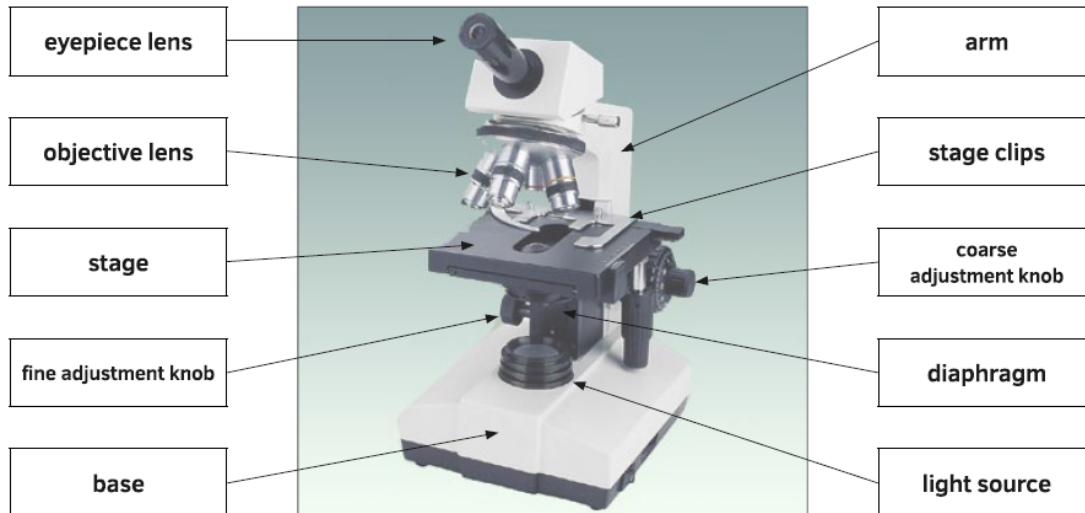


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Trilogy Biology Paper 1 FOUNDATION

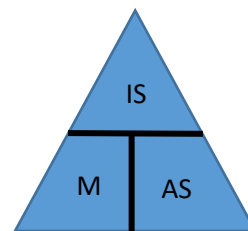
B1 Cell Structure and Transport

- Learn the parts of a microscope to use in the microscopy required practical



- Learn how to prepare a slide for the microscopy required practical
Peel a small amount of sample and place on a slide, add iodine to dye the sample. Place a cover slip over the top. Place under the light section of the microscope.
- Learn the equation for calculating the size of cells

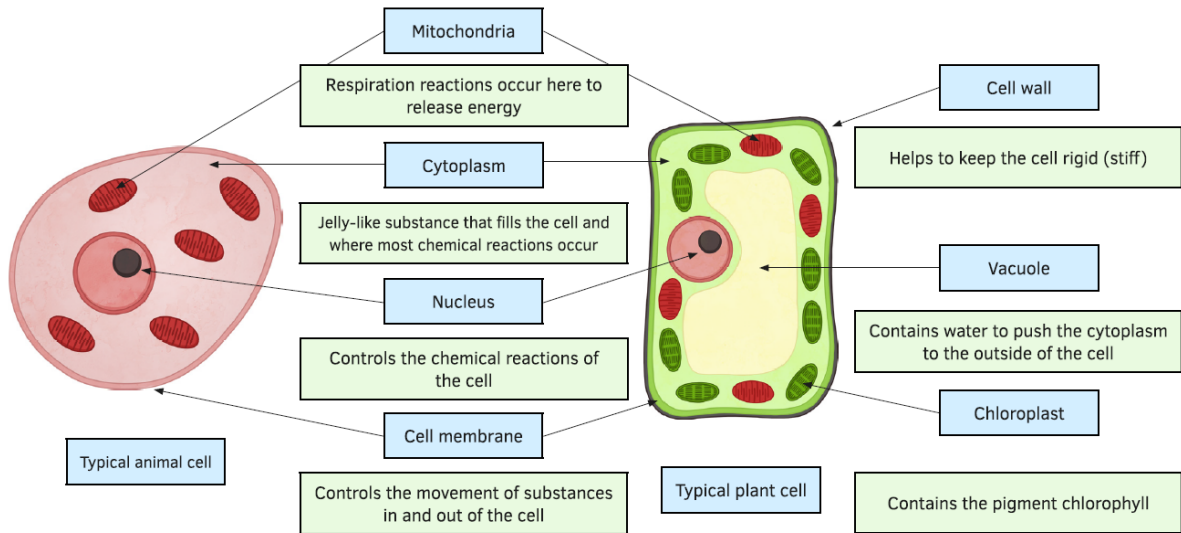
$$\text{Magnification (M)} = \frac{\text{Image Size (IS)}}{\text{Actual Size (AS)}}$$



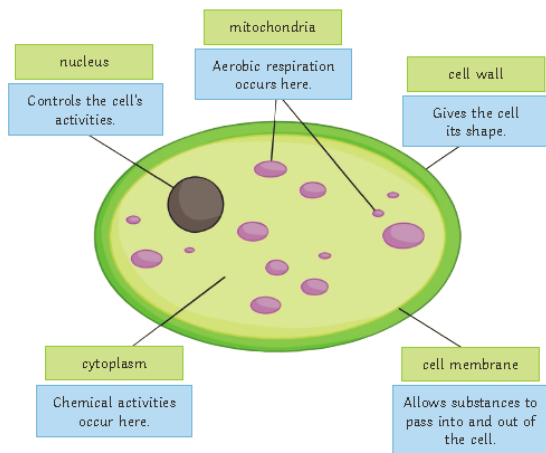
- Learn the structure and function of eukaryotic cells

Definition: Eukaryotic cells have membrane bound organelles.

