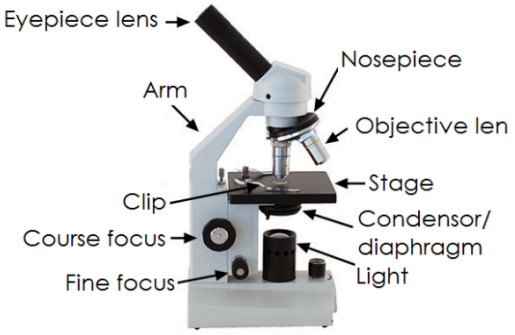
Cells

1 - Microscopes

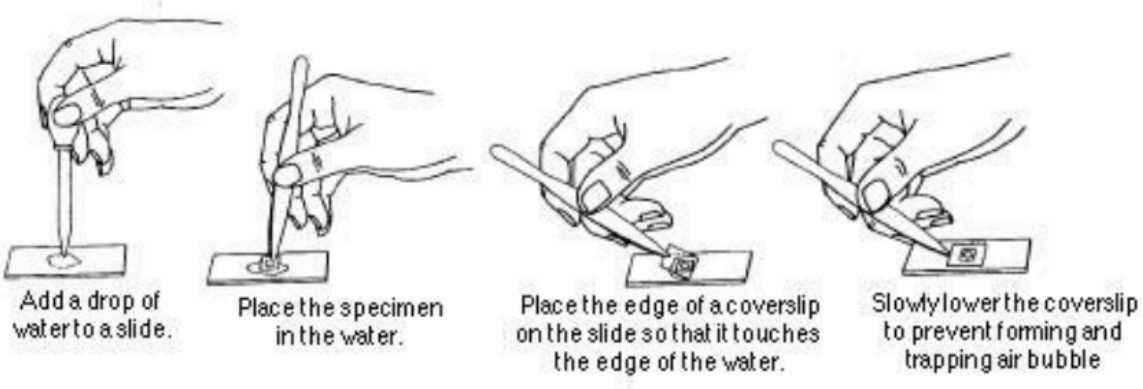
All living organisms are made up of tiny units called **cells**. Cells are so small that they cannot be seen with the naked eye.

The parts of the microscope and their functions



Key Part	***Function***
Eyepiece lens	To magnify the image
Objective lens	To magnify the image
Stage	Where the slide with the 'material' is placed
Coarse and fine focus dials	Focuses the image to make it clear
Light	Provides light which shines through the material.

Preparing Slides



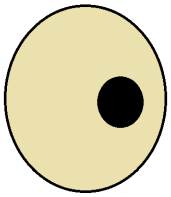
Calculating magnification

To work out the total magnification of the microscope you do the following …

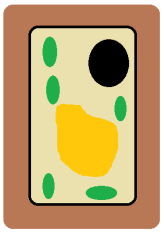
Magnification of eye-piece lens x Magnification of objective lens used

2 - Plant and Animal Cells

Which cell is the **animal cell,** and which is the **plant cell**?



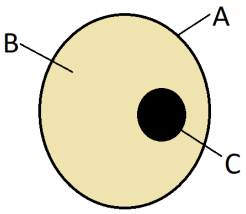
Cell A



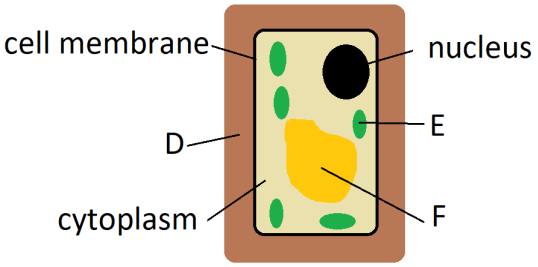
Cell B

Cell A	Animal Cell
Cell B	Plant Cell

Parts of the Cell



A	Cell Membrane
B	Cytoplasm
C	Nucleus
D	Cell Wall
E	Chloroplast
F	Vacuole



Cell part	***Function***	***Cell type found in***
Nucleus	Controls cell activity and contains the genes.	Both
Cytoplasm	Site where chemical reactions occur.	Both
Cell Membrane	Controls what substances can enter or leave the cell.	Both
Vacuole	Stores cell sap.	Plant
Cell Wall	Provides support.	Plant
Chloroplast	Site of photosynthesis.	Plant

3 - Specialised Cells

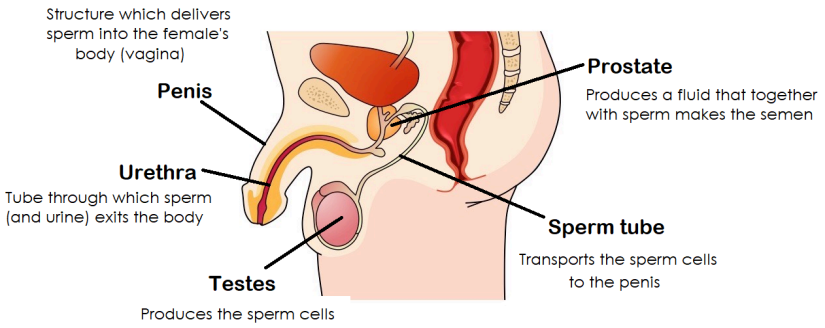
Specialised cells have different features to enable them to perform different functions.

