Movement of Substances into and out of Cells

Mark Scheme 1

Level	IGCSE(9-1)
Subject	Biology
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1B)
Topic	Structure and Functions in Living Organisms
Sub-Topic	Movement of Substances into and out of Cells
Booklet	Mark Scheme 1

Time Allowed: **64 minutes**

Score: **/53**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

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>cm^2</u>;; or surface area <u>2400</u> unit <u>mm^2</u>;;	If number wrong but units cm^2 or mm^2 = 1	Max 2
(ii)	volume <u>8</u> unit <u>cm^3</u>;; or volume <u>8000</u> unit <u>mm^3</u>;;	If number wrong but units cm^3 or mm^3 = 1	Max 2

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3 (e)</td><td>
<table>
<tr><td></td><td>Cube A</td><td>Cube B</td><td>Cube C</td></tr>
<tr><td>largest surface area</td><td>✓;</td><td></td><td></td></tr>
<tr><td>largest surface area to volume ratio</td><td></td><td></td><td>✓;</td></tr>
<tr><td>greatest proportion of cube coloured red</td><td></td><td></td><td>✓;</td></tr>
</table>
</td><td></td><td>3</td></tr>
<tr><td>(f)</td><td>humans/larger organisms have smaller SA:VOL ratio;

diffusion;

too slow / less efficient / therefore less (relative) penetration / eq;

need to move oxygen / nutrients / named substance;

mass flow / circulatory system / eq;</td><td></td><td>3 max</td></tr>
<tr><td></td><td></td><td></td><td>Total 14 marks</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a) (i)

(ii)</td><td>9.8(03922%);;
allow one for 0.51 in working

different masses / different sizes / <u>valid</u> comparison;</td><td></td><td>2

1</td></tr>
<tr><td>(b)</td><td>water <u>enters</u> / water <u>in</u> / eq;
dilute to more concentrated solution / eq;
partially permeable membrane / eq;</td><td>interpret the term concentration alone as being water molecules</td><td>3</td></tr>
<tr><td>(c)</td><td><table><tr><th>Cube of side in cm</th><th>SA in cm^2</th><th>Volume in cm^3</th><th>SA/Vol ratio</th></tr><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></table></td><td>one mark for each pair</td><td>3</td></tr>
<tr><td>(d)</td><td>more osmosis / faster (small cubes) / greater % increase / greater % change / eq;

larger SA:Vol ratio (of small cubes);</td><td>allow converse</td><td>max 2</td></tr>
</table>

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

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. cocentration 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)	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) diffusion is slow / diffusion takes too long / diffusion is insufficient / diffusion is affected by distance / eq; 4. need to get oxygen / glucose to cells / all of the body;	allow converse	Max 3