Plant and Animal cells:



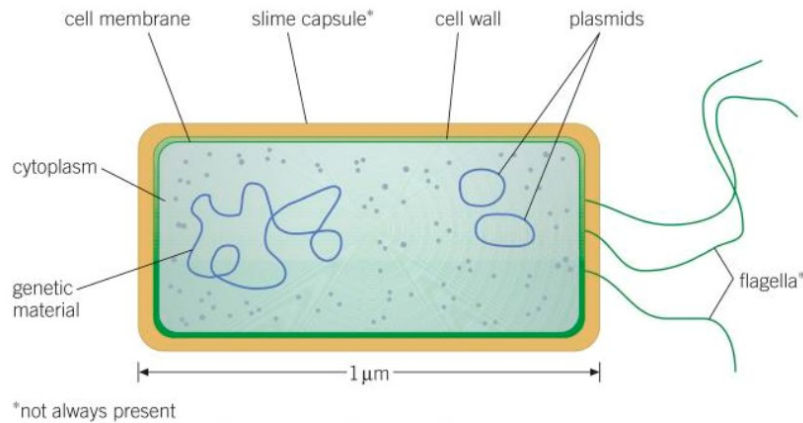
Yeast cells:



- **Learn the structure and function of prokaryotic cells**

Definition: Prokaryotic cells have DNA not bound in a membrane bound organelle (nucleus)

Bacterial cells:

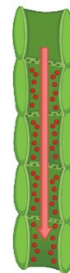


- **Learn the names of the transport vessels in plants**



Xylem transports water and mineral ions from the roots to the leaves.

Made of dead cells and strengthened with lignin.



Phloem transports starch molecules made by photosynthesis to wherever the molecules are needed by the plant.

Living cells that have companion cells (to provide energy) and made from cellulose.

- **Learn the definitions for the three types of substance transport**

Diffusion: The movement of a substance from a high concentration to a low concentration, down the concentration gradient.

Osmosis: The movement of water across a partially permeable membrane from an area of high concentration to an area of low concentration, down the concentration gradient.

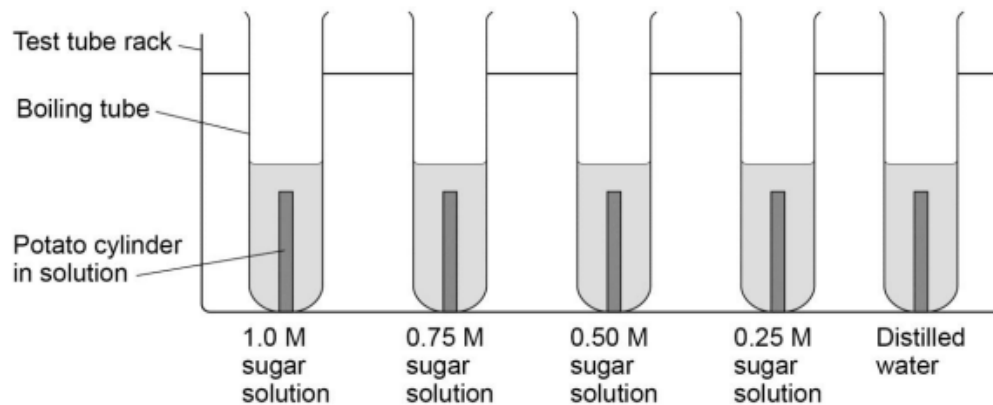
Active Transport: the movement of a substance from an area of low concentration to high concentration using energy, against the concentration gradient.

- **Learn the method for the Osmosis in potato cells required practical**

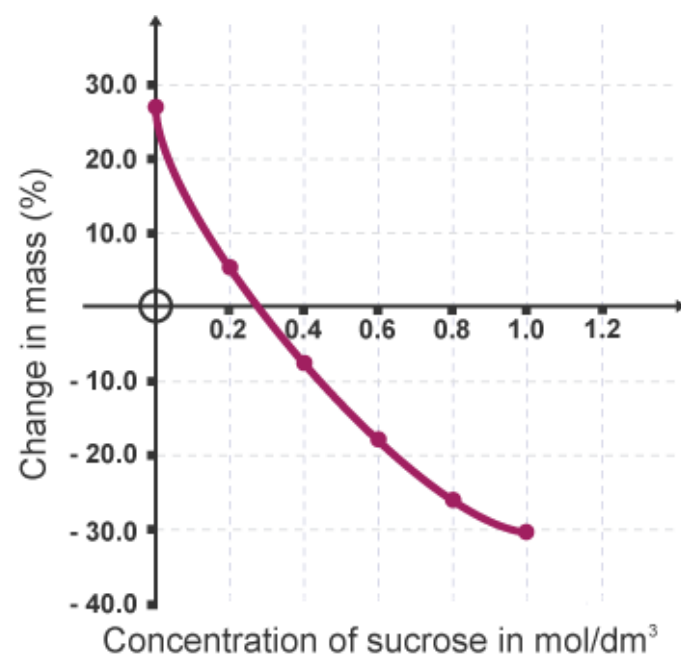
Aim: To investigate the rate of osmosis in different sugar solutions compared to potato cells.

