PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 6: PLANT STRUCTURES AND THEIR FUNCTIONS (PACK 2)

SCORE	PERCENTAGE
/65	%

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Mark Scheme

Q1.

Question Number	Answer	Mark
(i)	to remove the calcium chloride solution	(1)

Question Number	Answer	Mark
(ii)	wash hands after use / use gloves / wear goggles	(1)

Q2.

Question number	Answer	Additional guidance	Mark
(i)	3 / three		(1) AO 2 2

Question number	Answer	Additional guidance	Mark
(ii)	A description including **three** of the following points: • guard cells (1) • take in water (1) • by osmosis (1) • (guard cells) become turgid/change shape/swell (1)	accept uneven thickness of guard cell walls leads to bulging	(3) AO 1 1

Question number	Answer	Additional guidance	Mark
(iii)	A explanation linking **two** of the following points: • no stomata (in the upper surface) to reduce water loss (1) • water loss during transpiration / evaporation (1) OR • stomata (on the lower surface) allow gas exchange (1) • gas exchange is needed for photosynthesis (1)	accept stomata (on the lower surface) {allow / reduce} water loss accept more water loss if stomata on top accept the idea of movement of oxygen or carbon dioxide for gas exchange	**(2)** AO 2 1

Q3.

	Answer	Acceptable answers	Mark
(i)	**D** ☒ positive phototropism		**(1)**
(ii)	An explanation to include the following linked points (auxins) move to the shaded side of a shoot (1) causing cells on the shaded side to <u>elongate</u> (1)	 accept move to the side opposite the light accept get longer for elongate Ignore references to cell division	**(2)**

Q4.

Question Number	Answer	Mark
(i)	**B** ethene	(1)

Question Number	Answer	Mark
(ii)	**A** carbon dioxide	(1)

Q5.

Question Number	Answer	Additional guidance	Mark
	An answer including **three** from: • fields with the weed killer had a higher crop yield (1) • the difference in crop yield varies (1) • this must be caused by some other external factor / named factor (1) • the weed killer caused the weeds to **overgrow** and die (1) • reducing **competition** for resources so more wheat could grow (1)	accept figures quoted from the table accept disrupts plant growth pattern accept reduced competition for named resources accept reverse argument	**(3)** **AO3 2ab**

Q6.

Question Number	Answer	Additional guidance	Mark
	Any two from: • fruit formation • flower formation • production of seedless fruit	accept larger fruit / more fruit formed accept fewer flowers formed accept other correct use of gibberellins	(2)

Q7.

Question number	Answer	Mark
(i)	**C a large surface area and thin cell walls** **A.** *is not correct because root hair cells have a large surface area* ***B*** *is not correct because root hair cells have thin walls* ***C*** **The only correct answer is C** ***D*** *is not correct because root hair cells have thin walls*	**(1)** AO1 1

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking two from: • through the {root/cells} by osmosis (1) • (then up) the xylem (1) • by transpiration / evaporation of water (from the leaves) (1)	 ignore phloem accept by capillary action	**(2)** AO1 1

Q8.

Question number	Answer	Additional guidance	Mark
(i)	Any one from: • keep leaf peel flat (1) • keep leaf peel in place (1) • protect the (objective) lens (1) • protect the specimen (1)	ignore to prevent drying out	**(1)** AO 2 2

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking **two** of the following: • the leaf peel is thin / leaf is too thick (1) • as the leaf peel allows light to pass through it/the leaf would not allow light to shine through it (1) • to enable the {stomata / cells/ guard cells} to be identified (1)	accept leaf would be opaque accept to see stomata / cells	**(2)** AO 2 2

Q9.

Question Number	Answer	Mark
(i)	Any **two** from: • same number/size of algal balls (1) • same volume of hydrogencarbonate solution (1) • same concentration of hydrogencarbonate solution (1) • same size (bijou) bottle (1) • reduce influence of external light (1) • temperature of room (1)	**(2)**

Question Number	Answer	Mark
(ii)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification – application of understanding (2 marks): • the bottle closest to the light source will photosynthesise the most due to greater light intensity (1) • this will remove carbon dioxide from the indicator solution (1) • causing the solution to become less acidic/more alkaline /pH to increase (1)	(3)

Q10.

