Mark scheme

Movement into and out of cells

Biology 0610 · Questions from Paper 3 and Paper 4

Total marks

89

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
6	6	8	8	8	7	8	10	12	16	**89**

Question 1 [6]

1 (a)	<table><tr><th>diffusion</th><th>osmosis</th></tr><tr><td>X</td><td>✓ ;</td></tr><tr><td>✓</td><td>X ;</td></tr><tr><td>✓</td><td>✓ ;</td></tr><tr><td>X</td><td>X ;</td></tr></table>	[4]	1 mark for each correct row
(b)	movement (of oxygen) from high to low concentration ; random movement of particles ; (identification of this as) diffusion ; water acting as solvent ;	[max 2] **[Total: 6]**	

Question 2 [6]

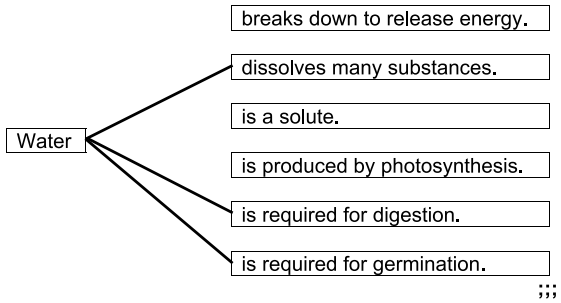
2(a)	<table><tr><th>process</th><th>involves the movement of particles down a gradient</th><th>involves the movement of particles up a gradient</th><th>energy is required to move the particles</th></tr><tr><td>diffusion</td><td>✓</td><td></td><td></td></tr><tr><td>active transport</td><td></td><td>✓</td><td>✓</td></tr></table>	**2**	3 correct ticks = 2 marks 1 or 2 correct ticks = 1 mark
2(b)	lungs / alveoli; leaf / stoma(ta); small intestine / ileum / duodenum;	**3**	**A** stomach / liver / kidney / muscle / AVP
2(c)	provides support / turgid / AW;	**1**	
		Total: 6	

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Question 3 [8]

3(a)	line ending on cell membrane ; line ending in the cytoplasm ; line ending on or in the vacuole ;	3	
3(b)(i)	**1** cell, is larger / has expanded / has changed shape / AW ; **2** cytoplasm has increased in volume ; **3** vacuole, is larger / AW ; **4** cell wall / cell membrane, is, stretched / AW ;	2	
3(b)(ii)	**1** water moves into the, cell / vacuole ; *max two from:* **2** ref. to osmosis ; **3** through partially permeable membrane ; **4** cell or vacuole contents / cytoplasm , more concentrated than (distilled) water / AW ;	3	

Question 4 [8]

4(a)	 ;;;	3	one mark for each correct line **R** each additional line
4(b)(i)	*membrane:* (dialysis) tubing ; *cytoplasm:* water ;	2	
4(b)(ii)	arrow starting from water (inside tubing), crossing dialysis tubing and ending in salt solution ;	1	
4(b)(iii)	osmosis ;	1	
4(c)	(cell) wall ;	1	

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Question 5 [8]

5 **(a)**	(water moves by) osmosis / diffusion ; down a (water potential) gradient/ from a high concentration of water to a low concentration of water ; lower water potential / AW in the blood ; colon has a high concentration of water / blood has a low concentration of water ; because the membrane is partially permeable ;	max [3]	
(b) (i)	<table><tr><th>length</th><th>time</th><th>surface area</th><th>volume</th><th>sa to volume ratio</th></tr><tr><td>2</td><td>41</td><td>24</td><td>8</td><td>3:1 ;</td></tr><tr><td>3</td><td>76</td><td>54</td><td>27</td><td>2:1 ;</td></tr></table>	[2]	1 mark for each correct line **A** if just ratio stated
(ii)	as surface area to volume ratio falls the efficiency of diffusion falls / time taken for diffusion increases / **ora** ;	[1]	
(c)	many air sacs / alveoli ; to increase / large surface area ; idea of extensive blood supply ; to remove absorbed materials ; one cell thick ; short diffusion distance ;	max [2]	
		[Total: 8]	

Question 6 [7]

