Question Number	Answer	Acceptable answers	Mark
1(a)	**D** leaf palisade cell		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation linking two of the following: • by osmosis • from an area of high **water** concentration to an area of low **water** concentration • through (partially permeable) membrane	Ignore references to diffusion reject active transport accept water moves down a concentration gradient	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	• all four bars plotted correctly (+/- 1/2 small square) (1) • X axis correctly labelled for plotted bars , eg North A, North B, South A, South B (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	a quadrat		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(iii)	A suggestion including two of the following: • Species B **is able to** grow on both (North and South) sides (1) • (there are more) on the south side because of a specific difference in a named abiotic factor eg lighter /darker on South side , temperature, pH, water level, (1) • there are fewer on the north side because they are out competed by species A / idea of eaten more on North side (1)	Ignore species B is found / grows on both sides Ignore carbon dioxide concentration Accept less pollution / less sulphur dioxide on South side	**(2)**

(Total for question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	D - transpiration		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	B – 32 g		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	A description including two of the following • it rises between the temperatures of 15(°C) and 35(°C) (1) • water loss decreases after 35(°C) (1) • credit correct reference to figures from the table, if related to temperature (1)	ignore any explanation given, including ref to transpiration award one mark for : water loss went up and then went down eg. greatest water loss at 35(°C) there is less water loss at 45(°C) than at 35(°C)	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	A suggestion including any two from the following: • prevent evaporation/loss of water from the soil (1) • to ensure that mass of the calcium chloride only changed (due to water loss from plant) (1) • to ensure that method is valid / it is a fair test (1) • to stop the uptake of water by the soil (1)	ignore ref to water loss from pot or roots ignore accurate and reliable	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation including any two from the following: • glucose production will decrease (1) • photosynthesis will decrease (with increase in waterloss)(1) • as water is used in photosynthesis (1)	 glucose production stops photosynthesis will stop / is less efficient accept from a correct equation	**(2)**
Question Number	Answer	Acceptable answers	Mark
2(d)	A description including **two** from the following: • osmosis (1) • from high concentration to low concentration / down a concentration gradient (1) • through a partially permeable membrane (1)	 not active transport, but ignore diffusion correct references to water potential and solute potential not from where there are more water molecules semi permeable and selectively permeable	**(2)**

(Total for question 2 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	diffusion / osmosis		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	active transport	active transportation	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	xylem	xylem vessel / tube(s)	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	reasonable straight line drawn through all points, must be drawn with a ruler, must have at least one point on either side of the line	lines drawn to include zero value are not correct reject two lines drawn reject point to point lines ignore extrapolation to y axis	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	reading from their graph at the point that line crosses x axis / 0.3M +/- half square tolerance	ecf from 3(b)(i)	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(iii)	An explanation linking the following points in a logical order: • ref to (increase in mass due to) {osmosis / movement of water / absorption of water} (1) • water into the cell (1) • ref to higher concentration of water outside of the courgette (1) • water across (cell) membrane / cell wall (1)	**Ignore** movement of sugar correct ref to sugar concentration ORA	**(3)**

(Total for question 3 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	Correct substitution i.e. (-0.5 ÷ 10.3) x 100 (1) - 4.85 / - 4.9	Accept data correctly put into other acceptable methods. Accept answer with more decimal places eg: - 4.8543 / - 4.854368932 Full marks for correct bald answer award max of one mark if negative is not written eg 4.85 / 4.9	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	better / easier / more valid comparison can be made between values /can make more valid conclusion / because the original / starting masses of potato were not the same / Idea of easier to visualise the size of the change	Ignore makes the results / test reliable / accurate	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	A description including the following: • Produce two (daughter) cells • which are **genetically** identical • and diploid	Accept DNA for chromosomes throughout Also credit details of the process of mitosis chromosomes replicates (1) spindle fibres form / chromosomes attached to spindle (1) Chromosomes arranged on equator / middle of cell / chromosomes pulled apart /pulled to poles /separation of sets of chromosomes (1) Idea of nucleus reforming / New cell wall formed (to divide cell) / cytokinesis / description of cytokinesis (1)	**(3)**

Question Number		Indicative Content	Mark
QWC	***4(c)**	A explanation to include some of the following points • active transport requires energy • (active transport moves mineral ions) from the soil • into root (hair cells) • reference to pumps (in the cell membranes) • from a low concentration to a high concentration/against their concentration gradient • reference to mineral ions / mineral salts accept named minerals eg nitrates • diffusion is a passive process • gases diffuse from high to low concentration/down their concentration gradient • gas exchange in the leaf occurs by diffusion • carbon dioxide diffuses in • to air spaces in leaves / into cells • for photosynthesis / produces glucose • oxygen diffuses in • for respiration	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation that gives information about active transport **OR** diffusion in the correct context e.g. minerals ions are transported into root (hair cells) • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation that gives details of active transport or diffusion transporting materials e.g. carbon dioxide diffuses into leaves down their concentration gradient OR a limited explanation of both active transport and diffusion • 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**	• a detailed explanation that describes **both** processes e.g. active transport requires energy to transport mineral ions into the root hair cell AND carbon dioxide diffuses into the leaf for photosynthesis • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for question 4 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	A description including **three** of the following points: • into root hairs (1) • through a partially permeable membrane (1) • by osmosis (1) • down a concentration gradient (1)	 accept: through leaves (as correct for water plants) reject: active transport ignore: refs to diffusion accept: from a high concentration (of water) to a low concentration (of water)	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	An explanation including **two** of the following points: • less /slower movement of water into the plant (1) OR • more / faster movement of water out of the plant (1) • (because) less (free) water outside the plant than inside (1)	 accept: lowers concentration of water outside the plant (than inside) ORA	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	diffusion		**(1)**

Question Number		Indicative Content	Mark
QWC	***5(b)**	An explanation including some of the following points: water • through the xylem • capillary action • osmosis into cells in the leaf • evaporation from leaves • transpiration stream • diffusion into the atmosphere • through stomata glucose • converted to sucrose • dissolved in water • through the phloem • bidirectional mineral salts • dissolved in water • through the xylem • from root to tip	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of the transport of one molecule e.g. water moves from roots to leaves • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation of the transport of two molecules including correct reference to at least one of the vessels phloem or xylem. • 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**	• a detailed explanation of the transport of all three molecules with correct reference to movement through phloem and xylem • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for question 5 = 12 marks)