Question Number	Answer	Additional guidance	Mark
	A description including **two** from: • (dissolved) in water (1) • diffusion through the root (1) • (so water moves) through the xylem (1) • by transpiration (stream) (1) • into leaves by diffusion (1)	 accept active transport through the plant reject phloem accept evaporated from the leaves	**(2)** **AO2 1**

Q11.

Question number	Answer	Additional guidance	Mark
(i)	An answer linking the following: • as light intensity increases so does the rate of photosynthesis (1) • (it levels off) when light intensity ceases to be a limiting factor (1)	 accept idea of another factor limiting the rate of photosynthesis accept named factor	**(2)** AO 3 1a AO 3 1b

Question number	Answer		Mark
(ii)	An explanation linking **two** of the following: • as temperature increases so does the rate of photosynthesis {as enzymes can catalyse more reactions / more collisions occur} (1) • maximum rate of photosynthesis at the optimum temperature for **enzymes** (1) • {above the optimum/at high temperatures} **enzymes** become denatured (and photosynthesis decreases) (1)	 accept more enzyme-substrate complexes form accept active site changes shape for denatured	**(2)** AO 3 2a AO 3 2b

Q12.

	Answer	Acceptable answers	Mark
(i)	there is an increase in the % of bananas that ripen as the ethylene concentration increases	Ignore positive effect	**(1)**
(ii)	An explanation to include two of the following points • concentration of ethylene to use is 3% (1) • would be more expensive to increase the ethylene concentration above 3% • when there is no added ripening benefits past 3%(1) • below 3% not all bananas are ripe (1)	Do not credit ideas related to longer shelf life as the question asks about ripening	**(2)**

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Q13.

	Answer	Acceptable answers	Mark
(a)	A description including **three** of the following points: • all have digits/fingers (1) • all have { similar bones /radius / ulna / carpals}(1) • all have a humerus bone (1) • pentadactyl limb (1)	accept: phalanges for fingers accept: same bone structure	**(3)**
(b)	An explanation including two of the following points: • soft tissue of organisms does not form fossils (1) • some fossils are yet to be found (1) • fossils may be damaged (1) • conditions not correct for fossil formation (1) • fossils may only be fragments / not whole organisms (1)	accept: references to plant or animal tissue accept: reasons why they may not be found accept: reasons for damage e.g. earthquakes accept: named conditions e.g. pH	**(2)**
(c) (i)	D 9.0%		**(1)**
(c) (ii)	• lowered the level of carbon dioxide / carbon dioxide {removed / taken in} (1) • increased the level of oxygen / oxygen {produced / made}(1)	accept: percentage for level If CO_2 written must be correct, do not accept CO^2	**(2)**
(c) (iii)	Any **two** from: • large organisms {more complex/carry out greater number of functions / more cells}		**(2)**

	• for (more aerobic) respiration • for (more) energy		

Q14.

Question number	Indicative content	Mark
*	**AO1 and AO2** **shoot growth** • auxins • moved to the shaded part of the plant shoot • causing cells to elongate • making the plant bend towards the light • this is an example of positive phototropism **root growth** • auxins • collect in large amounts on the underside of the root • inhibiting cell elongation • causing the cells above to elongate faster • causing the root to grow downwards • in the direction of gravity • this is an example of positive gravitropism	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections are made between elements in the context of the question
Level 2	3–4	Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections are made between elements in the context of the question
Level 3	5–6	Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and developed. The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question.

Level	Mark	
	0	No rewardable material.
Level 1	1–2	A simple statement of the direction of growth of shoots **OR** roots. Linked to some understanding of how or why this occurs.
Level 2	3–4	An explanation of either root **OR** shoot growth including reference to tropisms or cell elongation **OR** a simple explanation of both root **AND** shoot growth including reference to tropisms or cell elongation. Linked to the role of auxins.
Level 3	5–6	An explanation of root **AND** shoot growth including the process of cell elongation and direction of growth. Linked to the role of auxins in tropic responses.

Q15.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **Plant adaptations** • grass is flexible so does not break in the windy conditions • good root structure to prevent being uprooted in the windy conditions • long thin leaves to reduce wind damage / air resistance **leaf structure** • leaf is rolled to trap air inside • thick waxy cuticle to prevent water loss • by evaporation / transpiration • no stomata on the upper surface to prevent water loss • stomata in pits on the underside of the leaf to retain moist air and reduce water loss • hairs on the lower surface reduce air movement	**(6)** AO 1 1 AO 2 1

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents an explanation with some structure and coherence.
Level 2	3–4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

Q16.