Method 1. Use a cork borer to cut five potato cylinders of the same diameter. 2. Use the knife to trim off any potato skin on each potato cylinder. Then trim each potato cylinder so that they are all the same length. 3. Accurately measure the mass of each potato cylinder. 4. Accurately measure the length of each cylinder. 5. Record your measurements in a table like the one shown over the page. 6. Measure 10 cm³ of each concentration of sugar or salt solution and put into boiling tubes. Label each boiling tube clearly. 7. Measure 10 cm³ of the distilled water and put into the fifth boiling tube. Label the boiling tube clearly. 8. Add one potato cylinder to each

boiling tube. 9. Leave the potato cylinders in the boiling tubes for a chosen amount of time. 10. Remove the potato cylinders from the boiling tubes and carefully blot them dry with the paper towels. 11. Measure the new mass and length of each potato cylinder again. Record your measurements for each concentration in your table.



- Learn what the results mean in the osmosis required practical

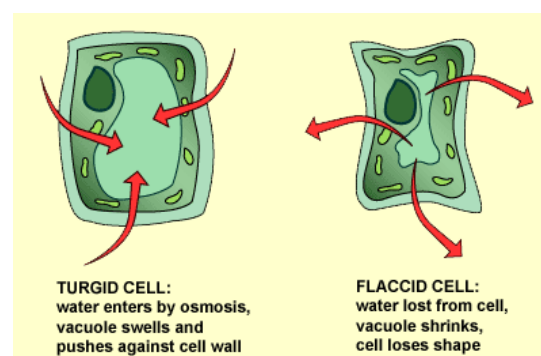


Mass of the chip goes up because the concentration of sugar/salt solution is weaker than that inside the chip. The water moves in by osmosis.

If there is no change in mass the concentrations of the sugar/salt solution is the same as that inside the chip.

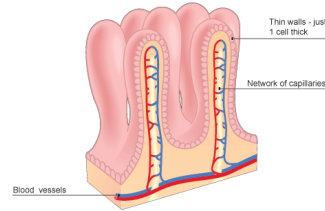
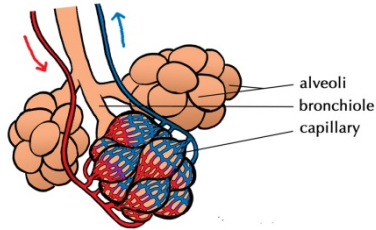
Mass of the chip goes down the concentration of sugar/salt is stronger than that in the chip. Water moves out of the cells by osmosis.

- Learn what turgid and flaccid cells look like



- Learn why a high surface area is an advantage

Alveoli in the lungs and villi in the small intestines are highly folded. They have a large surface area for fast diffusion. Oxygen diffuses quickly across the alveoli walls in to the blood. Nutrients diffuse from the small intestine in to the blood across the villi.



B2 Cell Division

- Learn the definition of mitosis and meiosis

Mitosis: Cells, usually any body cells, divide to produce two identical daughter cells.

Meiosis: Cells, gametes, divide to produce cells with half the chromosome number.

- Learn the steps of cloning plants through taking cuttings

- 1) Take off shoots of the plant
- 2) Dip the ends of the plants in rooting powder that contain growth hormones (auxin)
- 3) Allow the roots to grow in water
- 4) Plant the large amount of plantlets in pots
- 5) Each plantlet is a clone of the parent plant



- Learn the definition for the two types of stem cells

Stem cells: Cells that can differentiate into different types of cells by switching certain genes on or off.

Embryonic stem cells: Stem cells that differentiate into any different cell types after the eight cell stage in an embryo.

Adult stem cells: Stem cells that can differentiate into some cell types needed in the human body.

B3 Organisation and the Digestive System

- Learn what nutrients are used for in the body

Nutrient	Made of small repeating units of...	Used in the body for?	Foods
Protein	Amino Acid	Growth and repair	Meat and fish
Lipids (fat)	Glycerol and fatty acids	An energy store	Oils, butter
Carbohydrate	Sugars	Used to create energy in respiration	Bread, pasta, rice

- Learn how to test for different nutrients in the required practical

Aim: To test for different nutrients in food

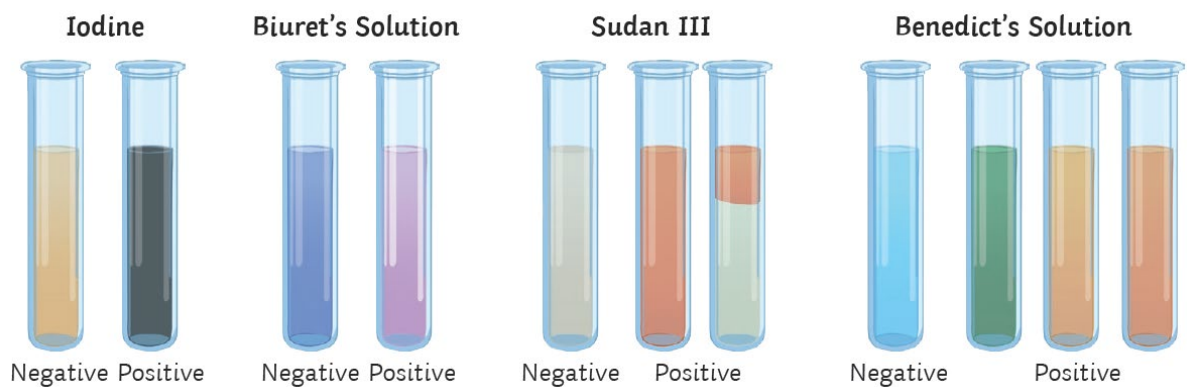
Testing for starch – Add Iodine to the food

Testing for sugars – Add Benedict's solution and put in a water bath for 5 minutes

