

Question 15 (Answer: **B**)

- Glycolipids project from the outer surface, where they can be recognised by other cells.
- That lets cells attach to one another and act as antigens for recognition.
- Fluidity is controlled by cholesterol and by the fatty-acid tails, not by the glycolipids.

Question 17 (Answer: **A**)

- Unsaturated fatty acids have kinks from their C=C bonds, so the tails pack loosely and stay fluid.
- Shorter tails have fewer interactions, which also keeps the membrane fluid.
- Cholesterol prevents the tails packing tightly at low temperature, so all three help.

Question 18 (Answer: **A**)

- Membrane proteins and glycoproteins project from the surface where other cells and molecules meet them.
- They act as receptors for hormones and other messenger molecules.
- They also act as antigens and as attachment points between cells, so all three are correct.

Question 14 (Answer: **B**)

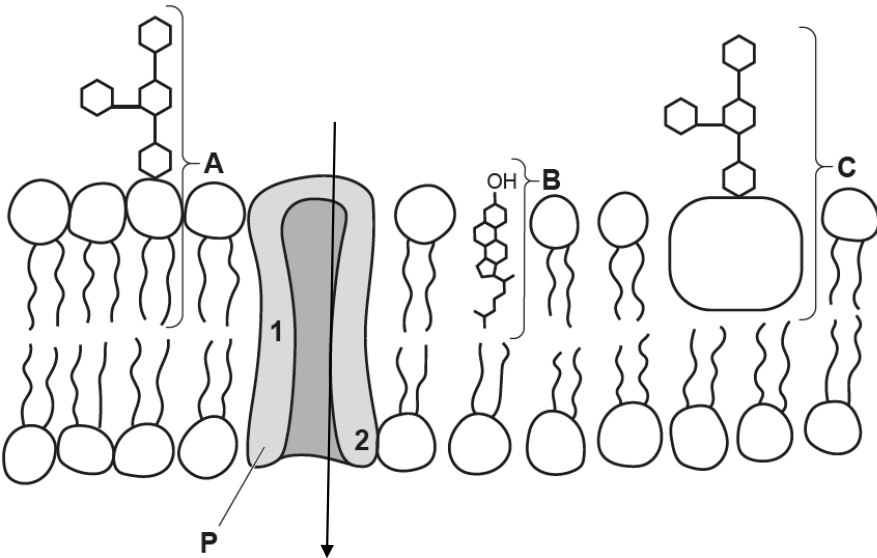
- A phospholipid has a polar phosphate head and two non-polar fatty acid tails.
- The polar heads face the water on each side of the membrane.
- The non-polar tails turn inwards, away from the water.

Question 18 (Answer: **D**)

- Membrane proteins can move sideways because the bilayer is fluid.
- Fusing the two cells lets the red and green proteins mix across the whole surface.
- Given time and a warm enough temperature the colours become evenly intermingled.

Question 16 (Answer: **C**)

- Match each label to its position: phospholipids form the bilayer, cholesterol sits between the tails.
- A protein spanning the membrane with a carbohydrate chain outside is a receptor for cell signalling.
- Channel proteins allow diffusion of ions, but that is passive, not active transport.

1(a)	A glycolipid ; B cholesterol ; C glycoprotein ;
1(b)	 1 arrow through protein ; 2 direction of arrow correct ;
1(c)	<i>any three from:</i> fluidity (of membrane) increases ; unsaturated fatty acids have double bonds ; (double bonds) cause the fatty acid chain to, kink / bend / AW ; unsaturated fatty acids cannot lie as close together as saturated fatty acids A ora or <i>ref. to</i> increased distance between phospholipids / AW ; <i>ref. to</i> weakening the hydrophobic interactions between, fatty acid chains / cholesterol ;
1(d)	<i>any one from:</i> position 1 has amino acids with, hydrophobic / non polar / AW, R-groups ; position 2 has amino acids with, hydrophilic / polar / ionic / AW, R-groups; A ref. to amine and carboxyl groups as appropriate