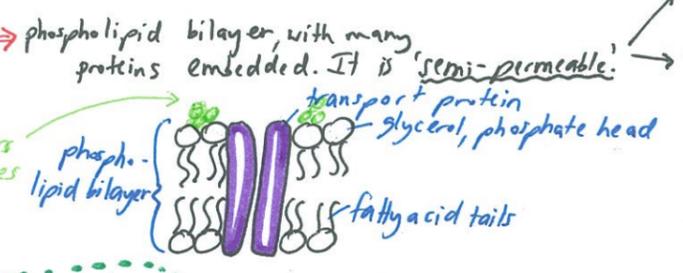
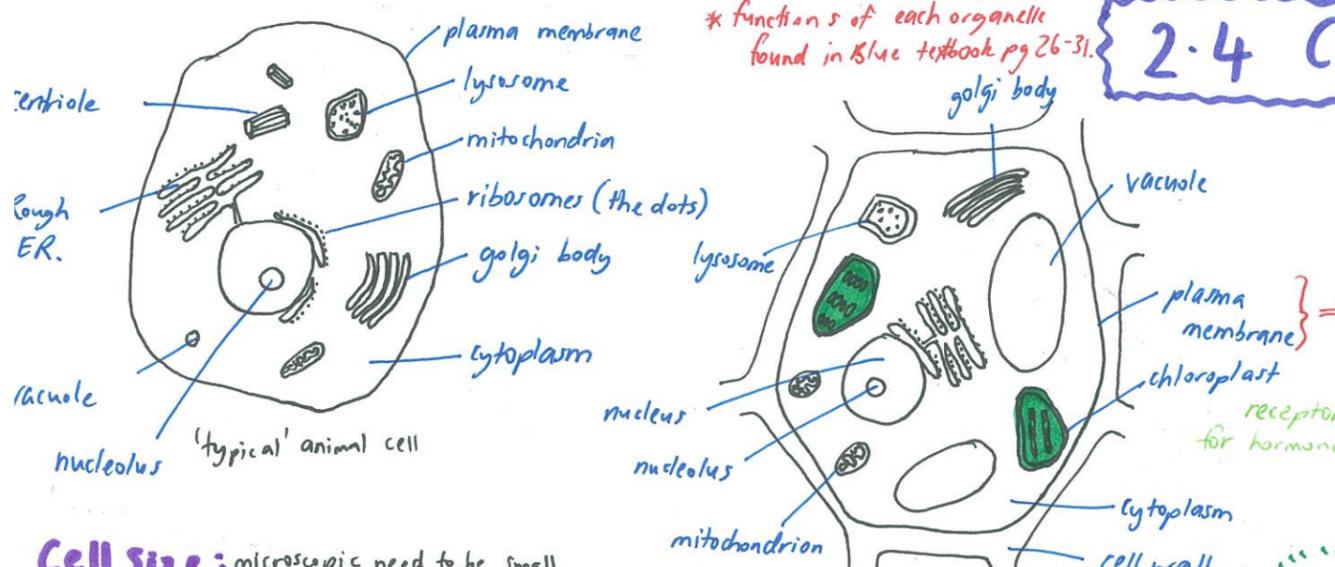
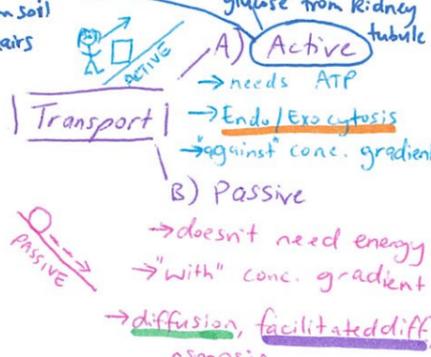


2.4 Cells

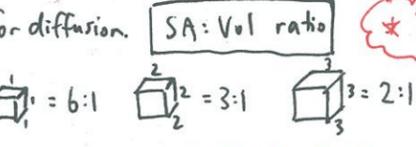
* structure always linked to function
 * Prokaryotes: found only in bacteria; cells lack defined nucleus, organelles not membrane-bound.
 * Eukaryotes (us!): found in all other organisms, cells have defined nucleus and membrane-bound organelles.



Freely pass = glucose, O₂, amino acids
 need to be broken down = proteins and carbs

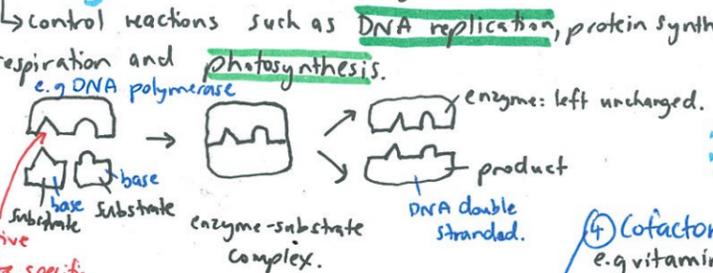


Cell size: microscopic, need to be small for diffusion.