Testing for Protein – Biuret Solution and shake

Testing for fats – Add Sudan III solution

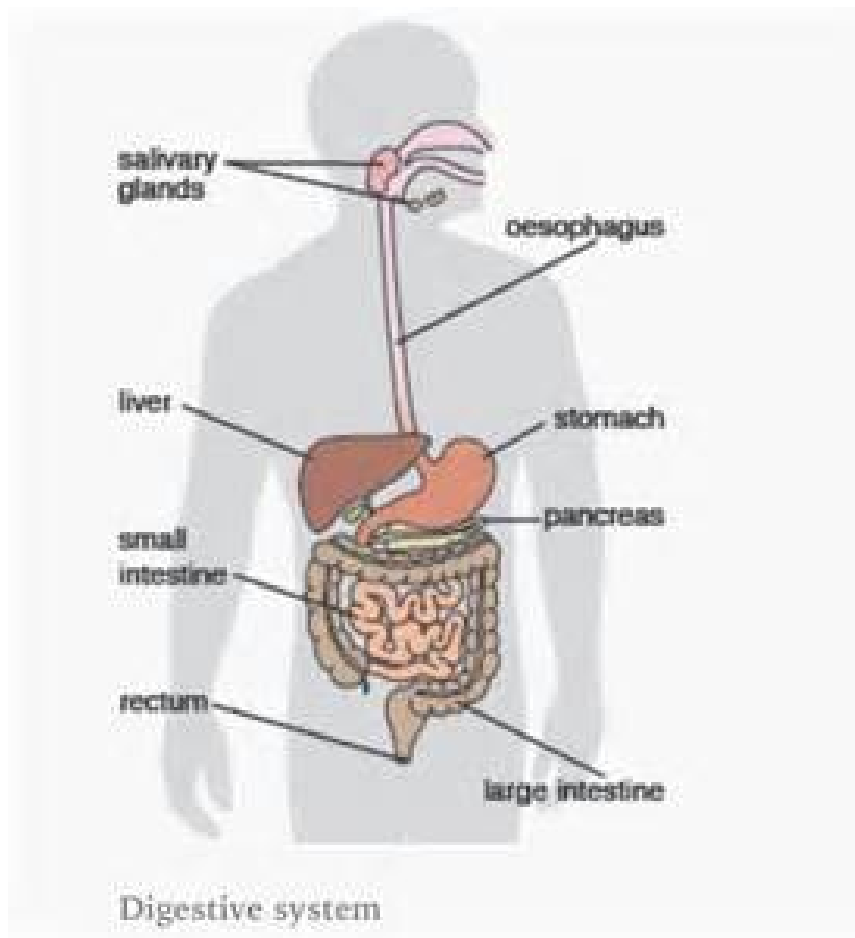
- Learn positive and negative results for the required practical



- Learn the name of the three main enzymes and what they do in digestion

Enzyme name	Substrate	Product
Protease	Proteins	Amino acids
Lipase	Fats	Lipids and glycerol
Amylase	Carbohydrates	Sugars

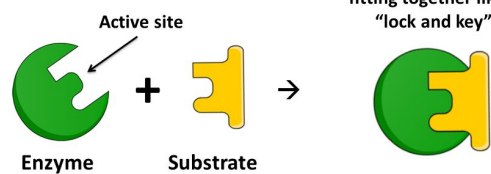
- Learn the parts of the digestive System



- Understand the lock and key model for enzymes

Enzymes

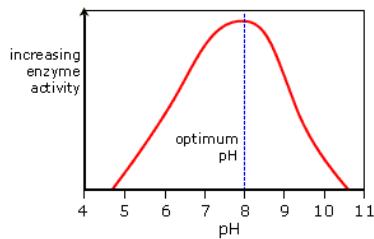
(Lock and key model)



Substrate and enzyme fitting together like a "lock and key"

We use the "Lock and Key" model to demonstrate how enzymes and substrates fit together. Each enzyme fits specifically to a certain substrate. For example Lipase fits together with lipids to break them down

- Understand that enzymes work best (at the fastest rate) at their optimum conditions

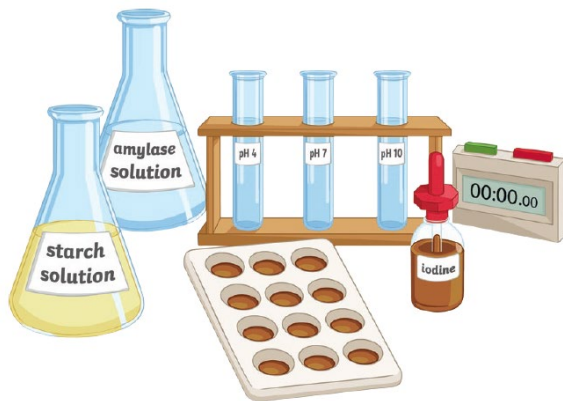


Enzymes are biological catalysts that break down nutrients in to their smaller repeating units. The peak shows the fastest activity of the enzyme, this is the optimum activity.

- Describe how to carry out the enzyme required practical

Aim: To find the optimum pH that amylase breaks down starch.

- Heat your water bath to 35°C.
- Put the test tubes of starch, amylase and different pH buffers in the water bath.
- While the solutions are reaching the required temperature, put one drop of Iodine solution into each depression on your spotting tile.
- When all the tubes have reached 35 °C take one of the tubes of starch from the water bath and add the 2cm³ of your first pH buffered solution. Stir the mixture with a glass rod.
- Use the pipette to add 2 cm³ of amylase solution to the mixture. Start the stopclock as soon as you add the amylase. Keep stirring the mixture with the glass rod.
- After 10 seconds, remove one drop of the mixture with a glass rod.
- Put this drop on the second depression of your spotting tile.



