

4. Cell membranes and transport

Starter Quiz · 课前小测

A-Level Biology

Name: _____ Score: _____

1. In the phospholipid bilayer, the molecules arrange so that:
 - ☐ the hydrophilic heads face the water and the hydrophobic tails point inward
 - ☐ the tails face the water and the heads point inward
 - ☐ all heads point the same way
 - ☐ there is only one layer
2. Which molecules cross the membrane by simple diffusion through the bilayer?
 - ☐ small, non-polar molecules such as oxygen and carbon dioxide
 - ☐ large polar molecules such as glucose
 - ☐ charged ions only
 - ☐ whole vesicles
3. As a cell gets larger, its surface area to volume ratio:
 - ☐ gets smaller, because volume grows faster than surface area
 - ☐ gets larger
 - ☐ stays the same
 - ☐ becomes zero
4. Adding a solute to pure water:
 - ☐ lowers its water potential
 - ☐ raises its water potential
 - ☐ has no effect on water potential
 - ☐ makes it pure again
5. Why is the model called "fluid mosaic"?
 - ☐ phospholipids slide past each other (fluid) and proteins are dotted through it (mosaic)
 - ☐ the membrane is frozen solid
 - ☐ it is made only of carbohydrate
 - ☐ proteins cannot move at all
6. Facilitated diffusion uses channel or carrier proteins but needs no energy — it is still passive.
 - ☐ True ☐ False

7. A cube has side length 2. Using ratio = $6/L$, what is its surface-area-to-volume ratio?

8. Pure water has the highest possible water potential, which is defined as zero.

☐ True ☐ False

9. In the fluid mosaic model the phospholipids are locked in place and cannot move.

☐ True ☐ False

10. A cube has side length 3. Using ratio = $6/L$, what is its surface-area-to-volume ratio?

1. **the hydrophilic heads face the water and the hydrophobic tails point inward**

Heads are attracted to the water on both sides; the tails hide in the middle, away from water.

2. **small, non-polar molecules such as oxygen and carbon dioxide**

Only small or non-polar molecules can pass straight through the oily bilayer, down the gradient.

3. **gets smaller, because volume grows faster than surface area**

Volume (L^3) grows faster than surface area ($6L^2$), so the ratio $6/L$ falls as L increases.

4. **lowers its water potential**

Pure water has the highest water potential; dissolving a solute lowers it.

5. **phospholipids slide past each other (fluid) and proteins are dotted through it (mosaic)**

"Fluid" = the phospholipids move; "mosaic" = proteins scattered through the bilayer like tiles.

6. **True**

Ions and large polar molecules cross via proteins, but movement is still down the gradient, so no ATP is used.

7. **3**

ratio = $6 / L = 6 / 2 = 3$ (i.e. 3 : 1).

8. **True**

Pure water is defined as having a water potential of 0 kPa; adding solute makes it negative (lower).

9. **False**

"Fluid" means the opposite — the phospholipids slide past one another, so the membrane can bend and move.

10. **2**

ratio = $6 / L = 6 / 3 = 2$ (i.e. 2 : 1) — smaller than the side-2 cube, because it is bigger.