

A Level OCR Biology

6 Plasma membranes – answers

Question	Answers	Extra information	Mark	AO Spec reference
1(a)(i)	A phospholipid ✓ B glycoprotein / protein / channel or carrier protein ✓ C cholesterol ✓		3	AO1 2.1.5(a) 2.1.5(b)
(ii)	A Controls what enters / leaves the cell OR acts as a barrier OR allows small / non-polar molecules through membrane ✓ B Cell signalling / recognition / allows polar molecules through membrane ✓ C Regulate fluidity / stability of membrane ✓		3	
(b)	Any three from: phospholipid is made up a phosphate head and fatty acid tails ✓ phosphate head is hydrophilic AND fatty acid tails are hydrophobic ✓ phosphate heads arrange to face outwards/to the aqueous environment OR fatty acid tails arrange to face inwards/to each other, forming a hydrophobic core ✓ weak intermolecular forces exist between hydrophobic tails ✓		3 max	
(c)	Three pairs from: Separate organelles from cytoplasm / compartmentalization AND phospholipid (bilayer) ✓ Form (transport / secretory) vesicles AND phospholipid ✓ Site of reactions AND intrinsic proteins / enzymes ✓ Provide attachment surface AND glycoprotein / glycolipid ✓ Controls what enters / leaves <u>organelles</u> AND phospholipid / carrier / channel proteins ✓	<i>One mark for each pair of correctly linked role and component</i>	3 max	
2(a)	Red beetroot particles can diffuse out of cells ✓ From high to low concentration of beetroot juices ✓		2	AO2 AO3
(b)(i)	Temperature of water		1	2.1.5(c)

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(ii)	Any two from: Volume of cylinder ✓ Mass of cylinder ✓ Shape of cylinder ✓ Same (part of) beetroot ✓ Volume of water used ✓		2 max	2.1.5(d) Practical
(iii)	Step 2: Allow movement of substances on all surfaces ✓ Step 3: Remove red juice from damaged cells from cutting ✓ Step 4: Remove excess water/juice from surface ✓	One mark per step	3	
(c)	Description: As the temperature increases, the lower the transmission of light AND Any three from: Increasing temperature increases <u>kinetic energy</u> of phospholipids ✓ Phospholipids move more/further apart ✓ Breaks weak (intermolecular) forces between (fatty acid/hydrophobic) tails ✓ Larger gaps between phospholipids, becomes more permeable (for red beetroot particles to escape) ✓ AND less light can pass through the coloured solution ✓	One mark for correct description Three marks for effects on membrane structure One mark for linking to the experimental result	5	
3(a)	Water: absorbed by osmosis ✓ down water potential gradient ✓ Mineral ions: absorbed by active transport ✓ against concentration gradient ✓		5	AO2 2.1.5(d) 2.1.5(e) Synoptic: Specialised cells

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	Transport in plant: transported in the xylem ✓			
(b)	Any two pairs from: More channel proteins / aquaporins AND for <i>more / faster</i> osmosis ✓ More carrier proteins AND for <i>more</i> active transport ✓ More mitochondria AND for more aerobic respiration / for more energy (to do active transport) ✓	<i>Answer should include comparative words – for example credit “more mitochondria”, but not “has mitochondria”</i> One mark per adaptation One mark per correctly linked explanation	4 max	
(c)	distilled water has higher water potential ✓ Water moves into cells by <u>osmosis</u> OR <u>down water potential gradient</u> ✓ Plant cells have a cell wall ✓ Prevents bursting ✓ Whereas animal cells do not have a cell wall, so cannot withstand pressure ✓		5	
4(a)(i)	Movement of particles against concentration gradient / from area of low concentration to area of high concentration ✓ using energy / ATP ✓ involving carrier proteins ✓		3	
(ii)	Both require energy / ATP AND Any one pair from: Active transport involves carrier proteins AND bulk transport involves formation and fusion of vesicles ✓ Energy in active transport is used to change carrier protein shape AND energy in bulk transport is used to form and fuse vesicles ✓	One mark for similarity Two marks for difference One mark per correct statement	3 max	AO1 AO2 2.1.5(d) 2.1.5(b) UF