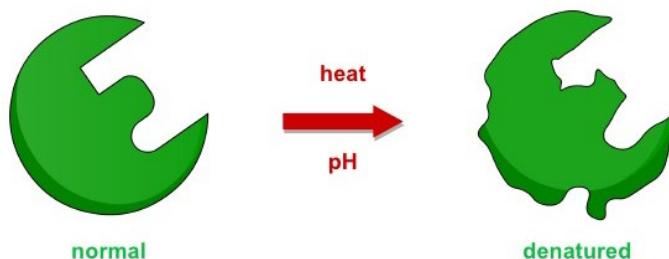
2. Describe what the results mean

The faster the iodine doesn't turn black means the starch is being broken down faster by the enzyme. Some pH's may not break down the starch, so the iodine keeps going black when the solution has been added, because the enzyme has been denatured.



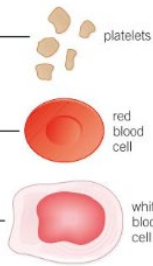
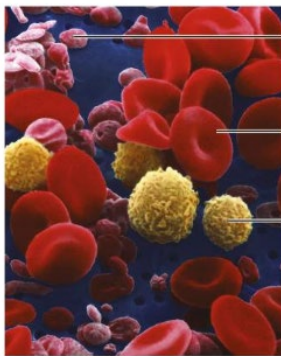
You can see this took six spotting times to no longer go black, that is 60 seconds.

- Describe what happen to an enzyme at high temperatures and extreme pHs



B4 Organising Plants and Animals

- Learn the three main parts of the blood

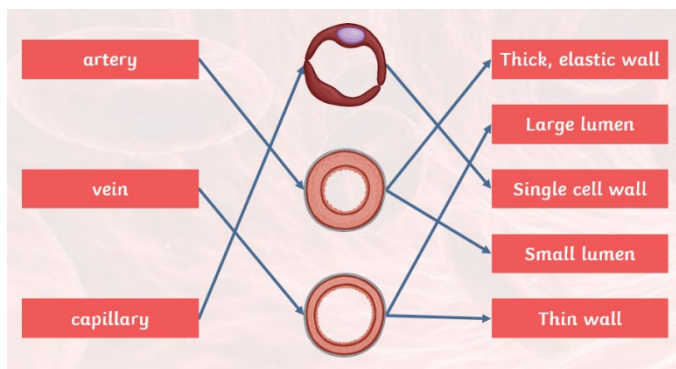


Platelets and fibrins help blood clotting

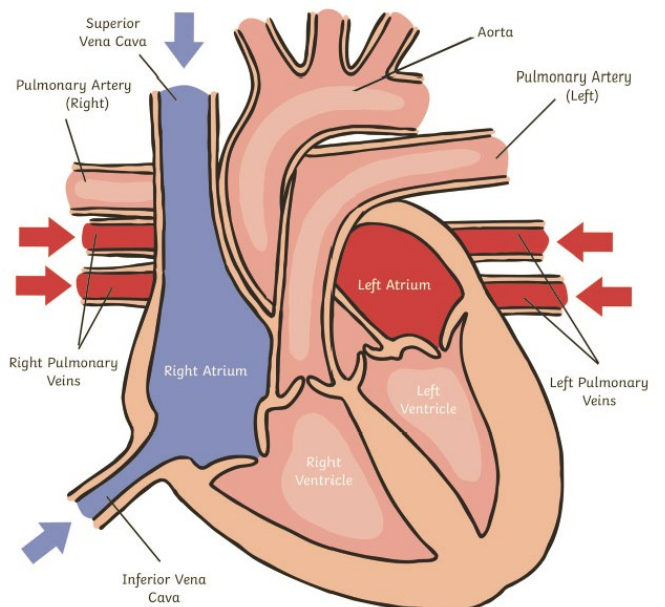
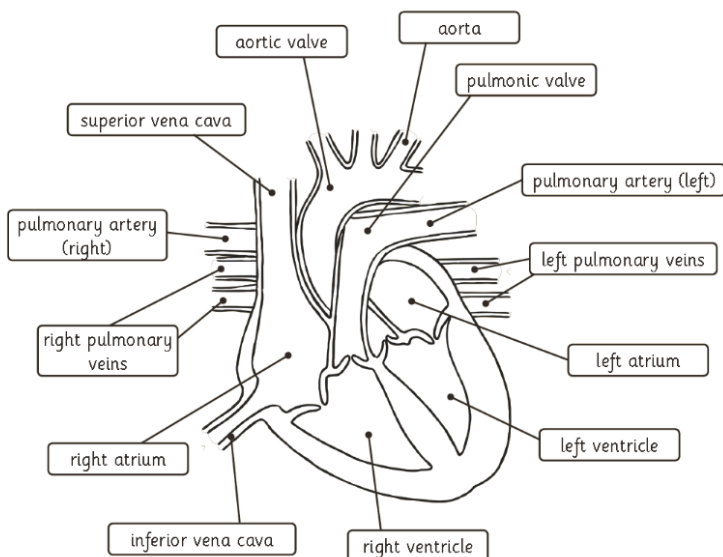
RBCs transport oxygen around the body

