2 Cells and their membranes – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
organelles			
nucleus			
mitochondria			
chloroplasts			
surface-area-to-volume ratio			
phospholipid bilayer			
fluid mosaic model			
selectively permeable			

Recall

You already know that cells are the building blocks of life:

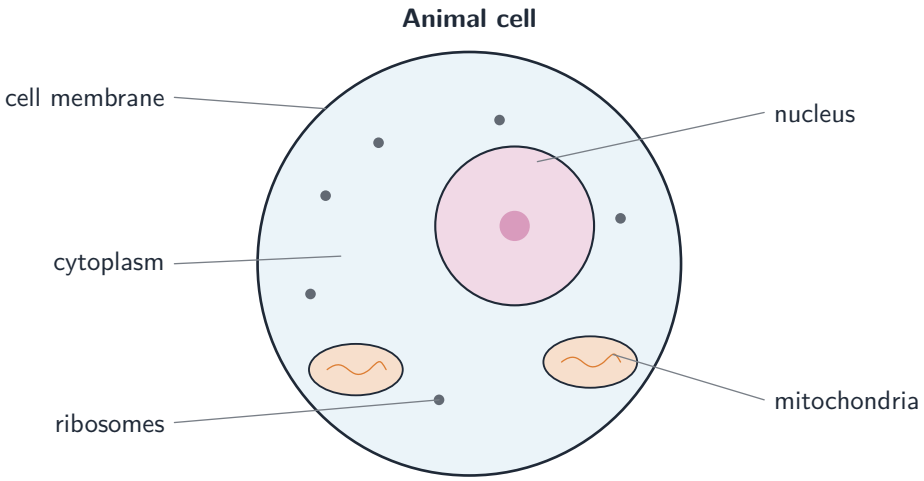
- You have seen animal and plant cells and named their parts.
- A **nucleus** holds the DNA; **mitochondria** release energy; plant cells have **chloroplasts**.
- A membrane surrounds every cell.

This sheet lines up cell structure for AP. Each idea has a short worked example.

New ideas

1 Organelles

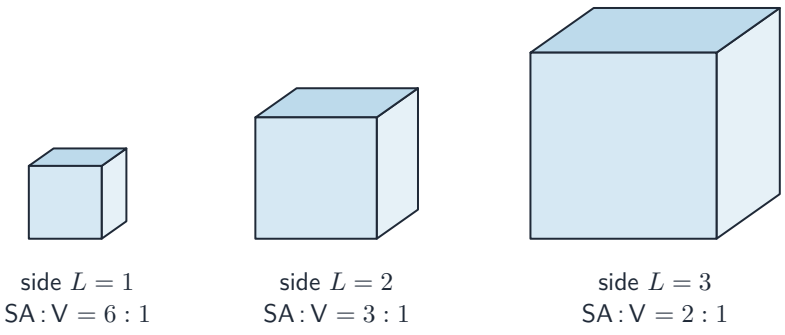
A cell divides its work among **organelles** :



- the **nucleus** holds the DNA,
- **mitochondria** carry out respiration (release energy),
- **chloroplasts** carry out photosynthesis (in plants).

2 Why cells stay small

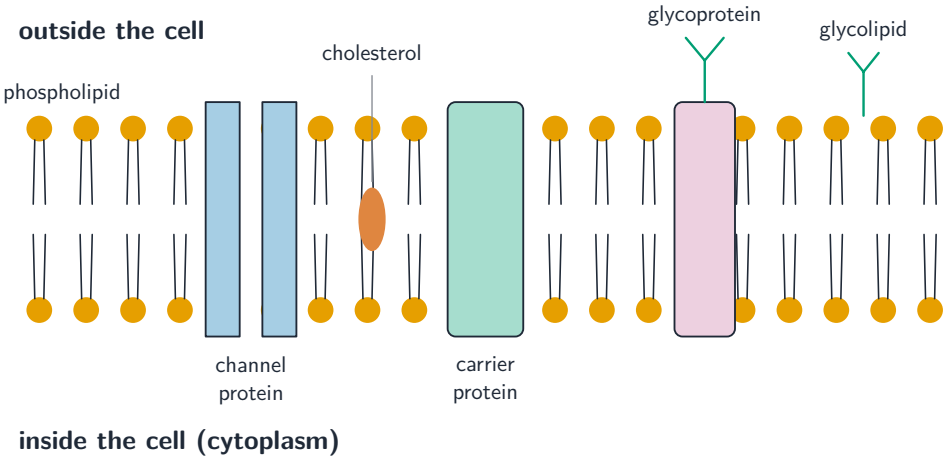
As a cell grows, its volume rises faster than its surface area, so its **surface-area-to-volume ratio** falls. A small cell has enough surface to exchange materials fast enough for its inside.



a bigger cube (or cell) has a **smaller** surface area : volume ratio

3 The cell membrane

The membrane is a **phospholipid bilayer** – a double sheet with water-loving heads outside and water-hating tails inside – studded with proteins. This **fluid mosaic model** pictures it as a fluid sheet in which the parts drift.



4 A selective barrier

The membrane is **selectively permeable** : small non-polar molecules pass easily, but large or charged particles need help. This lets the cell control what goes in and out.

Watch out: a bigger cell is worse at exchange, not better – its volume grows faster than its surface, so the surface-area-to-volume ratio drops and it cannot supply its interior fast enough.

Practice

Try these in order. The methods are all above.

2.1 State the job of (a) the nucleus, (b) the mitochondria. [2]

2.2 Explain why cells stay small, using the surface-area-to-volume ratio. [2]

2.3 Name the type of molecule that makes up most of the cell membrane. [1]

2.4 State what "selectively permeable" means. [2]

2.5 Name one organelle found in a plant cell but not an animal cell, and state its job. [2]