

Question number	Answer	Notes	Marks
1 (a)	easier to see / no need to stain / contrast / cytoplasm is red / eq;		1
(b) (i)	1. movement of <u>water</u> ; 2. from dilute to more concentrated solution / eq; 3. through partially permeable membrane / eq;		2
(ii)	(in distilled water) 1. water into cells; 2. outside solution/distilled water more dilute / down concentration gradient / eq; 3. cell membrane against cell wall / eq; 4. <u>turgid</u> ; (allow converse in salt solution for each point) 1. water leaves cell; 2. outside solution/distilled water less concentrated / eq; 3. cell membrane shrinks away from cell wall /eq 4. <u>plasmolysed</u> / <u>flaccid</u> ;		4
(c)	1. water into red blood cell / eq; 2. cells burst / haemolysis / eq; 3. no cell wall;		2

Total 9 marks

Question number	Answer	Notes	Marks
2	1. high humidity decreases rate ; 2. reduced concentration gradient / eq; 3. high wind increases rate ; 4. increased concentration gradient / eq; 5. high temperature increases rate ; 6. more (kinetic) energy / more evaporation / eq; 7. high light increases rate ; 8. stomata open / eq;	One mark for condition and change in transpiration second mark for explanation of change Allow converse throughout	5

Total 5 marks

Question number	Answer	Notes	Marks
3 (a)	protect <u>eyes</u> / prevent blindness / eq;		1
(b)	1. diffusion; 2. high concentration to low concentration / eq;		2
(c)	1;		1
(d) (i)	surface area <u>24</u> unit <u>cm²</u> ; or surface area <u>2400</u> unit <u>mm²</u> ;	If number wrong but units cm ² or mm ² = 1	Max 2
(ii)	volume <u>8</u> unit <u>cm³</u> ; or volume <u>8000</u> unit <u>mm³</u> ;	If number wrong but units cm ³ or mm ³ = 1	Max 2

Question number	Answer				Notes	Marks
3 (e)		Cube A	Cube B	Cube C		3
	largest surface area	✓;				
	largest surface area to volume ratio			✓;		
	greatest proportion of cube coloured red			✓;		
(f)	<ol style="list-style-type: none"> 1. humans/larger organisms have smaller SA:VOL ratio; 2. diffusion; 3. too slow / less efficient / therefore less (relative) penetration / eq; 4. need to move oxygen / nutrients / named substance; 5. mass flow / circulatory system / eq; 					3 max
						Total 14 marks

Question number	Answer	Notes	Marks																
4 (a)	(i) 9.8(03922%);; allow one for 0.51 in working		2																
	(ii) different masses / different sizes / <u>valid</u> comparison;		1																
(b)	water <u>enters</u> / water <u>in</u> / eq; dilute to more concentrated solution / eq; partially permeable membrane / eq;	interpret the term concentration alone as being water molecules	3																
(c)	<table border="1"> <thead> <tr> <th>Cube of side in cm</th> <th>SA in cm²</th> <th>Volume in cm³</th> <th>SA/Vol ratio</th> </tr> </thead> <tbody> <tr> <td>(0.5)</td> <td>(1.5)</td> <td>(0.125)</td> <td>(12)</td> </tr> <tr> <td>(1.0)</td> <td>6</td> <td>1</td> <td>6</td> </tr> <tr> <td>(2.0)</td> <td>24;</td> <td>8;</td> <td>3;</td> </tr> </tbody> </table>	Cube of side in cm	SA in cm ²	Volume in cm ³	SA/Vol ratio	(0.5)	(1.5)	(0.125)	(12)	(1.0)	6	1	6	(2.0)	24;	8;	3;	one mark for each pair	3
Cube of side in cm	SA in cm ²	Volume in cm ³	SA/Vol ratio																
(0.5)	(1.5)	(0.125)	(12)																
(1.0)	6	1	6																
(2.0)	24;	8;	3;																
(d)	more osmosis / faster (small cubes) / greater % increase / greater % change / eq; larger SA: Vol ratio (of small cubes);	allow converse	max 2																

(e)	cell wall; cell membrane; cytoplasm; vacuole; nucleus; chloroplast;	5 to 6 = 3 3 to 4 = 2 1 to 2 = 1	max 3
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TOTAL 14 MARKS

Question number	Answer	Notes	Marks
5 (a)	(i) movement of particles/ions/molecules/gas from a high concentration to a low concentration / down a concentration gradient;	ignore substances / liquid ignore along / across	1
	(ii) 3 mm;		1
	(iii) must be clear in middle and not drawn outside cube;	allow if border not shaded	1
(b)	cube shows more penetration of dye at any one edge and clear in middle;	allow if uneven allow if border not shaded	1
(c)	1. temperature (increased); 2. particles have more (kinetic) energy / move faster / more movement / eq; OR 3. concentration of dye (increased); 4. increased gradient / more particles / eq; OR 5. concentration of agar (increased); 6. reduces speed of particle movement /eq;	allow converse ignore more collisions	maximum of two factors Max 4

Question number	Answer	Notes	Marks
5 (d)	<ol style="list-style-type: none"> 1. dye does not reach middle of cube / takes longer to reach middle of cube / reaches lower proportion; 2. large organisms / large cubes have small SA: VOL; 3. (in large organisms) <u>diffusion</u> is slow / <u>diffusion</u> takes too long / <u>diffusion</u> is insufficient / <u>diffusion</u> is affected by distance / eq; 4. need to get <u>oxygen</u> / <u>glucose</u> to cells / all of the body; 	allow converse	Max 3