CELL STRUCTURE

Cytoplasm:	Living material that makes up a cell
	between solid-liquid (texture)
	made of many structures, can be seen in an electron microscope
	structures -> **organelles**
Nucleus:	largest organelle
Contains:	**chromosomes** (carry genes)
	important group of proteins:**enzymes** (control the chemical reactions in the cytoplasm)
Cell membrane:	thin layer
	forms a boundary between cytoplasm-outside
	chemicals can pass into and out -> membrane is **partially permeable**
	can go further & *control* the movement-**selectively permeable**
Mitochond-rion:	need a lot of energy (muscl-e/nerve cells)
	carry out reactions of **respir-ation**

- The DNA stays in the nucleus, proteins are carried to the cytoplasm, they are put together in **ribosomes**.

PLANT CELLS

Cell wall:	layer of non-living material outside the cell membrane
	made of **cellulose** (carbohyd-rate) -> helps the cell to keep its shape
Vacuole:	large central space surrounded by a membrane
	permanent feature of the cell
	filled w/ **cell sap** (store of dissolved sugars, mineral ions and other solutes)
Chloro-plast:	absorbs light energy to make food (photosynthesis)
	contains **chlorophyll** (green pigment)

ENZYMES: CONTROLLING REACTIONS IN THE CELL

- Chemical reactions are controlled by **enzymes**

- Enzymes are biological **catalysts**

- Catalysts: chemical which speeds up a reaction w/out being used up itself

- It takes part in the reaction, but then is unchanged and free to catalyse more

- Cells contain many different enzymes, each catalysing different reactions

genes -> proteins (enzymes) -> catalyse reactions

KEY POINT

Metabolic reactions: chemical reactions in a cell

Metabolism: sum of all the metaboloic reactions

Enzymes' function: catalyse these reactions

KEY POINT 2

In the intestine enzymes are covered onto the food to break it down -> *extracellular enzymes* (outside cells)

However, most enzymes stay inside cells and do their function there -> *intracellular*

KEY POINT 3

Secretion is the release of fluid/substances from a cell/tissue

Why are enzymes important?

- The temperatures inside the organisms are low

e.g-> human 37ºC, w/out catalysts the reactions would be too slow to allow life to go on

- Reactions only take place quickly enough when enzymes are ther to speed them up

ENZYMES 2

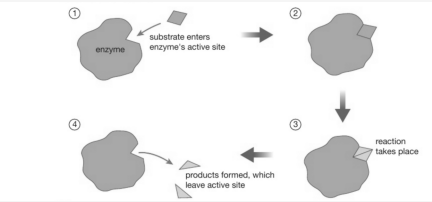
Substrate:	molecule that an enzyme acts on
Active site:	small area on an enzyme's surface
Lock and key model:	the substrate fits into the active site of the enzyme like a key fitting into a lock

ENZYMES 2 (cont)

a substrate will only fit into the active site of a particular enzyme

1- the substrate attaches to the active site of the enzyme
2- the reaction the takes place and products are formed
3- substrate joins up w/ the active site -> lowers the energy needed for the reaction to start, allowing the products to be formed easily

enzyme catalysing



TEMPERATURE

As the enzyme is heated up to the **optimum** temperature, the rise in temperature increases the rate of reaction.

↑ temperatures give the enzyme's molecules & substrate + kinetic energy -> they collide more often

+ collisions -> reaction will take place more frequently

KEY POINT
"Optimum" temperature means the "best" temperature (temperature at which the reaction takes place most rapidly)

TEMPERATURE 2

However, above the optimum, temperature has another effect

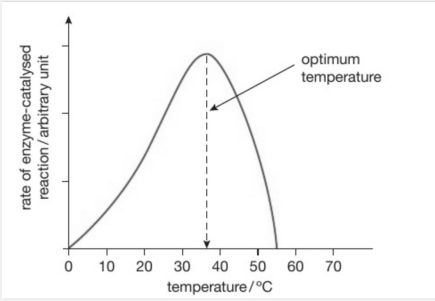
Enzymes are made of proteins-> proteins are broken down by heat

Denatured: ↑40ºC, heat destroys the enzyme

Denaturing changes the shape of the active site so the substrate won't fit into it

Denaturing's permanent- enzyme molecules won't catalyse the reaction

effect of t on the action of an enzyme



pH

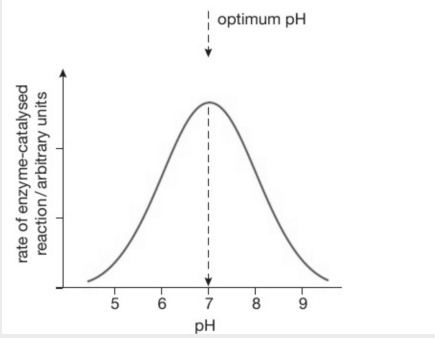
pH's inside cells is neutral (pH7) & most enzymes have evolved to work best at this pH.

at extremes of pH either side of neutral, the enzyme activity decreases (photo)

optimum pH: pH at which the enzyme works best

either side of the optimum, the pH affects the structure of the enzyme molecule & changes the shape of its active site-> substrate won't fit into it so well

pH figure



HOW THE CELL GETS ITS ENERGY

how does it get energy? ↓

respiration: break down food molecules to release the stored chemical energy that they contain

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oxygen: oxidise food

carbon dioxide & water: are released as waste products

glucose (sugar):main food oxidised, contains stored chemical energy that can be converted into other forms of energy

respiration releases **ATP**, can be used in ↓

-contraction of muscle cells (movement)

- active transport of molecules and ions

- building large molecules (proteins)

- cell division

reaction for respiration ↓ ↓

glucose + oxygen -> carbon dioxide + water (+energy)

$C^6H^{12}O^6 + 6O^2 \rightarrow 6CO^2 + 6H^2O$

⌙-> **aerobic respiration**