WBCs protect the body from pathogens

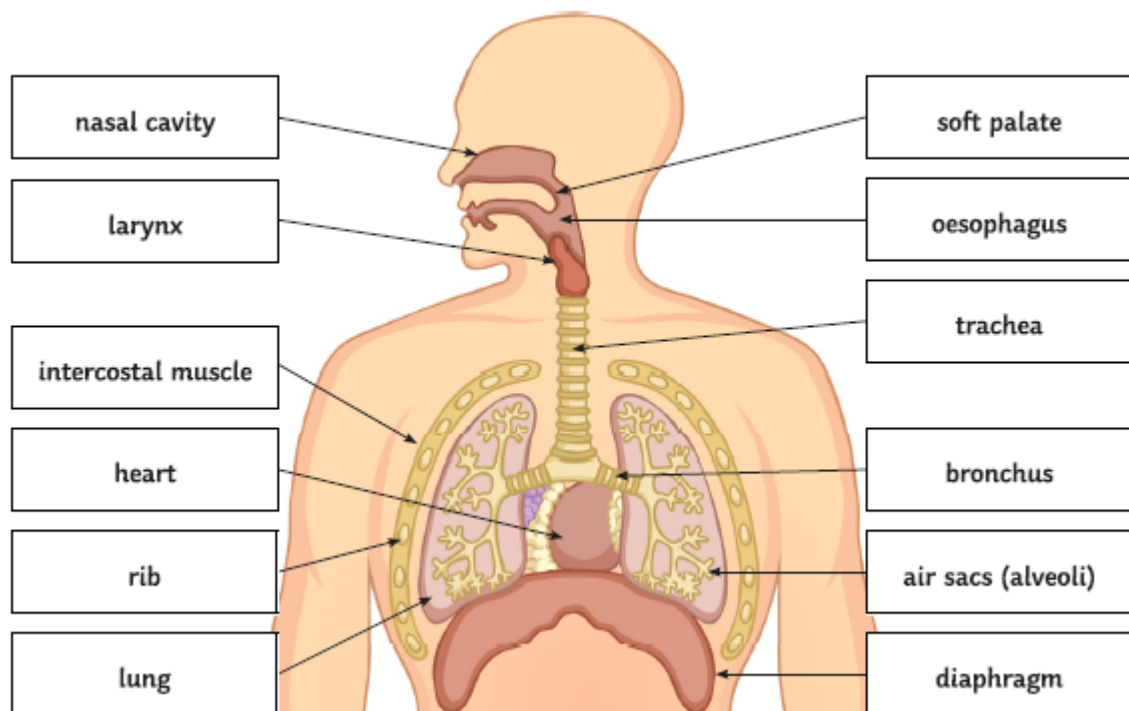
- Learn the three types of blood vessels



- Learn the structure of the heart (two diagram to show different aspects)



- Learn the parts of the respiratory system

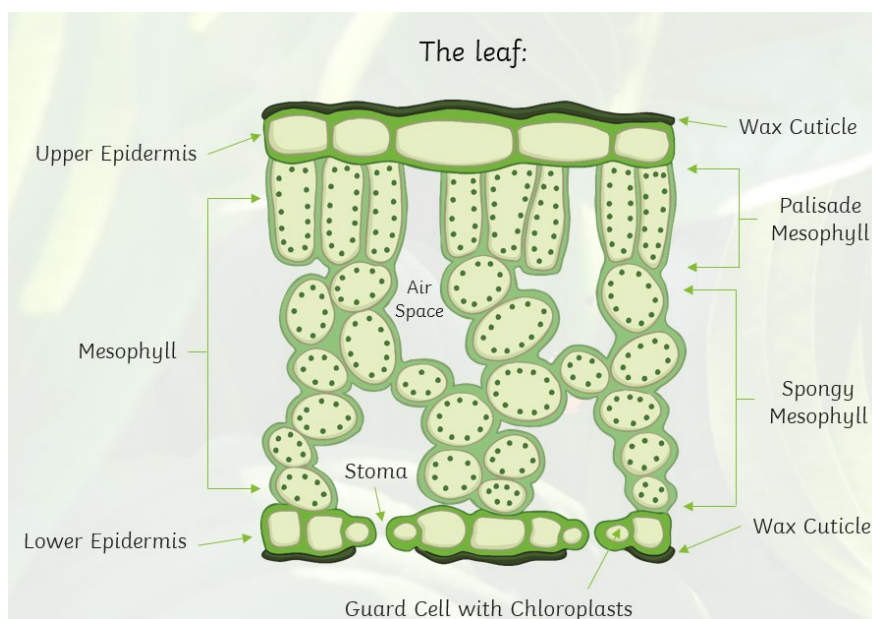


- Learn the process of inhalation and exhalation

Inhalation: The diaphragm flattens and moves down, the ribs move out increasing the volume of the lung and lowering the pressure inside. The difference in pressure forces air in.

Exhalation: The diaphragm curves and moves up, the ribs move in decreasing the volume of the lung and increasing the pressure inside. The difference in pressure forces air out.

- Learn the structure of the leaf



B5 Communicable diseases

- Learn to describe the four main pathogens

Communicable Diseases: Illness caused by pathogens that can be passed on to other organisms.

Pathogen	How they reproduce	How they make you feel ill	Examples
Bactria (Bacterium)	Binary fission (mitosis)	Produce toxins that travel round the body in the blood	Animals: Salmonella, Gonorrhoea Plants: Relatively few
Viruses (Virus)	Get inside cells and use the cell structures to reproduce	Burst cells open following the reproduction of lots of viruses	Animals: HIV/AIDS, Measles, Flu Plants: Tobacco Mosaic Virus
Fungus (Fungi)	Produce spores that spread and grow (similar to seeds)	Various	Animals: Athlete's foot Plants: Rose Black Spot
Protists (or protozoa)	Binary fission (mitosis) in a vector (usually)	Various	Animals: Malaria

- Learn some basic parts of the non-specific immune system

The non-specific immune system: The body's defences that stop pathogens from entering the body e.g. acidic tears, acidic stomach, ciliated cells in the respiratory and reproductive systems, eye lashes and eyebrows, skin, clotting factors (platelets and fibrins).

