

## Reproduction & Embryology

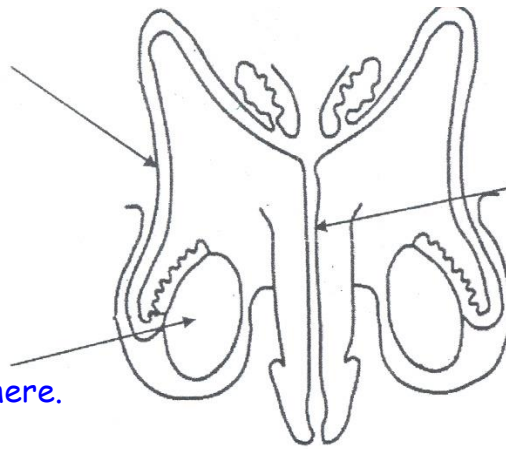
### Human Reproduction

This is the process of making babies. This requires information from both the male and the female. This information is contained in gametes (sex cells).

### Male Reproductive Organs

**Sperm duct**  
Sperm travel down this tube during sexual intercourse.

**Testes**  
Sperm are made here.

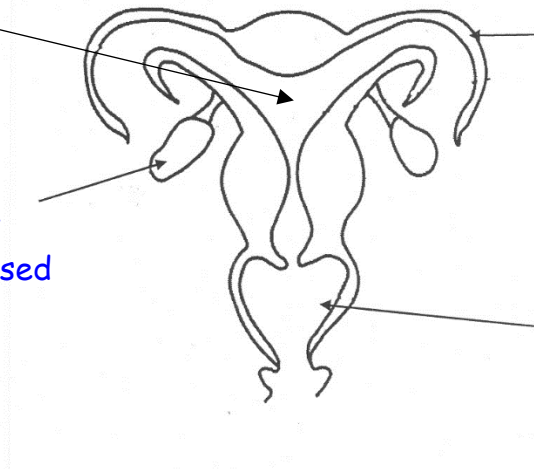


**Penis**  
Sperm are released from here during sexual intercourse.

### Female Reproductive Organs

**Uterus (womb)**  
The fertilised egg embeds into the wall and the embryo develops here.

**Ovary**  
Eggs are released from here.



**Oviduct (fallopian tube)**  
Eggs are fertilised here.

**Vagina**  
Sperm are released into here from the penis during sexual intercourse.

## Fertilisation

This is when a sperm cell meets and enters a female egg cell in the fallopian tube (oviduct). This follows sexual intercourse where the male ejaculates sperm into the vagina of the female. Only one sperm cell is needed to fertilise one egg.

The fertilised egg begins to divide. The ball of cells travels to the uterus where it embeds itself into the wall.

## Pregnancy

The ball of cells develops into an **embryo**. Over the next **9 months** (gestation period) this develops into a baby. The developing baby gets oxygen, food (nutrients) and water from its mother's blood. These pass into the baby's blood at the **placenta**. The baby's waste products (including carbon dioxide) move from the baby's blood into the mother's here as well. The baby is connected to the placenta by its **umbilical cord**.

When the baby is ready to be born, the amnion bursts, releasing the **amniotic fluid**, and the female's uterus muscles begin to contract. These get stronger and closer together.

Every month a female produces an egg. If it is not fertilised, the egg passes out the vagina along with the lining of the uterus wall. This is a **period**.

## Inheritance

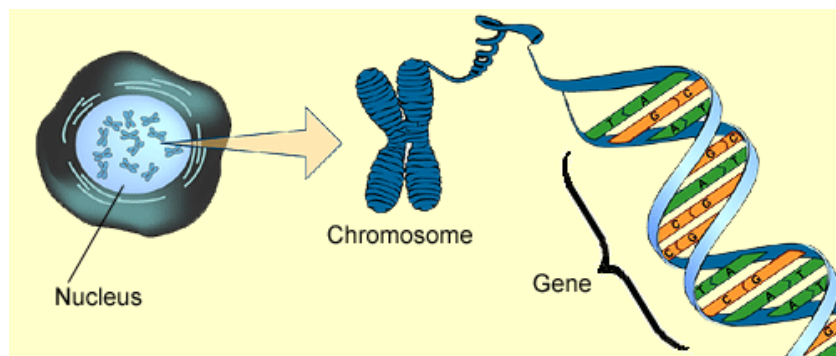
There are characteristics in plants and animals which are passed down from their parents. These are called inherited characteristics. They are determined by genetic information from the parents.

Examples:

Animals	Plants
Hair	Seed shape
Colour	Flower colour
Height	Size of leaf
Tongue-rolling	Height of plant

### Where are the Genes?

The genes which control characteristics are found in chromosomes. These are found in the nucleus of a cell. They are made up of DNA and certain sections of this DNA are referred to as **genes**.



