3. Movement into and out of cells

3.2 Osmosis

Paper 3 and 4

Marking Scheme

Q1.

(b)	*any one from:* (osmosis) involves <u>water</u> (only) / AW ; (osmosis) involves a partially permeable membrane / AW;	1	

Q2.

(b)	<table><tr><th></th><th>requires energy from respiration</th><th>takes place against a concentration gradient</th><th>always involves the movement of water</th><th>substances can cross the cell membrane</th></tr><tr><td>diffusion</td><td></td><td></td><td></td><td>✓</td></tr><tr><td>osmosis</td><td></td><td></td><td>✓</td><td>✓</td></tr><tr><td>active transport</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr></table> ;;;;	4	one mark for each correct column

Q3.

(c)(i)	–1.0 / –1 (mm) ;	1	
(c)(ii)	4(%) ;;	2	MP1 selection of correct data from Table 1.1 MP2 correct calculation ecf MP2 for correct calculation from incorrect data
(d)	osmosis ;	1	
(e)	*idea that,* the cell / the contents / vacuole, will shrink / AW ;	1	

Q4.

(b)	*one mark per row:* <table><tr><th>feature</th><th>diffusion</th><th>osmosis</th><th>active transport</th></tr><tr><td>involves movement of water only</td><td></td><td>✓</td><td></td></tr><tr><td>always involves movement across a partially permeable membrane</td><td></td><td>✓</td><td>(✓)</td></tr><tr><td>movement is from a higher solute concentration to a lower solute concentration</td><td>✓</td><td></td><td></td></tr><tr><td>requires energy from respiration</td><td></td><td></td><td>✓</td></tr><tr><td>involves the movement of both gases and solutes</td><td>✓</td><td></td><td></td></tr></table> ;;;;	4

Q5.

(b)(i)	cell contents / cytoplasm / (cell) membrane, shrunk ; vacuole smaller ; cell membrane separates from cell wall ; external solution fills space between cell wall and cell membrane ;	**2**	
(b)(ii)	water moves out of the cell ; osmosis (in correct context) ; through a partially permeable membrane / AW ; sugar solution more concentrated than cell contents / AW ;	**3**	
(b)(iii)	add / place in, water OR dilute / less concentrated, sugar solution / AW ;	**1**	

Q6.

(a)(i)	(potato cylinder in test-tube 1) increased in mass (by 5g) ; (potato cylinder in test-tube 2) mass stayed the same ;	**2**	
(a)(ii)	6 (g) ;	**1**	
(a)(iii)	water moves out of the potato (cylinder) ; by osmosis ; because there is more water inside the potato than in the solution / AW ;	**2**	

Q7.

(c)(i)	9.3 ;;;	**3**	MP1 selection of correct values from table MP2 correct calculation to any number of significant figures MP3 correct rounding to two significant figures
(c)(ii)	*any three from:* (salt) solution has a lower water potential than the (red blood) cells/ ora ; (diameter decreases because) water leaves the (red blood) cells by osmosis ; water travels, from higher water potential to lower water potential / down a water potential gradient ; across the, cell / partially permeable, membrane ;	**3**	
(c)(iii)	*any one from:* water potential (of red blood cells) is the same (as the salt solution) / AW ; no, net / overall, movement of water (across membrane / in or out of cell) ;	**1**	
(d)	(red blood cells) do not have a (rigid) cell wall / ora ;	**1**	
(e)	*any two from:* transport (of ions / sucrose / AW) / translocation ; as a reactant / (used in) photosynthesis ; as a solvent / substances dissolve in it ; medium for, chemical / enzyme / metabolic, reactions ; support / (maintaining) turgidity (of cells) / (maintaining) turgor pressure / prevent wilting ; AVP ;	**2**	e.g. cooling / temperature regulation / germination / elongation of cells (in growth)

Q8.

(a)(i)	–13.28 (%) ;;;	**3**	MP1 for correct selection of data from Table 2.1 = 1.11 – 1.28 ***or*** (–)0.17 MP2 correct calculation (–0.17 ***or*** 1.11 – 1.28 / 1.28) × 100 ***or*** –13.28125 MP3 answer rounded correctly to two decimal places with a minus sign
(a)(ii)	*any five from:* potato (cube) in 0.8 (mol dm^{-3} solution) loses greater (percentage) mass / **ora** ; movement of water out / loss of water, is cause of mass loss ; water moves from an area of high water potential to an area of low water potential / AW ; water potential of 0.8 (mol dm^{-3} solution) is lower than the water potential of the 0.6 (mol dm^{-3} solution) ; greater / steeper, water potential gradient in 0.8 (mol dm^{-3}) than in 0.6 (mm dm^{-3}) ; (relatively) more water leaves the potato (cube) in 0.8 (mol dm^{-3} solution) ;	**5**	
(a)(iii)	*any two from:* (cell is) swollen / large(r) / big(ger) / wide(r) / AW ; (cell is) turgid ; vacuole is, swollen / large(r) / big(ger) / wide(r) / AW ; cell wall bulges / AW ; cell membrane / cytoplasm / cell contents, presses on cell wall / AW ;	**2**	

Q9.

(a)	osmosis ; solvent ;	**2**	
(b)	*drawing with:* arrow showing water movement into cell ; *max. two from:* no space between cell membrane and cell wall ; cell wall, slightly bent outwards / straight ; vacuole larger in proportion than in Fig 1.1 ;	**3**	
(c)	wilting ; lack of turgor pressure (at the end of the week) ; **ora** no longer a push against cell wall / AW ; **ora** (mesophyll) cells not providing support / cell collapses / AW ; (lack of water means cells become) flaccid / plasmolyse ;	**3**	