

Cell Division

- Cell Continuity means all cells develop from pre-existing cells.
- Chromatin is a tangled ball of elongated chromosomes in which each chromosome is not distinguishable.
- Haploid and Diploid Nuclei:
 - A haploid nucleus has one set of chromosomes, it only has one of each type of chromosome in the nucleus.
 - Symbolised by the letter 'n', the number of chromosomes in a cell is given as $n = 23$ etc.
 - A diploid nucleus has two sets of chromosomes, it has two of each type of chromosome in the nucleus.
 - Symbolised as '2n', the number of chromosomes in a cell is given as $2n = 46$ etc.
- Homologous pairs consist of two chromosomes that each have genes for the same features at the same positions.

The Cell Cycle and Interphase

- Most cells grow until they reach a certain size and then divide. Exceptions include red blood cells and nerve cells.
- Interphase:
 - Happens regardless of whether mitosis or meiosis occurs in the cell.
 - The chromosomes are very elongated, individual chromosomes can not be distinguished.
 - The mass of material is called chromatin.
 - The cells are very active:
 - production of organelles, enzymes, proteins.
 - duplication of chromosomes (later part of interphase).

Mitosis

- Mitosis is a form of nuclear division in which one nucleus divides to form two daughter cells, each containing the same number of chromosomes with identical genes.
- It has four phases, each of which runs smoothly into the next and which can be difficult to see the exact beginning and end of.

- Prophase
 - Chromatin starts to contract.
 - Chromosomes become visible as double-stranded structures. They are held together by the centromere.
 - The nucleolus (the region in the nucleus where ribosomes are made) disappears.
 - Spindle fibres appear in the cytoplasm.
 - All the spindle fibres collectively form a structure called the spindle.
 - Nuclear membrane starts to break down.

- Metaphase:
 - Nuclear membrane completes it's breakdown.
 - Chromosomes line up across the middle of the cell.
 - A spindle fibre from each end/pole of the cell attaches to each centromere.

- Anaphase
 - Spindle fibres contract causing the centromere to split.
 - One strand (chromosome) from each double-sided chromosome is pulled to opposite sides of the cell.
 - The chromosomes at each end are exact duplicates of each other.
 - This is the shortest phase of mitosis.

- Telophase
 - The chromosomes at each end lengthen and become hard to distinguish.
 - Spindle fibres break down.
 - Nucleolus/nucleoli begin to re-form.
 - Nuclear membrane forms around each of the two poles.