4 Cell membranes – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
partially permeable			
diffusion			
osmosis			
simple diffusion			
oxygen			
concentration gradient			
facilitated diffusion			
ions			
glucose			
water potential			
Active transport			
endocytosis			
exocytosis			
volume			
surface area			

English	**Write it 3 times** (English)
turgid	
plasmolysis	

Recall

From Part 1 you know the membrane is **partially permeable** . Here we look at the ways substances cross it, and why cell size matters.

- At IGCSE you met **diffusion** and **osmosis** .
- Now we add *facilitated diffusion*, *active transport*, and the surface area : volume idea.

New ideas

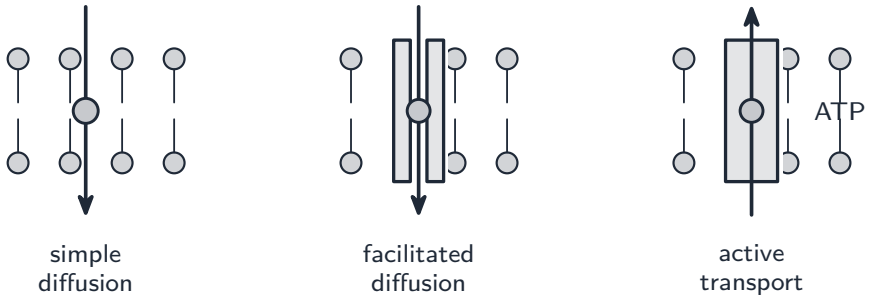
Read these first, then do the Practice.

1 Passive transport (no energy)

- **simple diffusion** – small or non-polar molecules (like **oxygen**) pass straight through the bilayer, **down** the **concentration gradient** .
- **facilitated diffusion** – **ions** and large polar molecules (like **glucose**) cross through channel or carrier proteins, still down the gradient.
- **osmosis** – water moves across a partially permeable membrane from higher to lower **water potential** .

2 Active transport (uses ATP)

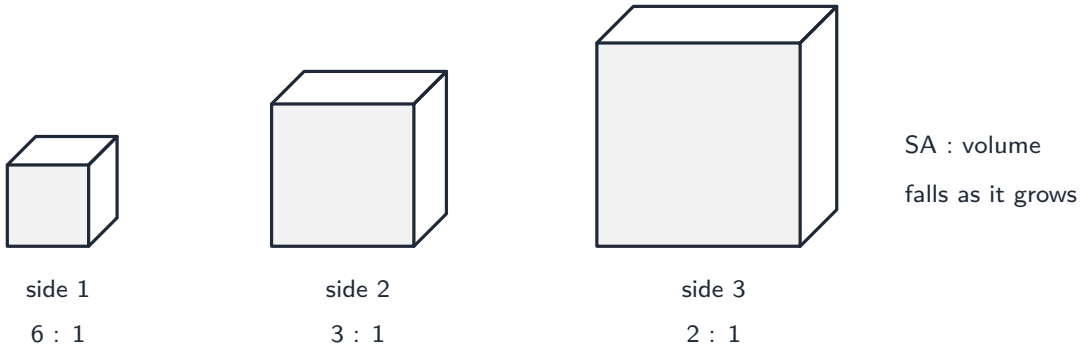
Active transport moves a substance **against** its concentration gradient (low → high). It needs a carrier protein **and** energy from **ATP**.



Larger amounts move in bulk by **endocytosis** (folding material in) and **exocytosis** (releasing material out), both using ATP.

■ 3 Surface area to volume ratio

A cell exchanges substances across its surface. As it grows, **volume** grows faster than **surface area** , so the surface area : volume ratio gets **smaller**.



This is why small or thin, flat cells exchange materials fast, while large cells cannot rely on diffusion alone.

■ 4 Cells in solutions

- a plant cell in pure water becomes **turgid** (the wall stops it bursting); in a strong solution it loses water and undergoes **plasmolysis** .
- an animal cell has no wall: in pure water it may **burst**; in a strong solution it **shrinks**.

Watch out: passive transport (diffusion, facilitated diffusion, osmosis) goes *down* the gradient with *no* energy; active transport goes *against* the gradient and needs ATP and a carrier protein. As a cell grows, its surface-area-to-volume ratio *falls*.

Practice

Try these in order.

4.1 Name the process that moves a substance **against** its concentration gradient. [1]

4.2 State one difference between simple diffusion and facilitated diffusion. [1]

4.3 Active transport and facilitated diffusion both use proteins. State one way they differ. [1]

4.4 A cube-shaped cell of side 2 has a surface area : volume ratio of 3 : 1. Explain what happens to this ratio as the cell grows larger. [2]

4.5 Explain why a small cell can exchange substances faster than a large cell. [2]

4.6 An animal cell and a plant cell are both placed in pure water. Describe what happens to each. [2]

4.7 Challenge. Cells lining the gut are covered in tiny folds called microvilli. Explain how this helps absorption, using the idea of surface area. [2]