duckweed) to work slower/stop working ✓ The rate of photosynthesis/food production is slower ✓	2	2 x 3.2b	<p>ALLOW enzymes denature / active site/enzyme changes shape DO NOT ALLOW kills enzymes/enzymes die</p>
	(v)	Include other/greater range/smaller intervals of pH values ✓ Around pH 6.5 ✓	2	2 x 3.3a	<p>IGNORE just repeat readings</p> <p>ALLOW values in range of 5-8</p>

Q13. (June 2024)

21	(a)	(i)	First check the answer on the answer line If answer = 3.25 award 2 marks $1\,300\,000 \div 400\,000 \checkmark$ $= 3.25 \checkmark$	2	2 x 2.2	ALLOW ECF for wrong conversion of 1.3 million e.g., 130000
		(ii)	Any two from: There are too many to count them all $\checkmark$ They are spread over a large area $\checkmark$ Might count the same ones more than once $\checkmark$ Some areas are difficult to access $\checkmark$ Some might be born / some might die $\checkmark$	2	2 x 3.3a	ALLOW idea it would take too long to count them all ALLOW elephants move around ALLOW population fluctuates IGNORE references to being killed by hunters
	(b)		<i>Elephants benefit from ecotourism because:</i> The elephants are protected (from hunting) $\checkmark$ <i>Local people benefit from ecotourism because:</i> They receive money/employment due to the tourists $\checkmark$	2	2 x 2.1	ALLOW habitats are protected

Q14. (June 2024)

	(e)	(i)	(The snakes survived because) there was no/less mongoose/predator $\checkmark$	1	3.1b	ALLOW no/less competition / not/less eaten by the mongoose
		(ii)	Any two from: Mongoose could reach the island $\checkmark$ They could eat/hunt/kill/predate/the remaining snakes $\checkmark$ (Tourists) could destroy habitat/poach/eat/hunt/kill/predate snake $\checkmark$ Introduce disease/pathogens $\checkmark$	2	2 x 3.1b	ALLOW predators / new predators ALLOW idea predator/tourists would eat snakes' food IGNORE snakes become extinct/endangered ALLOW e.g., tourists litter the island

Q15. (June 2025)

C

Q16. (June 2025)

B

Q17. (June 2025)

	(v)	Produces carbon dioxide/smoke/pollution/greenhouse gases $\checkmark$ Correct consequence e.g. greenhouse effect $\checkmark$	2	2 x 1.1	IGNORE carbon monoxide / methane ALLOW idea of chemicals being toxic / climate change / global warming / breathing difficulties / rising sea levels DO NOT ALLOW references to ozone layer
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Q18. (June 2025)

23	(a)	<p>Any two from: Position at random (on the different sections of pitch) ✓ Count the number (of dandelions in a quadrat) ✓ Repeat/use of several quadrats ✓</p> <p>AND (Mean) = divide (total) number of dandelions by number of quadrats ✓</p>	3	3 × 1.2	<p>ALLOW random number generator / grid references/co-ordinates DO NOT ALLOW transect line IGNORE percentage cover</p> <p>ALLOW take more samples/quadrats</p> <p>ALLOW correct number of quadrats qualified IGNORE references to calculating populations</p>
	(b)	<p>First check the answers in the table If answers = 78.5-79 and 235-237 award 3 marks</p> <p>3.14 or $\pi \times 5^2$ or 25 ✓ = 78.5 ✓ 235.5 ✓</p>	3	3 × 2.2	<p>ALLOW any number in the range of 78.5-79 ALLOW any number in the range of 235-237 ALLOW ECF for a correctly calculated total number of dandelions from an incorrectly calculated area</p>
	(c)	<p>Community ✓ Compete ✓ Equally ✓</p>	3	3 × 3.2b	
	(d)	<p>Sample (soil) from each area/around parts of the pitch ✓ Test them with (universal) indicator/a pH meter/probe ✓</p>	2	2 × 3.3a	<p>ALLOW pH paper IGNORE litmus paper</p>

Q19. (Nov 2020)

A

Q20. (Nov 2020)

D

Q21. (Nov 2020)