Question number	Answer	Additional guidance	Mark
	An explanation linking three of the following: • phototropism is controlled by the hormone auxin (1) • auxins move to the shaded side of the shoot (1) • causing **cell** elongation (1) • causing the shoot to bend towards the light (1)		**(3)** **AO2 1**

Q17.

Question number	Answer	Additional guidance	Mark
	An explanation linking three of the following: • (weed killers contain) auxins (1) • these act on broad leaf plants /only act on the weeds (1) • causing them to overgrow (1) • (selective) weedkillers do not kill grass plants (1)	accept the weeds grow too fast	**(3)** **AO1 1**

Q18.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (marks)** Transpiration • the movement of water • from the root through the plant • through the lignified cells/dead cells • of the xylem • driven by evaporation of water from the leaves • through the stomata • flow is only in one direction • by capillary action • according to the cohesion-tension theory Translocation • the movement of sugars from the leaves • through the plant • as sucrose • through the living sieve cells • of the phloem • flow is bidirectional • to sinks in the plant where the sucrose is needed	**(6)** AO 1 1

Level	Descriptor
	No rewardable material.
Level 1	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents an explanation with some structure and coherence.
Level 2	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

Q19.

Question number	Indicative content	Mark
*	**AO1 6 marks** **Reforestation** • reforestation is planting of trees • trees take up water from the soil • prevents erosion and reduces flooding • trees can be used for renewable resources • provides habitats • increases the rate of photosynthesis • removes carbon dioxide and releases oxygen • reduces greenhouse gases / global warming • provides a source of medicines / food for consumers **Animal conservation** • increase numbers of endangered species / prevent extinction • through controlled breeding programmes /reduction in poaching /maintaining habitats • generating income to fund conservation projects through zoos / animal parks / ecotourism • improves the number of animals / range of species • maintains the food web • maintains genetic diversity • allows re-introduction of animals into the wild	(6)

Level	Mark	Descriptor
	0	• no rewardable material.
Level 1	1-2	• demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • presents an explanation with some structure and coherence.
Level 2	3-4	• demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and /or developed. • presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • presents an explanation that has a well-developed structure which is clear, coherent and logical.

Additional Guidance

Level 1	1-2	• A brief explanation of either the benefits of reforestation OR animal conservation projects. • The response refers to changes in atmospheric gases OR photosynthesis OR HOW animal conservation improves biodiversity
Level 2	3-4	• A brief explanation of the benefits of reforestation AND animal conservation projects • The response refers to changes a named atmospheric gas OR photosynthesis OR HOW animal conservation improves biodiversity
Level 3	5-6	• A detailed explanation on the benefits of reforestation and animal conservation projects • The response refers to changes in both named atmospheric gases AND HOW animal conservation improves biodiversity including why endangered species are preserved or the impact on food webs

Level	Marks	Possible responses
Level 1	1 2	• Animal conservation protects endangered species / reforestation provides habitats for animals • Reforestation is planting trees which take in carbon dioxide / reforestation provides habitats for animals and reduces greenhouse gases
Level 2	3 4	• Animal conservation protects endangered species and reforestation provides habitats for animals / Animal conservation protects endangered species from hunting. Reforestation is the planting of trees which provides habitats for animals. • Animal conservation protects endangered species so the numbers increase and reforestation is the planting of trees. The trees take in carbon dioxide and provide habitats for animals
Level 3	5 6	• Animal conservation protects endangered species so the numbers increase by protecting them from hunting and maintaining habitats. Reforestation is the planting of trees. The trees take in carbon dioxide and provide habitats and food source for animals. • Animal conservation protects endangered species so the numbers increase by protecting them from hunting and maintaining habitats. Reforestation is the planting of trees. The trees release oxygen and take in carbon dioxide. They also provide habitats and food source for animals.

Q20.

Question Number	Answer	Additional guidance	Mark
(i)	An explanation linking: • as light intensity decreases the number of (small) plants (per m^2) decreases (1) • because the (small) plants will not be able to photosynthesise enough (1)	accept reverse argument	**(2)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
(ii)	Any **one** from: • same time of day (1) • same meter (1) • same position(s) in area / measure the same size area (1) • same person makes the readings (1) • meter held vertically each time (1)	accept other valid variables that should be controlled	**(1)** **AO3 1ab**