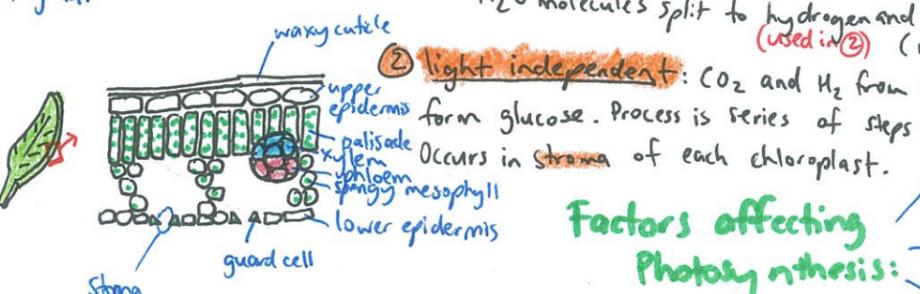
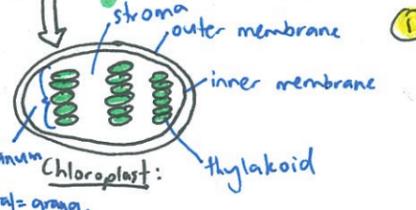
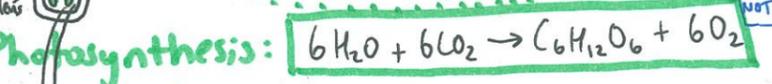


* ↑ cell size = ↓ SA:Vol ratio = ↓ diffusion efficiency.

Enzymes: proteins, made by ribosomes, biological catalysts, substrate specific.



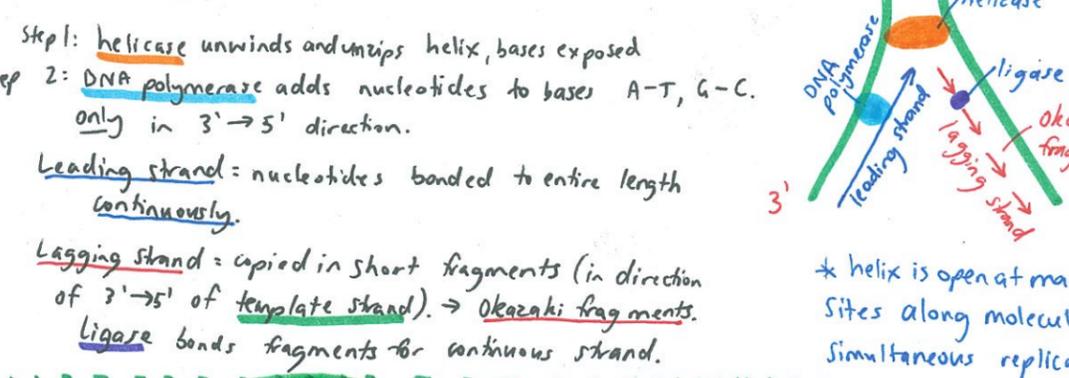
Factors affecting enzymes:
 1. Temp: Optimum = denatured, H-bonds broken, 37°C for humans.
 2. pH: mainly 7 if in cells, digestive enzymes exception (e.g., pepsin at pH=1).
 3. Concentration: ↑ conc. substrate = ↑ rate of reaction (until saturation).
 4. Cofactors: e.g. vitamins, help some enzymes.
 5. Inhibitors: poison e.g. Hg.
 Enzyme's tolerance: denatures if exceeds.



Factors affecting photosynthesis:
 1. Temperature: enzymes denature.
 2. Light intensity: something else limiting factor.
 3. CO₂ concentration: ↑ CO₂ = ↑ rate.



DNA Replication: essential so every new cell has same genetic code.
 → series of enzyme-controlled steps
 → needs ATP



Respiration: breakdown of glucose into usable chemical energy - ATP. Aerobic = O₂, Anaerobic = no O₂.
 + lactic acid, occurs in cytoplasm (glycolysis).
 + heat, occurs in matrix of mitochondria and cristae.
 Sugars → stored as starch in roots.
 used in respiration.
 Step 1: Glycolysis: Glucose → 2 pyruvate (cytoplasm)
 Step 2: Krebs Cycle: in mitochondria, CO₂ out, H⁺ produced.

Diffusion: random movement of particles in liquids and gases resulting in net movement of particles from high conc. to low conc. ("down" conc. gradient).

Facilitated diffusion: faster than simple diffusion, transport proteins provide channels - these are specific i.e. P450 can transport O₂ up to 1.8x faster than simple diffusion.

Osmosis: water movement across semi-permeable membrane; high water potential (high H₂O conc.) to low water potential (low H₂O conc.).

Endocytosis: taking in substances, removes part of membrane.
 Pinocytosis = fluids
 Phagocytosis = solids

Cytosis: movement of substances into or out of cells by folding of membranes.
Exocytosis: removal of substances e.g. enzymes or hormones, adds to membrane.

Mitosis: produces 2 daughter cells that are genetically identical. Allows growth and damaged cells to be replaced.
 Dividing cells cycle from Interphase → Mitosis → Interphase.

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP + heat$
 * 90% of time cells are in interphase... they grow, carry out life process e.g. protein synthesis, ATP production.
 * this occurs in all cells, all the time, sometimes anaerobically.
 Cells with large numbers of mitochondria: kidney tubules, muscle cells, liver cells.
 H⁺ bonds w/ O₂.