18	(a)	<p>pooter ✓</p> <p>Any two from: place tube A next to/over moth/insect ✓ student sucks ✓ on tube B ✓</p>	3	3 × 1.2	<p>ALLOW student sucks the moth/insect into tube A = 2 marks ALLOW tube with end covered by fine mesh</p>
	(b) (i)	<p>FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 250 award 2 marks</p> <p>25 × 30 / 3 OR 750 / 3 ✓ = 250 ✓</p>	2	2 × 2.2	
	(ii)	<p>Idea of less visible ORA ✓ otherwise they are more likely to be eaten ORA ✓</p>	2	2 × 2.2	<p>ALLOW spot not visible to predators = 2 marks ALLOW small spot is less likely to be toxic / poisonous If no other mark scored, credit less likely to be washed off</p>

Q22. (Nov 2020)

Q23. (Nov 2021)

Q24. (Nov 2021)

Q25. (Nov 2021)

22	(a)		<i>Quadrat:</i> Sample the plants (in the hedge) ✓ Count the number (of different species) in the quadrat ✓ <i>Key:</i> Identify the species of plants ✓	3	3 x 1.2	ALLOW random placement ALLOW idea that the small area is representative of the rest of the hedge ALLOW key to identify species so they can be counted = 2 marks if counted not credited for quadrat
	(b)	(i)	All correct points correctly plotted ✓✓	2	2 x 2.2	ALLOW +/- half a square 0 to 2 correct points plotted = 0 mark 3 or 4 correct points plotted = 1 mark All 5 correct points plotted = 2 marks
		(ii)	Correctly drawn line of best fit ✓	1	2.2	ALLOW best straight line or smooth curve DO NOT ALLOW dot to dot line ALLOW line of best fit for their plotting IGNORE any extrapolation of line DO NOT ALLOW double lines
		(iii)	FIRST CHECK ANSWER ON THE ANSWER LINE If answer = 261 (years) award 2 marks 2.1 x 110 + 30 ✓ = 261 (years) ✓	2	2 x 2.2	
(iv)	Yes (no mark) As the age of field increases the area of the field decreases ✓ D/oldest field has small area and E/newest field has large area / 261yr old/oldest field has 1500m ² area and 162yr old/newest field has 10 000m ² area ✓			2	2 x 3.2b	IF ANSWER IS NO THEN ZERO MARKS ORA

Q26. (Nov 2021)

23	(a)	<table><tr><td>Acid will decrease the pH and cause the enzyme to change shape.</td><td>✓</td></tr><tr><td>Acid will increase the pH and cause the enzyme to change shape.</td><td></td></tr><tr><td>Acid will increase the pH and cause the substrate to change shape.</td><td></td></tr><tr><td>The enzyme will not fit into the active site of the substrate.</td><td></td></tr><tr><td>The substrate will denature</td><td></td></tr><tr><td>The substrate will not fit into the active site of the enzyme.</td><td>✓</td></tr></table>	Acid will decrease the pH and cause the enzyme to change shape.	✓	Acid will increase the pH and cause the enzyme to change shape.		Acid will increase the pH and cause the substrate to change shape.		The enzyme will not fit into the active site of the substrate.		The substrate will denature		The substrate will not fit into the active site of the enzyme.	✓	2	2 x 2.1	More than 2 boxes ticked then each additional incorrect box negates a mark
	Acid will decrease the pH and cause the enzyme to change shape.	✓															
Acid will increase the pH and cause the enzyme to change shape.																	
Acid will increase the pH and cause the substrate to change shape.																	
The enzyme will not fit into the active site of the substrate.																	
The substrate will denature																	
The substrate will not fit into the active site of the enzyme.	✓																
	(b)	(i)	(Distilled) water ✓	1	2.2												
		(ii)	Yes: Increasing concentrations (of sulfur dioxide) are linked to lower rates of photosynthesis ✓ No: Because there is no evidence that it is due to sulfur dioxide being an acid ✓	2	2 x 3.2a	ALLOW sulfur dioxide reduces the rate of photosynthesis IGNORE pH/acid references ALLOW reference to a correlation and not a cause/no causal mechanism											
		(iii)	Use different acids ✓	1	3.3b	IGNORE measure the pH to show it is an acid IGNORE repeat experiment with different concentrations of sulphuric acid											