- Learn the three main roles of the white blood cells

The specific immune system: The bodies defence to specific pathogens.
The white blood cells produce antitoxins, produce antibodies and engulf pathogens.

- Learn what happens when you become infected with a pathogen (e.g. chicken pox, flu, cold)

The pathogen enters the body.

Some white blood cells produce antibodies with a specific shape the pathogen however this takes time and can often be after you are feeling unwell.

The white blood cells then engulf and digest the pathogens.

These antibodies are stored in memory cells.

They can be produced quickly if you become re-infected with exactly the same pathogen so you don't become unwell.

B6 Preventing and Treating Disease

- **Learn what drugs treat**

Painkillers do not kill any pathogen they only treat symptoms.

Antibiotics prevent bacteria growth.

Antiviral drugs treat viruses.

- **Learn why viruses are difficult to treat**

They replicate inside the cells of the host and antibiotic and most other drugs cannot get inside the cell without damaging it.

- **Learn how vaccines build immunity**

They inject you with inactive pathogens.

The white blood cells produce antibodies.

The antibodies are stored in the memory cells.

The antibodies can be used quickly if the person becomes re-infected.

- **Learn the stages of a drug trial and why these stages are important.**

1) Tested on cell in the lab	Look for initial changes in the cells and how they react
2) Test on animals	Look for side effects and any changes in behaviour
3) Test on a large amount of healthy volunteers with a small dose	To look for side effects, allergies, and how the drug reacts if people are also on other medication
4) Test on people with the condition	To check the drug works and what dosage is needed

- **Learn the stages of a drug trial and why these stages are important.**

Placebo – Fake drug that looks the same but contains no chemical

Often trials are designed so some people receive the drug being trialled and some people receive the placebo. This is to check the results and avoid BIAS.

Open Trial – Everyone knows who is receiving the drug and the placebo

Blind trial – Only the doctors and nurses know who is receiving the drug and the placebo

Double Blind Trial – Only one person at the top who is receiving the drug and the placebo.

- **Learn how antibiotics were discovered**

Alexander Fleming discovered penicillin by accident.

He went on holiday and left some petri dishes with bacteria on them out on the lab bench.

When he came back he noticed fungi had grown and stopped the bacteria growing in certain area of the plate. They produced a chemical that killed the bacteria.

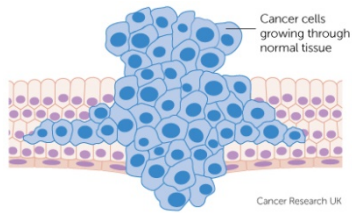
We now use fungi (mould) to produce antibiotics that kill bacteria for us.

B7 Non-Communicable Disease

- **Learn the definition for non-communicable disease**

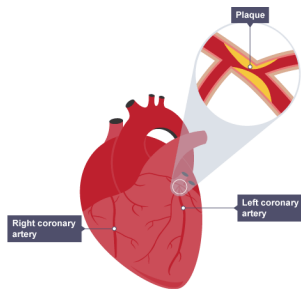
Disease or condition that is not transmitted (spread) between people. e.g. cancer, heart disease, conditions related to smoking, type 2 diabetes, cirrhosis of the liver.

- **Learn what cancer is and why malignant tumours are more dangerous**



Cancer is uncontrolled growth of the body cells. Benign tumours do not spread around the body. Malignant tumours can spread in the blood to form secondary tumours.

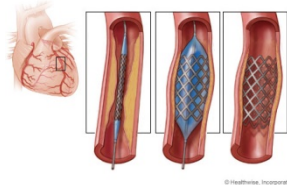
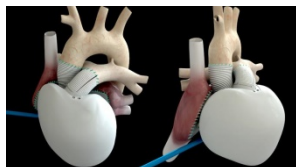
- **Learn what coronary heart disease is**



This is caused by risk factors such as poor diet, lack of exercise, fatty foods, smoking and drinking too much. Some people are more likely to get it because of their genes. But it cannot be caught, so it is a non communicable disease.

- **Learn some ways to treat coronary heart disease**

Artificial hearts – temporary Stents – widen vessels Statins – reduce cholesterol

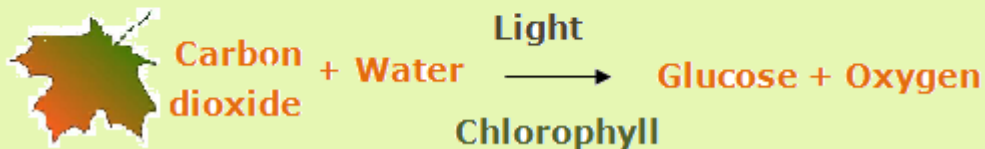


B8 Photosynthesis

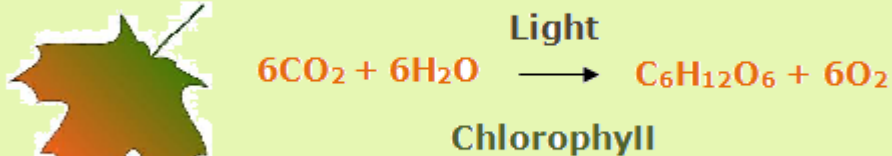
- Learn the structure of a plant cell and what each do (PAGE 1)
- Learn the equation for photosynthesis