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Question	Answers	Extra information	Mark	AO Spec reference																									
	Active transport – transport smaller molecules AND bulk transport – transport larger molecules/whole cells ✓	A comparative statement must be given to gain full marks																											
(iii)	<table border="1"> <thead> <tr> <th>Substance</th> <th>Diffusion</th> <th>Facilitated diffusion</th> <th>Active transport</th> <th>Bulk transport</th> </tr> </thead> <tbody> <tr> <td>oxygen</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>glucose</td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>sodium ions</td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>bacterial cell</td> <td></td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	Substance	Diffusion	Facilitated diffusion	Active transport	Bulk transport	oxygen	✓				glucose		✓	✓		sodium ions		✓	✓		bacterial cell				✓	One mark for each correct row	4	
Substance	Diffusion	Facilitated diffusion	Active transport	Bulk transport																									
oxygen	✓																												
glucose		✓	✓																										
sodium ions		✓	✓																										
bacterial cell				✓																									
(b)(i)	To increase surface area OR to hold more intrinsic proteins		1																										
(ii)	Mechanism: Active transport ✓ Explanation: Energy is needed ✓	One mark for mechanism One mark for explanation	2																										
(iii)	Mechanism: Facilitated diffusion ✓ Explanation: Moving down a concentration gradient ✓ Through a channel protein ✓	One mark for mechanism Two marks for explanation	3																										
5(a)(i)	Structure: Carbohydrate chain on (intrinsic) protein ✓ Function: (Carbohydrate chain) acts as receptor / antigen OR involved in cell signalling / cell communication ✓		2	AO1 AO3 2.1.5(b) 2.1.5(c) Synoptic: 2.1.4(c) (enzyme mechanism) 2.1.4(d) (enzyme activity)																									
(ii)	Structure: Hydrophilic phosphate head ✓ Hydrophobic fatty acid tails ✓ Function: (forms bilayer which) Acts as a barrier against (named) polar / hydrophilic substances OR selectively permeable / controls what can enter or exit the cell ✓		3																										

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Question	Answers	Extra information	Mark	AO Spec reference
(iii)	<p>Structure: Intrinsic protein / embedded within membrane ✓ Forms a pore/channel through the membrane ✓</p> <p>Function: Allows <u>facilitated</u> diffusion OR Allows polar/hydrophilic substances to pass through the membrane ✓</p>		3	
(b)(i)	<p>By random collision ✓ Hydrogen peroxide collides/binds to the <u>active site</u> of catalase ✓ Forms an enzyme–substrate complex ✓</p>		3	
(ii)	<p>Cube A (in refrigerator): Plasma membrane was intact ✓ Low permeability of membrane to catalase / hydrogen peroxide ✓ Only some hydrogen peroxide broken down successfully (to release some oxygen) ✓</p> <p>Cube B (in freezer and defrosted): <i>Idea that:</i> freezing/defrosting damages the (plasma) membrane ✓ Higher permeability of membrane to catalase / hydrogen peroxide ✓ More hydrogen peroxide broken down (so more oxygen released) ✓</p> <p>Cube C (boiled): High temperature causes catalase to denature ✓ Active site is no longer complementary to hydrogen peroxide ✓ No hydrogen peroxide broken down (so no oxygen produced) ✓</p>		9	
6(a)(i)	Glycoprotein / protein		1	AO2
(ii)	<p>1. DNA in the nucleus is <u>transcribed</u> / <u>transcription</u> occurs, making mRNA ✓ 2. mRNA is <u>translated</u> / <u>translation</u> occurs in ribosomes/rough endoplasmic reticulum ✓</p>		5	2.1.5(e) 2.1.5(b) 2.1.5(d)

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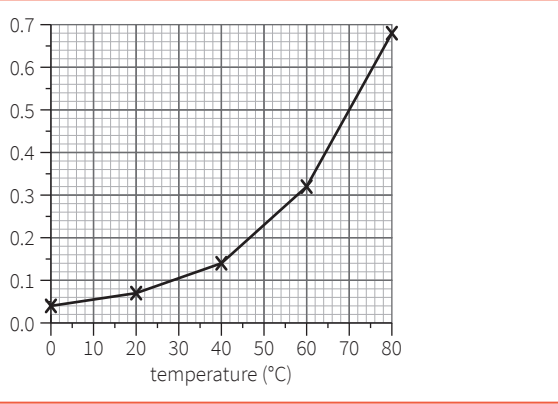
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	3. polypeptide is modified / packaged, in Golgi apparatus ✓ 4. protein is transported on transport/secretory <u>vesicles</u> ✓ 5. vesicle fuses with cell surface membrane, to deposit protein ✓	<i>Do not allow exocytosis</i>		Synoptic: 2.1.1(g) (eukaryotic cells) 2.1.1(i) (protein synthesis)
(iii)	Must be in the following order: 1. protein channels ✓ 2. facilitated diffusion ✓ 3. energy / ATP ✓ 4. active transport ✓		4	
(b)	(patient has) high blood glucose level (due to reduced intake into cells) ✓ Water potential in the bloodstream is lower (than that of body cells) / blood is hypertonic ✓ Water moves out of cells (into bloodstream) ✓ Down water potential gradient ✓ By <u>osmosis</u> ✓		5	

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Skills box answers

Question	Answer
<p>1</p>	 <p>mean absorbance of betalain solution(a.u.).</p>
<p>2</p>	<p>Describe: As the temperature increased, the absorbency increased. The relationship is not linear. There is a sharp rise in absorbency between 40 °C and 60 °C (from 0.14 to 0.43 AU).</p> <p>Explanation: The increase in temperature causes the phospholipids to move more (increased kinetic energy) and the bilayer becomes leaky. The betalains diffuse out through the cell surface membranes. As the temperature increases, the cell-surface membranes undergo damage. As protein carriers and channels in the cell-surface membrane start to denature at 40 °C. The integrity of the cell surface membrane is reduced further and more pigment leaks out, which increases absorbency.</p>
<p>3</p>	<p>The formation of ice crystals may puncture the phospholipid membranes, resulting in an increased leakage of pigments.</p>