

WJEC (Wales) Biology A-level
Topic 1.3: Cell Membranes and
Transport
Questions by Topic - Mark
Scheme

1.

Question		Marking details	Marks Available
1	(a)	<p>A {polar / hydrophilic / phosphate} {head / group}; NOT layer Glycerol = neutral</p> <p>B extrinsic protein;</p> <p>C {non-polar / hydrophobic} tails / fatty acids ; NOT lipid tail</p> <p>D transmembrane protein / carrier protein / channel protein / intrinsic protein;</p>	4
	(b)	<p>active transport / reference to {carrier protein / protein pump} changing shape; NOT channel protein NOT reference to more than one type of transport using ATP / energy;</p>	2
	(c)	<p>1. ref to fluid mosaic (model);</p> <p>2. proteins free to move (within membrane / bilayer); NOT in the cell</p> <p>3. {after fusion / 1 hour} there is a new arrangement of proteins / OWTTE;</p>	3
		Question 1 total	[9]

2.	Question	Marking details	Marks Available
2	(a)	7/8 nm (must have correct units); Accept range of 6-10	1
	(b)	Vitamin A - {Dissolves in /can pass directly through} { <u>phospholipid layer/ hydrophobic regions</u> }; By diffusion; Glucose – Cannot pass through <u>phospholipid</u> layer therefore uses {protein channels/ carriers/ transport proteins/ hydrophilic channels/intrinsic proteins}; By facilitated diffusion; Accept active transport	4
	(c) (i)	Ethanol {dissolves/emulsifies} (phospho) <u>lipids</u> / denatures protein; NOT cell membranes Creates {gaps/holes/pores} in the membrane/ makes membrane more porous; NOT makes membrane more permeable	2
	(ii)	Increased temperature increases <u>kinetic</u> energy of {dye/membrane} molecules; Increases (rate of) <u>diffusion</u> (of dye across membrane)/dye <u>diffuses</u> across the membrane more rapidly;	2
Question 2 Total			[9]
3.	(a)	A = phospholipid head/hydrophilic head/phosphate/polar group; B = hydrophobic tails/ fatty acids/ non polar tails: (Not: tails/ lipid layer) C = transmembrane protein/ carrier protein/ channel protein/	1 1 1

- intrinsic protein.
- (b) (i) As lipid solubility increases the rate increases; NOT rate of reaction 2
- Membrane contains (a double layer) of phospholipids/
Lipid soluble substances can {move/pass/ diffuse} through the membrane (more easily than water soluble substances.)
(any two)
- (ii) small molecules diffuse faster(or converse); 1
Higher kinetic energy/ easier to pass between phospholipid molecules. 1
- (c) concentration/ diffusion gradient/ concentration difference; 2
{amount/number} of carriers/ channel proteins/ larger surface area contains more carrier proteins;
temperature. (any two)
- (d) vitamin B₁ – polar/ ionic; 2
Cannot pass through phospholipid layer/ hydrophobic region;
Uses protein channels/ carriers/ transport proteins/
Hydrophilic (lining to) channels;
(any two)
- Vitamin K - non polar/non ionic;
dissolves in phospholipid/ hydrophobic regions; 2
so can pass (directly) through phospholipid/ hydrophobic regions;
(any two)

(Total 13 marks)

4.	4. (a) (i)	fluid mosaic model; mosaic of <u>protein</u> molecules/irregularly or randomly arranged; lipid layer fluid/can move;	3
	(ii)	A = phospholipid <u>bilayer</u> /fatty acid tails; (not: ref. hydrophobic) B = extrinsic/surface protein/glycoprotein; C = transmembrane/carrier/intrinsic protein;	3
	(iii)	allows passage of polar/charged/ionic/hydrophilic molecules/facilitated diffusion; (allow: ref. water/non lipid soluble; not: named molecule)	1
	(b)	movement up/against a concentration gradient; requires energy/ATP;	2
	(c)	maintain water potential; obtain nutrients/metabolites or named e.g. glucose; obtain oxygen/remove carbon dioxide; secrete molecules;	2 max (Total 11 marks)
		remove toxic substances or named; (not: waste products)	

5.

Question		Marking details	Marks Available
5.	(a)	(i) <u>two layers/ double layer</u> of <u>phospholipids</u> ; NOT bilayer	1
		(ii) <u>fatty acid</u> ;	1
		(iii) Any 2 from: transport/ form hydrophilic pores/ active transport/ channel proteins/ facilitated diffusion; receptors/ cell recognition; enzyme systems;	2 max
	(b)	Decreased fluidity/ rigid membrane - cells/ membranes more easily damaged (as blood flows)/ cannot pass through capillaries so easily; Membrane proteins change shape / denatured {carriers/ receptors/membrane enzymes} - so {reduced/no} {transport/movement} of molecules;	2
		Question 5 Total	[6]

6.	Question	Marking details	Marks Available
6	(a)	(Method) Diffusion; (Reason) <u>Rate is proportional to concentration</u> ; NOT graph is proportional	2
	(b)	(Increasing ion concentration) increases chance that (a molecule will) {collide with/ pass through} {pump/carrier/protein};	1
	(c)	Active transport;	1
	(d)	$\Psi_s = \Psi - \Psi_p$ / i.e. -100 -200; -300 kPa; (Must have units) Correct answer + unit = 2 marks Correct answer + no unit = 1 mark	2

Question 6 Total [6]

7.	(a)	(i) Phagocytosis/ <u>endocytosis</u> ; the (cell) <u>membrane</u> {invaginates/infolds/ surrounds/ wraps around/ engulfs} (to form a vesicle (allow vacuole))around the {food particle/ algae};	2
		(ii) Golgi { <u>Body/apparatus</u> };	1
		(iii) Exocytosis;	1