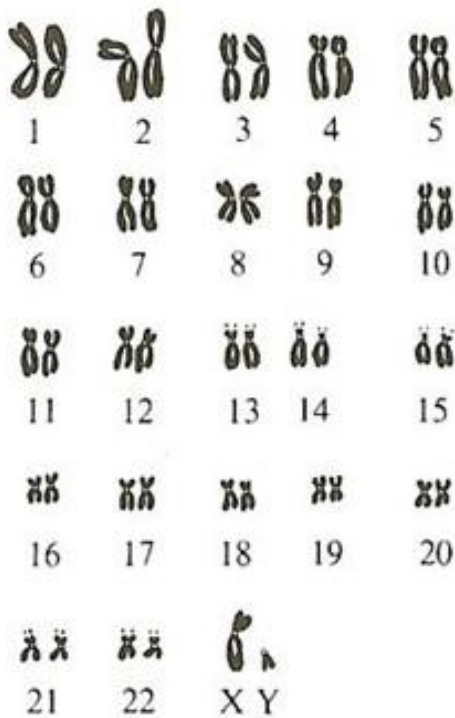
Human body cells contain **46 chromosomes** which pair up to give **23 pairs**. Red blood cells have no nucleus so don't have any chromosomes.

The gametes (male or female sex cells) have only **23 chromosomes**. This means when fertilisation occurs, the male sperm cell gives half of the genetic information and the female egg cell gives the other half.

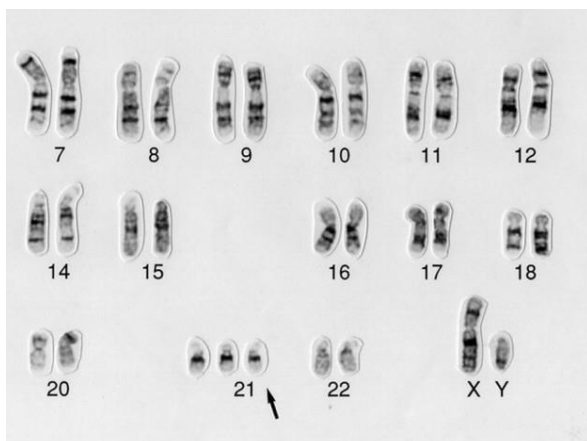
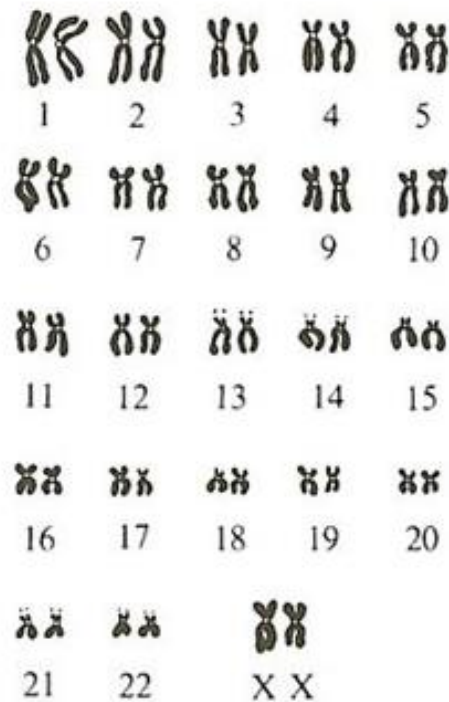
Together they provide 46 chromosomes, so the fertilised egg (called the **zygote**) contains a complete set of genetic information.

This complete set of chromosomes is known as the **human karyotype**. These show the karyotypes of a male and female. They differ in **pair 23**.

*male*



*female*



Sometimes someone is born with an extra chromosome. This is a type of **mutation** called trisomy and can lead to disorders such as Down's Syndrome. This occurs when there is an extra chromosome at position 21 in the karyotype.

## DNA Profiling

Everyone has a unique DNA sequence. However, many sections of this are shared with blood relatives. DNA profiling (fingerprinting) can be used to:

- Identify a criminal from DNA found at a crime scene.
- Identify blood relatives.
- Identify disorders or diseases in people going for a job.
- Identify disorders or diseases in people putting in for life insurance.

## Genetic Engineering

This is the moving of sections of DNA from one organism to another.

Bacteria are used a lot in genetic engineering. The activity of bacteria is controlled by their chromosomes (where the DNA is). Changing the chromosomes changes the bacterial activity.

Pieces of chromosome can be transferred from another organism into the bacteria which can then make a new substance.

## Products of Genetic Engineering

This has managed to give many beneficial products, such as:

**Insulin** for diabetics;

**Human growth hormone** for children who aren't growing;

**Crops** with more nutritional value;

**Crops** resistant to insects;

Fruit and vegetables which last longer on store shelves;

Fast-growing salmon.