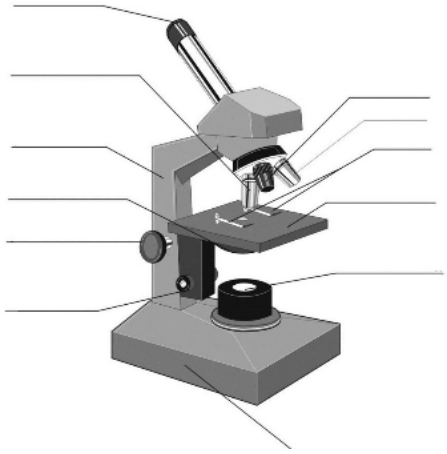
Microscopes;

The Light microscope allows you to view animal cells. It can magnify up to 1500 times. Some organelles such as mitochondria, chloroplasts, vacuoles, cell walls, cell membranes and nuclei are visible. Staining makes these organelles visible.

Label and annotate the diagram

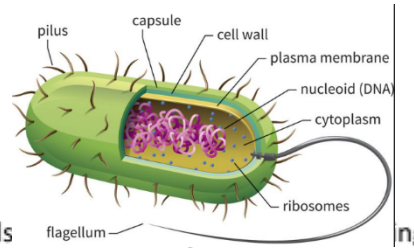


The electron microscope; invented in 1950s it allows a much higher magnification (500 000x) and better resolution, allowing greater detail to be seen. Electron microscopes allowed detailed ultrastructure of the cell to be seen, such as ribosomes and the inside of mitochondria and chloroplasts. The image is called an ELECTRON MICROGRAPH.

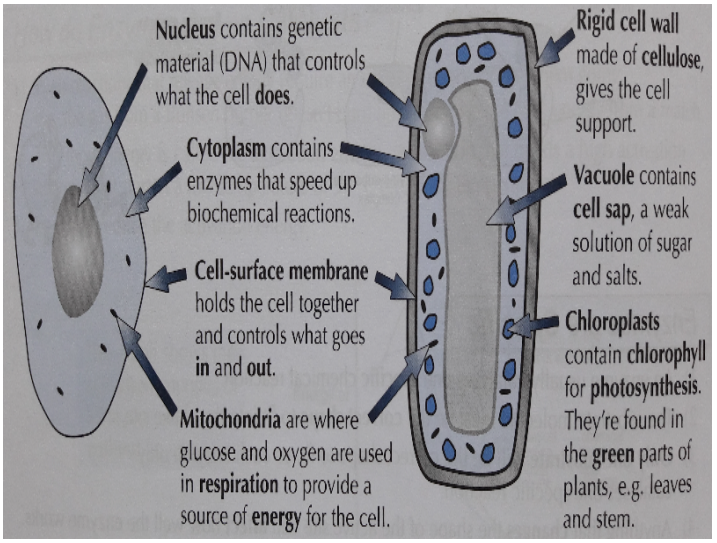
Eukaryotes and prokaryotes;

Prokaryotes are singled celled organisms such as bacteria.

Usually much smaller than eukaryotic cells (1/10th the size), do not contain a nucleus, chloroplasts or mitochondria, DNA can be found floating free in the cytoplasm or in loops called Plasmids, some have flagellum for movement.



Eukaryotic cells [illegible]ngle cellular or multi cellular organisms.



Questions;

Name 3 things visible with a light microscope in both animal and plant cells._____

_____

Name 4 organelles that both plant and an animal cell have. _____

_____

What is the calculation used to calculate the magnification of an object? _____

_____

What is the function of the mitochondria? _____

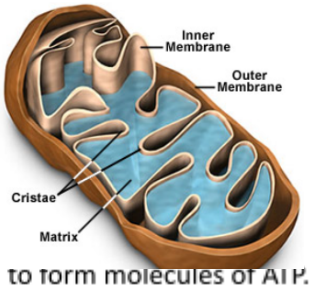
Cell structure;

Nuclei: controls the cell function, containing the DNA which is the coded information for the production of proteins.

During cell division the chromosomes become shorter and thicker and can be seen with a light microscope. The chromosomes will then make a copy of themselves, one copy for each cell produced during cytokinesis.

Nuclei have a double membrane called the nuclear envelope.

Mitochondria: can be seen with a light microscope, however, greater internal detail can be seen using an electron microscope.



The mitochondria's function is to carry out aerobic respiration. The energy released is used to form molecules of ATP.

ATP is used in the cells to provide energy for muscular contractions, active transport as well as anabolic and catabolic reactions.

Cell wall: the plant cell wall is made up of cellulose Molecules laid side by side to form microfibrils. These provides rigidity and support for the cell.

Questions;

Name 2 molecules that make up the cell membrane.

_____

Describe the membranes of the mitochondria.

_____

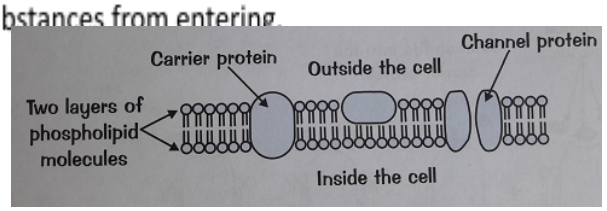
What is the name of the molecule that provide energy to the cell? _____

What term is used to describe water concentration?

_____

Cell structure;

Cell surface membrane: Found around every cell, it allows the movement of substances into and out of the cell. It is a partially permeable membrane and will prevent certain substances from entering.