Photosynthesis

Word equation



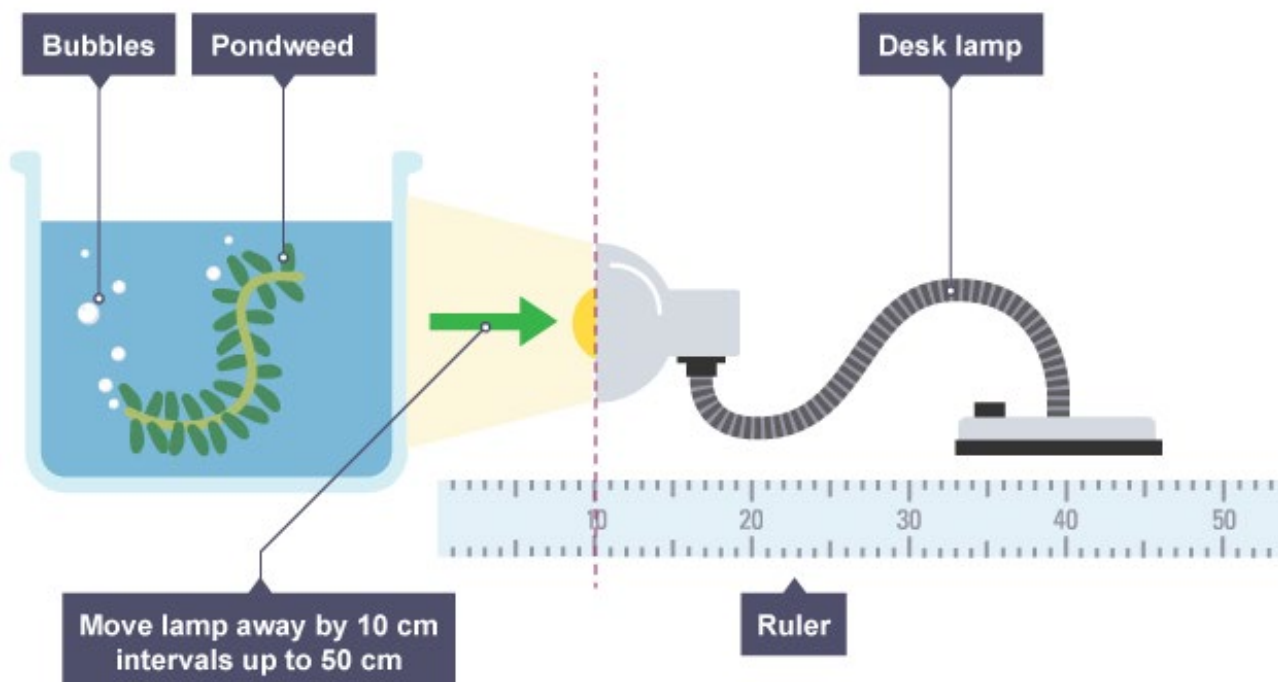
Symbol equation



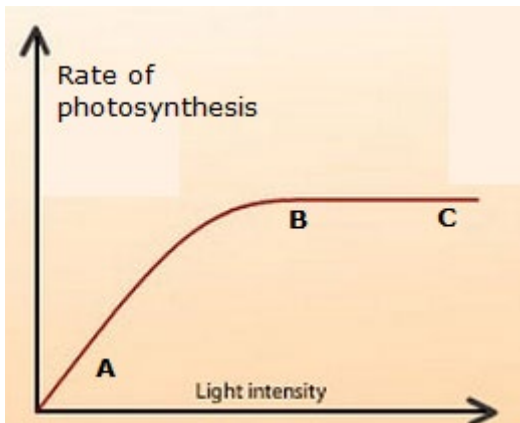
- Learn the method to complete photosynthesis required practical

Aim: To investigate how the distance from light affects photosynthesis

Method: 1. Set up equipment and measure the distance from the pondweed container to the light. 2. Count the number of oxygen bubbles given out for one minute. 3. Gradually move the ruler closer and repeat.



- Learn the what results mean from the photosynthesis required practical



The closer the light gets, the more oxygen bubbles should be coming off. This is because the more light the more photosynthesis is happening. This will increase up to a point, then won't increase anymore because something else is limiting photosynthesis.

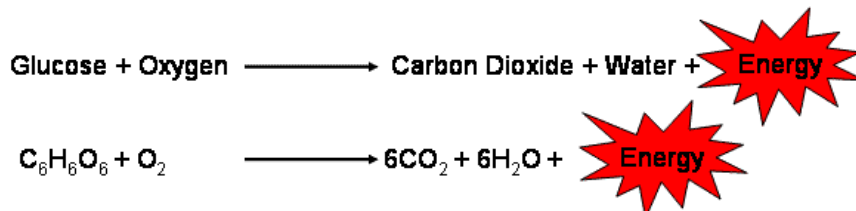
- Learn the limiting factors for photosynthesis

These limit the amount of photosynthesis and therefore the growth of the plant.
Light intensity, Carbon dioxide, temperature and the amount of chlorophyll within the leaf.
The more of all these things there are the more photosynthesis.

B9 Respiration

- Know when aerobic respiration and the equation for it

Aerobic respiration is making energy with oxygen inside cells.



- Know when anaerobic respiration and the equation for it

Anaerobic respiration is making (less) energy without oxygen.

