Chromosomes, Mitosis & Meiosis

Chromosomes

DNA (**d**eoxyribo**n**ucleic **a**cid) is the chemical that all genetic material is made from. It is found in the **nucleus** of all cells and codes for characteristics.

DNA is a **double helix** made from a polymer of two strands. It coils up into a structure called a **chromosome**. Humans have 46 chromosomes (23 pairs – half from each parent)

Genes are small sections of DNA that code for a particular **sequence** of **amino acids**. These join together to form a **protein**. There are 20 amino acids that can make up thousands of different proteins.

Asexual Reproduction

Asexual Reproduction – only one parent involved

The offspring are genetically **identical** to the parent (clones).

Bacteria and some plants reproduce asexually. Offspring are produced by **mitosis**.

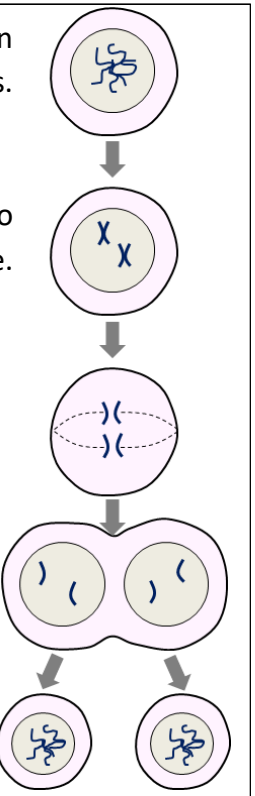
Sexual Reproduction

Sexual Reproduction – genetic information from two parents is combined. The mother and father produce gametes (egg and sperm) by meiosis.

Each gamete (in humans) contain 23 chromosomes, half the full amount.

Offspring are genetically different as they inherit a mix of both parents DNA.

Mitosis



The DNA is spread out in long strings before it divides.

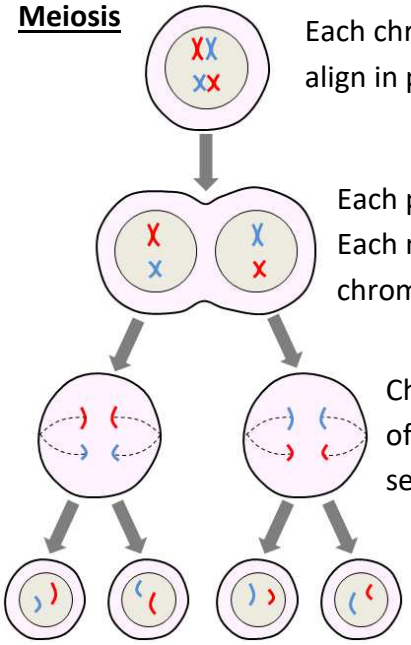
The DNA replicates so there are two copies of each chromosome.

The arms of each chromosome are pulled to opposite ends of the cell.

Nuclear membranes form around each new cell.

The cytoplasm divides and the DNA spreads out into strings. Two genetically identical cells have been produced.

Meiosis



Each chromosome makes a copy of itself and align in pairs down the centre of the cell.

Each pair of chromosomes are pulled apart. Each new cell now has one copy of each chromosome.

Chromosomes align along the centre of the cell in preparation for the second division.

Four gametes are produced, each genetically different with only single chromosomes.

Genome

All of the genetic material in an organism.

The human genome has been mapped – a really important advancement in science and medicine:

- scientists can identify genes that are linked to diseases.
- knowing the genes that are linked to diseases can help to develop treatments.
- genomes can tell us about human migration around the world. All modern humans descend from a common ancestor in Africa. Tiny **differences** in genomes allow scientists to work out **when** new populations split off and **where** they went.