Cell Type	Feature and Function
Sperm Cell	Tail so it can swim
Red Blood Cell	Flat disc shape with a large surface area which allows them to absorb as much oxygen as they can
Egg Cell	Contains extra nutrients for growth
Nerve Cell	Thin to carry messages up and down the body over large distances very quickly

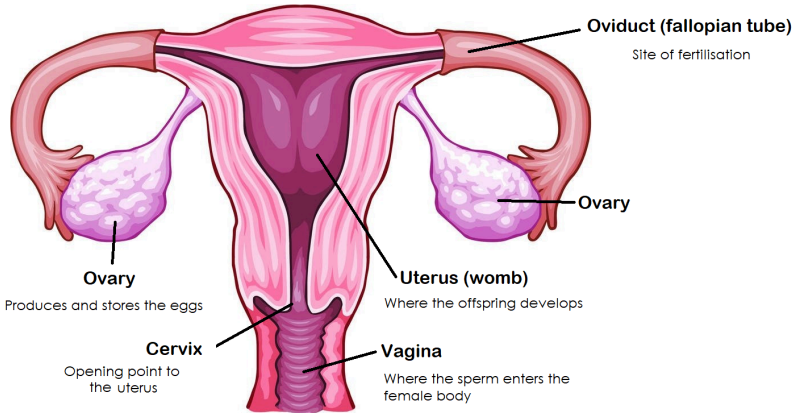
4 - Fertilisation

The cells involved in reproduction in humans are the sperm and egg. They are called the sex cells or gametes.

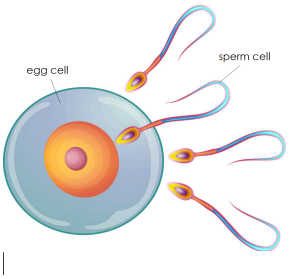
The key parts of the male reproductive system and their functions are shown in the diagram below.



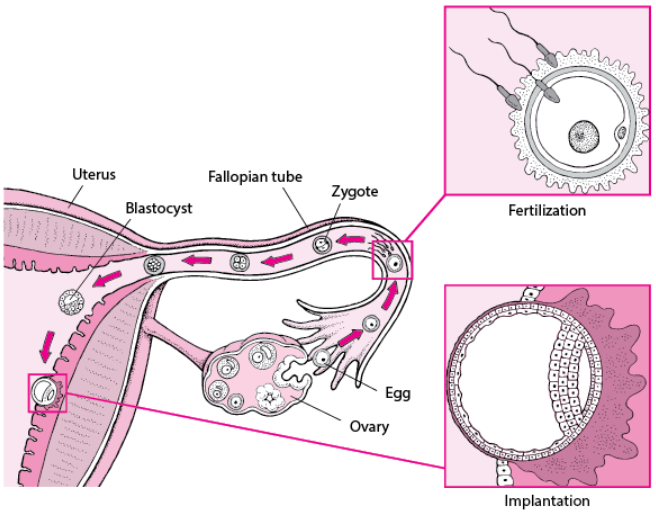
The key parts of the female reproductive system and their functions are shown in the diagram below.



During sexual reproduction in humans the nucleus of the sperm and the nucleus of the egg fuse together to form a new organism. This is called fertilisation.



Fertilisation occurs in the female's **oviducts** (fallopian tubes).



Once the egg is fertilised it is called a **zygote**. The zygote travels down the oviduct to the uterus, dividing into a ball of cells as it travels.

Once in the uterus it **implants** into the uterus wall where it develops into a new human being over the next 9 months.