It is made up of a double layer called the PHOSPHOLIPID BILAYER. These are molecules closely packed together in a mosaic pattern. Within the bilayer are large proteins which are also responsible for transport and for cell recognition.

Transport into and out of cells

There are 4 modes of transport you need to be aware of;

Diffusion: can be gas or liquid particles. They move from an area of high concentration to an area of low concentration down a concentration gradient. Small molecules such as oxygen, water and carbon dioxide can pass through the phospholipid bilayer.

Osmosis: occurs only with water. The water particles move from an area of high water concentration to an area of low water concentration, down a concentration gradient, across a partially permeable membrane. NO ENERGY IS REQUIRED. You will be required to refer to water potential in AS level not water concentration.

Facilitated diffusion: Some particles are too large to fit through the phospholipid bilayer and therefore require a carrier protein to assist. The protein carriers are within the bilayer and they change shape when they come into contact with a specific molecule (i.e. Glucose). NO ENERGY IS REQUIRED.

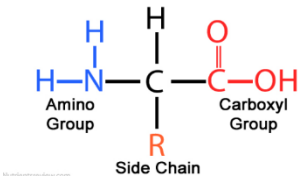
Proteins;

Proteins are made of long chains of amino acids, up to several hundred long. There are only 20 different amino acids and the combination of these 20 produce a wide range of complex proteins. Protein structures are held together with strong bonds called PEPTIDE bonds. The order of the amino acids determines the structure and how it works.

All amino acids have the same structure with one variation on the R group.

Contains; Hydrogen, oxygen,

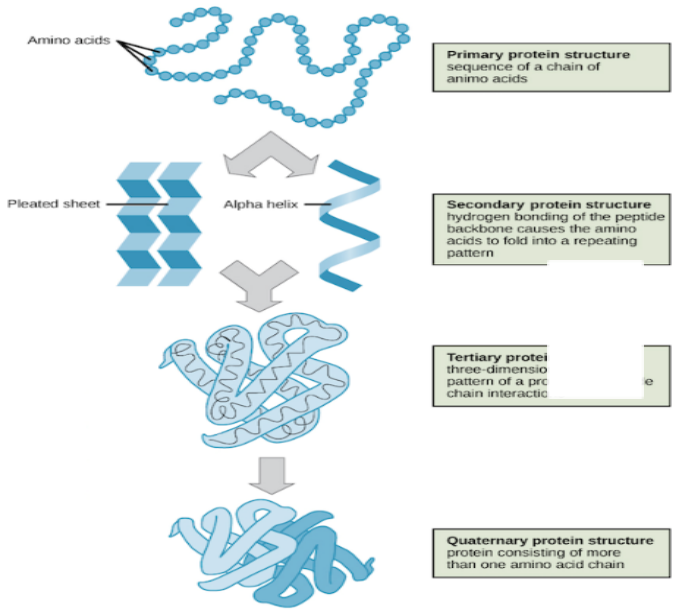
Nitrogen and carbon.



Proteins structure;

The order of the amino acids forms the PRIMARY STRUCTURE. The protein chain can then **coil** or **fold** into **pleats** which are held together by weak hydrogen bonds to for the SECONDARY STRUCTURE.

Enzymes have a further folding held together with stronger disulphide bonds. This is the TERTIARY STRUCTURE. If the structure is almost spherical it is called a **globular protein**.



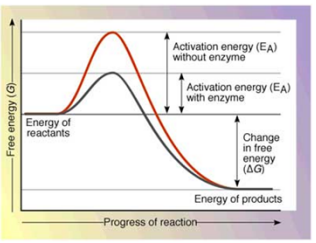
Enzymes; Help to speed up biochemical reactions.

Metabolism is the sum of all the biochemical reactions that occur per second and a single chain of these reactions is called a metabolic pathway.

Enzymes are biological catalysts and increase the rate of reactions.

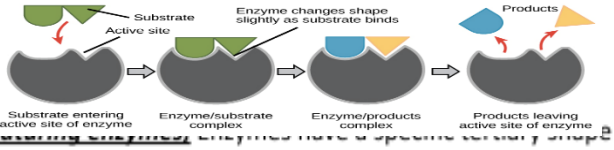
Reactions that release energy need an input energy to start.

The input energy is called the ACTIVATION ENERGY. Enzymes reduce the activation energy.



Enzymes are proteins; enzymes are globular proteins with a specific order of amino acids that determines what the enzyme does.

Enzymes can be catabolic (break substrates down) or anabolic (build substrates up). Enzymes have a specific site into which the substrates can attach itself, this attachment site is called the **active site.** The active site is **complementary** to the shape of the substrate. Once they attach together they form the **enzyme substrate complex**. The substrate then breaks bonds or makes bonds (depending on the type of enzyme) and the product leaves the active site. The active site is now able to accept another substrate.



Denaturing enzymes; Enzymes have a specific tertiary shape held in place by weak hydrogen bonds and stronger disulphide bonds. These bonds can be broken by an increase in temperature (kinetic energy) or a change in pH (H^+ in acid or OH^- in alkali disrupt the bonds).

Useful enzymes; Digestive enzymes are catabolic, breaking down food into smaller molecules. Enzymes are also needed in DNA replication, building up molecules (DNA polymerase).

Questions;

What types of bond hold together the secondary structure? _____ The tertiary structure? _____

How many amino acids are there and what elements are found in them? _____

Explain why denatured enzymes will not function. _____

_____

What is activation energy? _____