6(a)	<table><tr><th>feature</th><th>active transport</th><th>diffusion</th></tr><tr><td>movement of particles always occurs across a cell membrane</td><td>✓ ;</td><td></td></tr><tr><td>molecules moving during gas exchange</td><td></td><td>✓ ;</td></tr><tr><td>rate of movement of particles is higher when the concentration gradient is larger</td><td></td><td>✓ ;</td></tr><tr><td>requires energy from respiration</td><td>✓ ;</td><td></td></tr></table>	**4**	one mark per correct row **R** each additional tick
6(b)	*any three from:* for ion, uptake / absorption ; ion concentration lower in the soil than in the root (cell) / AW ; movement against the concentration gradient / AW ; creates a water potential gradient / AW ; named example of ion e.g. nitrate / magnesium ;	**3**	

Question 7 [8]

7(a)	osmosis ; solvent ;	**2**	
7(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**	
7(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**	

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Question 8 [10]

8	(a)	movement / diffusion, of water (molecules) ; from high water potential to low water potential / down water potential gradient ; across a partially permeable membrane ;	[3]	
	(b) (i)	1.0 (mol dm^{-3} sodium chloride solution) ;	[1]	
	(ii)	(to remove) excess / surface / AW, water / AW, on potato sticks ; to measure the mass of the potato (stick) only ;	[max 1]	**I** inaccurate unqualified **R** dry mass
	(c)	cells / potato sticks, have lost water (by osmosis) ; from high water potential to low water potential / down water potential gradient ; (cells / tissue / potato) were, plasmolysed / flaccid ; loss of turgor (pressure) ; not enough pressure of water pushing on cell walls ;	[max 3]	**I** water concentration **I** incipient (plasmolysis) **A** reduced turgidity / description
	(d)	protein denatured (when cooked) ; cell membrane, damaged / destroyed (when cooked) ; no osmosis will occur ;	[max 2]	**R** killed proteins **I** killed / denatured, cells **I** damaged cell wall
			[Total: 10]	

Question 9 [12]

9	(a)	carbon dioxide / CO_2 ; (aerobic) respiration ; (simple) diffusion ;	[3]	**A** excretion **I** gas exchange
	(b)	water enters by osmosis ; down a water potential gradient / high(er) to low(er) water potential ; through partially permeable membrane ; needs to remove water to prevent bursting ;	[max 3]	**R** water concentration **A** semi- / selectively / differentially
	(c)	as concentration of sea water increases the removal of water decreases ; as concentration of sea water increases the water potential gradient decreases ; therefore less water enters at higher concentrations of sea water ; less excess water ;	[max 3]	**A** 0% to 12%
	(d)	cell walls, inelastic / do not stretch / rigid / inflexible / keep shape of cell ; cells, are turgid / have high turgor pressure ; resist any increase in, volume / pressure ; these cells do not absorb excess water ; the cells will not burst ;	[max 3]	**I** strong / tough / don't break **A** (very) little water enters
			[Total: 12]	

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Question 10 [16]

10(a)(i)	net movement / AW, of particles ; from a region of higher concentration to a region of their lower concentration (as a result of their random movement) ;	**2**	
10(a)(ii)	kinetic (energy) ;	**1**	
10(b)(i)	aerobic respiration ;	**1**	
10(b)(ii)	arrow drawn from inside to outside of epithelial cell ;	**1**	
10(c)	*type:* active transport ; *explanation:* (particles move from) low(er) concentration to high(er) concentration ; uses energy ;	**3**	
10(d)	*any two from:* starch is insoluble ; starch is (too) large ; starch has already been broken down / AW ;	**2**	
10(e)	*any six from:* 1 *idea of* before immersion cells are turgid / *idea of* after immersion cells are flaccid **or** plasmolysed ; 2 *idea of* before immersion cell membrane **or** cytoplasm pushes against cell wall / *idea of* after immersion cell membrane **or** cytoplasm pulls away from cell wall ; 3 *idea of* before immersion increased turgor pressure / *idea of* after immersion decreased turgor pressure ; 4 ref to osmosis ; 5 salt solution is concentrated **or** has a lower water potential / cytoplasm is dilute **or** has a higher water potential ; 6 water moves from high water potential to low water potential ; 7 through a partially permeable membrane ; 8 cytoplasm / vacuole / cell contents, is darker (after immersion) / ora ; 9 cytoplasm / vacuole / cell contents, are more concentrated (after immersion) / ora ;	**6**	

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