01. 0610_w18_MS_42 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	thick / strong, (cell) wall ; withstanding, tension / collapse / hydrostatic pressure / AW ; lignin (in walls) / walls are impermeable ; prevents collapse / waterproofing ; wide / AW ; transport large volumes of water ; no (cell) contents / empty / dead cells / like pipes / like tubes ; no / little resistance to flow of water / allows water to flow easily / lots of water / continuous columns of water / no obstruction ; no, cross walls / end walls ; no / little, resistance to flow of water / allows water to flow easily / lots of water / continuous columns of water / no obstruction ; (bordered) pits ; lateral transport / AW ;	2	
(a)(ii)	evaporation from (cell walls) in mesophyll ; diffusion of water vapour through stomata ; reduction of, pressure / water potential, at top (of plant) resulting in water moving upwards ; continuous column of water (in the xylem) ; cohesion of water (molecules) ; **A** if described incorrectly cohesion described as, forces / attraction, between water molecules ; transpiration pull ; water enters *or* leaves xylem, by osmosis / down water potential gradient ; AVP ;	4	
(a)(iii)	support / described ;	1	
(b)	increase / decrease (in rate of transpiration) ; more / less, evaporation ; increase / decrease, rate of diffusion (of water vapour) ; *ref. to* (kinetic) energy of (molecules of) water ; stomatal pores become, wider / narrower ; guard cells become, turgid / flaccid ;	3	**A** stomata close

02. 0610_w18_MS_41 Q: 3

	Answer	Mark	Partial Marks
(a)	no, cytoplasm / (named organelle) / hollow ; *ref.* to lignin (in walls) (cell walls) are waterproof / water impermeable / AW (secondary) thickening of cell wall ; long / elongated (cells / vessels / tubes) ; (bordered) pits (for water movement between vessels) ; no, (perforated) end / cross walls (between cells) / end plates to connect vessels (end to end) ;	3	
(b)	(water enters) root hair (cells) / **M** ; by osmosis ; the soil has a higher water potential than the root (cells) ; ora water moves from an area of high(er) water potential to low(er) water potential ; active transport of ions to create a water potential gradient ; (across / through partially permeable), membrane(s) ; *ref to* root cortex / **L** – cortex / **M** to **L** to **(K)** to **J** ; AVP ;	5	
(c)(i)	87 ;;	2	
(c)(ii)	the nearer the tip / zone 1, the lower flow rate ; ora flow rate increases (from tip to bulb) in both treated and healthy roots ; flow rate is greater in zone 1 in the treated roots ; flow rate is lower in zones 2 and 3 in the treated roots ; ora comparative data quote with units ;	3	
(c)(iii)	xylem vessels are dead, so toxins / treatment have no effect ; osmosis / water flow into root, does not rely on living cells / energy / is passive / AW ; AVP ;	2	

03. 0610_s18_MS_41 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	label line and **X** pointing to any part of the 'star' in the centre of the root section ;	1	
(a)(ii)	composed of (group of) cells with similar structures ; working together to perform shared functions ;	2	
(b)	xylem supplies water ; air spaces ; large (internal) surface area ; water evaporates from surface of mesophyll cells ; guard cells, open / close, stomata ; water vapour, diffuses / moves, out through stomata ;	3	

04. 0610_s18_MS_43 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	**A** (upper) epidermis ; **B** palisade (mesophyll) ;	2	
(a)(ii)	(cell surfaces are sites of) gas exchange ; movement of gases by diffusion ; *ref. to* efficient / faster / AW, gas exchange / diffusion / photosynthesis ; carbon dioxide is, raw material / needed, for photosynthesis ; absorption of carbon dioxide (when light available) ; loss of oxygen (when light available) / absorption of oxygen ; oxygen is required for (aerobic) respiration ; more evaporation ; *idea of* maximising light absorption ;	3	
(a)(iii)	allows for, movement of (named) gases / diffusion / gas exchange, throughout the whole of the leaf ; *ref. to* faster / efficient / AW, diffusion / gas exchange ; allows / AW, photosynthesis / respiration / transpiration / evaporation ; *ref. to* storage of carbon dioxide ; (air spaces) connect (to outside air) via stomata ;	2	
(b)(i)	no / little, water ; high temperature ; low humidity / dry air ; high wind speed ; long day length / high light intensity ; high salinity / salt ; freezing ; disease ; (soil) waterlogging / low oxygen concentration / pH ; mineral / magnesium, deficiency ;	2	**A** drought / no, rainfall / precipitation / irrigation
(b)(ii)	*ref to* osmosis ; water, lost from / moves out of, cells / vacuoles ; down water potential gradient ; pressure of, water / cell contents, on (inelastic) cell wall decreases ; *correct ref. to* turgor / turgidity / flaccid / plasmolysed ; *ref. to* plants / cells, rely on water, for (structural) support / to prevent wilting ; **ora** water in cells not being replaced as quickly (as it is being lost) ; AVP ;;	4	
(b)(iii)	stomata close ; to prevent more water loss ; water conserved for, other processes / other parts of plant ; decrease surface area, exposed to the Sun / for absorption of heat ;	2	**A** reduces transpiration

