

Question number	Answer	Additional guidance	Mark
9(a)(i)	Two from: <ul style="list-style-type: none"> (meristem cells) are undifferentiated (1) (meristem cells) divide / produce more cells (1) by mitosis (1) 	accept are stem cells accept (the cells produced) can differentiate /become specialised/elongate (1)	(2)

Question number	Answer	Additional guidance	Mark
9(a)(ii)	An answer including <ul style="list-style-type: none"> use a thin section of {cells/meristem} (1) add a stain / named stain (1) place a cover slip on top of the sample (1) 	accept add a sample of the cells to the microscope slide accept a description of a coverslip	(3)

Question number	Answer	Mark
9(b)(i)	chloroplast / chloroplasts accept phonetically correct misspellings	(1)

Question number	Answer	Additional guidance	Mark
9(b)(ii)	(aerobic) respiration / release energy	ignore make / produce energy accept word equation for respiration accept to produce ATP	(1)



Question number	Indicative content	Mark
9(c)	<p>Structure of DNA</p> <ul style="list-style-type: none">• polymer• four bases (A, T, C, G)• (complementary) base pairs• A-T and C-G• (weak) hydrogen bonds join bases• two strands• double helix• nucleotides <p>DNA extraction</p> <ul style="list-style-type: none">• crush up / grind / squash cells• add detergent / salt solution / protease• heat in a water bath / heat to 60°C• add to (ice cold) ethanol• DNA forms as a precipitate /white strands	(6)

Level	Mark	Descriptor
	0	<ul style="list-style-type: none">• No rewardable material.
Level 1	1–2	<ul style="list-style-type: none">• Demonstrates elements of biological understanding, some of which is accurate. Understanding of scientific, enquiry, techniques and procedures lacks detail.• Presents a description which is not logically ordered and with significant gaps.
Level 2	3–4	<ul style="list-style-type: none">• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed.• Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing.
Level 3	5–6	<ul style="list-style-type: none">• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed.• Presents a description that has a well-developed structure which is clear, coherent and logical.



Question Number	Answer	Acceptable answers	Mark
1(a)(i)	8-10 (hours)	accept any value between 8 and 10	(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	(85/100) x 500 (1) Or (500/100) x 85 (1) 425 (plants)	award two marks for correct bald answer	(2)

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	plant can flower all year round/flowering not limited to one period of the year/plant can flower for longer/flower at any time.	ignore references to growing accept pollination for flowering	(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(iv)	C photoperiodism		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	less likely to be eaten (by animals / herbivores)	accept kills pests/reduces damage done by pests reject predators	(1)



Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	<p>An explanation linking two of the following:</p> <p>the bamboo mutated to produce cyanide (1)</p> <p>or</p> <p>bamboo plants that produced cyanide survived to reproduce/ increase in numbers/increase in size (1)</p> <p>and</p> <p>mutation in greater bamboo lemur allowed them to tolerate cyanide (1)</p> <p>or</p> <p>greater bamboo lemurs get more food so survive to breed/reproduce (more) (1)</p>	<p>accept some bamboo plants have the {gene/allele} to produce cyanide</p> <p>ignore bamboo plants not eaten</p> <p>accept lemurs have {gene/allele} to tolerate cyanide</p> <p>ignore {adapted to tolerate/resistant to} cyanide</p> <p>accept lemurs have less competition for food</p>	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	A aggression		(1)



Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation linking two of the following: sounds can be heard over a long distance /heard in the dark (1) do not need to have visual contact/allows communication with more animals (1) or more different types of sound (1) more {emotions/ behaviour/ information} can be conveyed (1)	accept quicker communication method accept doesn't require good vision	(2)

(Total for question 1 = 11 marks)

Question number	Answer	Additional guidance	Mark
2(a)(i)	$29 \div 500 = 0.058$ (1) $0.058 \times 100 = 5.8$ (1)	award full marks for correct numerical answer without working	(2)



Question number	Answer	Mark
2(a)(ii)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark): <ul style="list-style-type: none">• compost B (1) as it has the highest percentage water retained• and there is a higher amount of water loss in the plants due to higher temperatures causing a {larger rate of evaporation of water/higher transpiration rates} (1)	(2)

Question number	Answer	Additional Guidance	Mark
2(a)(iii)	Use the same starting mass of compost (1)	accept any other relevant improvement	(1)

Question number	Answer	Additional guidance	Mark
2(b)(i)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none">• by reducing the water content it reduces the number of microorganisms that can reproduce (1)• because there is a reduction of microorganisms this reduces the decay process/preserves the food (1)	accept bacteria/pathogens for microorganisms	(2)

Question number	Answer	Mark
2(b)(ii)	to kill unwanted micro-organisms	(1)

(Total for question 2 = 8 marks)



Question number	Answer	Additional guidance	Mark
3(a)(i)	$25 \times 25 = 625$ (1) $1 \div 625 = 0.0016$ (1)	award full marks for correct numerical answer without working	(2)

Question number	Answer	Mark
3(a)(ii)	An answer that combines points of interpretation/evaluation to provide a logical description: <ul style="list-style-type: none">as light intensity decreases the rate of photosynthesis also decreases (1)after 20 cm away when light intensity appears to have little effect on the rate of photosynthesis (1)	(2)

Question number	Answer	Mark
3(a)(iii)	use a light meter/lux meter	(1)

Question number	Answer	Additional guidance	Mark
3(a)(iv)	An explanation that combines identification – improvement of the experimental procedure (1 mark) and justification/reasoning which must be linked to the improvement (1 mark): <ul style="list-style-type: none">collect the gas/oxygen produced in a graduated gas syringe (1)to reduce the errors generated when counting bubbles which maybe of different sizes (1)	accept alternative gas collection method with measuring cylinder and beehive shelf accept leave the apparatus for a longer amount of time	(2)

Question number	Answer	Mark
3(b)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark): <ul style="list-style-type: none">the volume of gas produced would decrease to below four bubbles (1)because light is needed for photosynthesis (1)	(2)

(Total for question 3 = 9 marks)