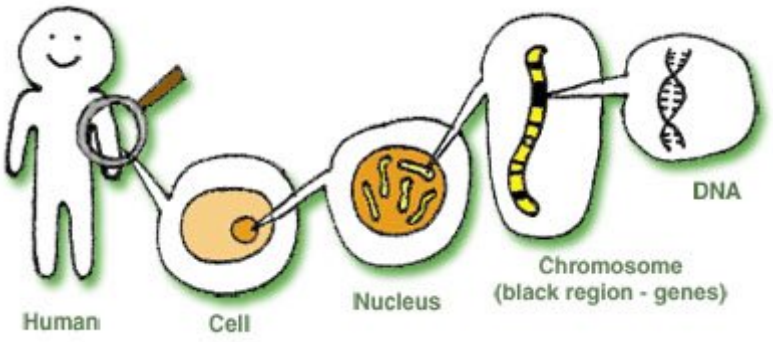
5 - The Role of Genes

Examples of Inherited Characteristics In Humans:	Examples of Inherited Characteristics in Animals
• Eye colour • Hair colour (but not dyed hair) and texture • Skin tone • Blood group (A, B, AB, O) • If you get freckles • Colour blindness • Dominant hand • Dimples • Earlobe attachment • Hairline shape • If you can roll your tongue or not	• Eye colour • Fur colour and pattern (e.g. patches, spots) • Skin colour • Height and length • Ear size and shape • Tail size and length • Scale colour and pattern • Size of fin in fish

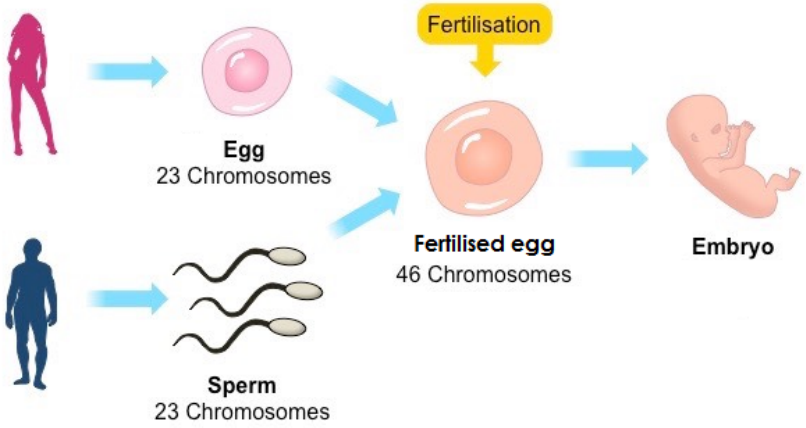
Inside the nucleus of the sperm and egg are structures called chromosomes which carry 'genes'.

The genes are made from a molecule called DNA.

Genes determine many features of the organism as they carry ‘inherited characteristics’.



Half of the genes come from the male parent and half from the female parent. This means some features of the new organism will be similar to the female parent and others will be similar to the male parent.



Genetics is the study of inherited characteristics. Inherited characteristics are the characteristics the organism has received from its parents so can be passed from generation to generation.

DNA profiling is a way of using a DNA fingerprint, a unique pattern of DNA that only one living organism has.

Genes are made from DNA. Every individual has a unique combination of genes. A DNA fingerprint is a unique pattern of DNA that only one living organism has.

DNA profiling is used to solve crimes, in paternity tests (to check the father of a baby), to identify species and to identify people.

6 - Microorganisms

There are 3 groups of microorganisms: Bacteria, Viruses, Fungi

They have many different uses.

Food product	***Type of microorganism used***	***Why this microorganism is used***
Bread	Yeast	Feeds on sugar to produce carbon dioxide which makes dough rise
Cheese	Bacteria	Feeds on lactose producing lactic acid which curdles milk (causing curds to form).
Yoghurt	Bacteria	Feeds on lactose producing lactic acid which thickens milk.

Microorganisms multiply rapidly. They need 4 essential resources microorganisms need to grow and reproduce: Water, Food, Warm temperature and a Suitable pH. Microorganisms are decomposers. Decomposition is the process where microorganisms break down dead organisms through the process of decay. The 'good' bacteria found in the guts of animals helps them break down food to aid in digestion.

7 - Disease

Definition	**Term**
Microorganisms that cause disease and infection.	Pathogen
Warning signs that a person shows when they become infected with a microorganism.	Symptoms
This can be given by a doctor to someone who is ill and infected. E.g. medication.	Treatment
When microorganisms spread through the population.	Transmission

High transmission rate - microorganisms CAN spread easily between people.
Low transmission rate - microorganisms CANNOT spread easily between people.

A very harmful disease which will cause many people to die (high mortality rate) has a high virulence.
A disease which is not very harmful and very few people die from it (low mortality rate) has a low virulence.

8 - Defence against disease

First Line of defence

Second Line of Defence

The immune system protects the body against disease if the first line of defence is breached. The white blood cells produce antibodies to help fight infection. Antibodies attach to pathogens and destroy them.

Vaccines contain a harmless version of the pathogen. When it enters your body, your immune system responds by producing antibodies against the pathogen that can act if you are infected in the future.