05. 0610_w18_MS_43 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	cell membrane / cell wall / cytoplasm / vacuole / nucleus ;;	2	
(a)(ii)	epidermis ;	1	
(a)(iii)	allows light through ; (light) reaches chloroplasts / chlorophyll ; in mesophyll / palisade cells ; (palisade / mesophyll / chloroplasts / chlorophyll) need light for photosynthesis / trap energy from light ;	3	
(b)	for gas exchange / diffusion of gases ; for, photosynthesis / respiration / transpiration ;; correct gas with direction for named process ;; controls the rate of, diffusion / transpiration / photosynthesis ; ref. to transpiration pull ;	3	**A** *ref. to* prevent, wilting / water loss
(c)(i)	move against the concentration gradient ; proteins (in membrane) ; using energy ; from respiration ;	2	
(c)(ii)	high(er) ion concentration results in large(r) (guard cell) volume ; ora comparative data quote with units to support any description ; high(er) ion concentration causes low(er) water potential ; ora (high ion concentration causes) water to move into (guard) cells ; across partially / AW, permeable membrane ; by osmosis ; large cell volume correlates with high turgor pressure ; ora because cell water / membrane / cytoplasm / vacuole, pushes more on cell wall ;	5	
(c)(iii)	lack of water ; high temperature ; low humidity / dry air ; wind ; AVP ;;	2	

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06. 0610_w19_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)	any shape drawn that includes one whole vascular bundle including all of the xylem and phloem with or without sclerenchyma ; label line from **X** to xylem in any of the vascular bundles ;	2	
(b)	cell vacuoles / cells, contain (much) water / have high water potential ; water absorbed, by osmosis / down water potential gradient ; cells, are turgid / have a turgor pressure ; cell contents / vacuole / cell membrane, pushes out (against cell wall) ; cell wall, does not stretch / is inelastic / is rigid ; AVP ; e.g. cells are tightly packed / AW	3	
(c)	**Q** sucrose / ^{13}C, is in shoot and root ; **T** no, sucrose / ^{13}C, in shoot or root ; **R** sucrose / ^{13}C, in root only / (in root but) not in shoot ; **S** sucrose / ^{13}C, in shoot only / (in shoot but) not in root ; *idea that* no transport of, sucrose / ^{13}C, where phloem is removed ; phloem transports (sucrose) in both directions ; leaf is source / carbon (dioxide) is fixed in leaf / sucrose is made in leaf ; roots / shoots, are sink(s) / described ; e.g. of descriptions respired / stored as starch / converted to another (named) compound ; AVP ; e.g. **Q** is a control	5	

	Answer	Mark	Partial Marks
(a)(i)	(glucose is produced by) photosynthesis ; light (energy) is, trapped / AW, by chlorophyll ; light energy is converted to chemical energy ; carbon dioxide and water, are used / react together / AW ; to produce (glucose and) oxygen ;	3	
(a)(ii)	translocation ;	1	
(a)(iii)	(sometimes roots) release / AW, energy / glucose / sucrose / (named) sugar ; for respiration ; example of use of energy in a plant ; e.g. flowering / new, leaves / growth / plant sometimes leaves cannot produce enough, glucose / carbohydrates ;	2	
(b)(i)	**Q** phloem ; **S** xylem ;	2	
(b)(ii)	**1** *ref to* osmosis (of water / across / bag / membrane) ; **2** water moves into, (source) bag / sucrose solution ; **3** from high water potential to low water potential ; **4** sucrose (molecules) cannot cross the (partially permeable) membrane ; **5** sucrose is too large (to fit through partially permeable membrane) ; **6** (water moving in) increases the pressure / volume, of solution in (source) bag ; **7** (increased, volume / pressure / water moving in) forces / pushes, the solution up (tube **Q**) ; **8** volume of bags has not increased / water has moved out of the (sink) bag ; **9** sucrose diffuses (along tube **Q**) ; **10** down a (sucrose) concentration gradient (between source and sink) ;	4	
(c)	the sucrose concentration / water potential (in the two bags) is the same / AW ;	1	
(d)	nitrate (ions) ;	1	