CAIE Biology A-level

Topic 5: The mitotic cell cycle

Notes

Mitosis

The role of **mitosis and the cell cycle** is to produce **identical daughter cells for growth and asexual reproduction** of cells. All the cells produced by mitosis are **genetically identical** therefore **mitosis does not give rise to genetic variation.**

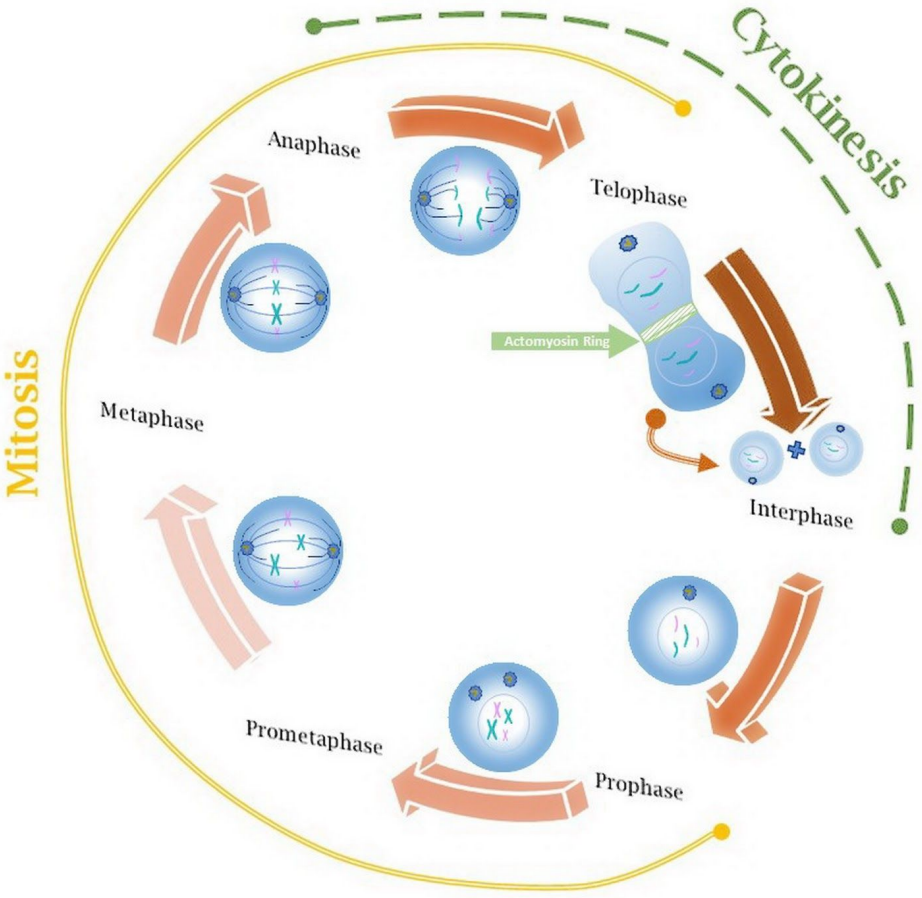
Mitosis is important for:

- **Growth**
- **Replacing** dead or damaged cells
- **Repairing** damaged tissue (via cell replacement)
- **Asexual reproduction**

Telomeres prevent genes from being lost during the process of DNA replication.

During the cell cycle, a cell is formed, it grows and then divides to form daughter cells. There are three stages of the cell cycle:

- **Interphase** – to summarise, during this stage the cell **grows and then prepares to divide –** chromosomes and some organelles are replicated, chromosomes also begin to condense. Interphase consists of the G1, G2 and S phases.
    - **G1** - the cell receives a signal committing the cell to replicate DNA, the cell grows and prepares to enter the S phase
    - **S** - the genome is completely duplicated
    - **G2** - G2 - prepares for mitosis
- **Mitosis** – mitosis is a form of cell division that produces identical cells, there are four stages of mitosis: **prophase, metaphase, anaphase and telophase.**
- **Cytokinesis** – during cytokinesis the parent and replicated organelles move to opposite sides of the cell and the **cytoplasm divides** thus producing two daughter cells.



Stem cells

Cells produced by mitosis are undifferentiated (those are called stem cells) which can be made into **specialised cells** via differentiation. Stem cells repeatedly undergo cell division and are used for cell replacement and tissue repair. Once the cell becomes specialised for a specific function it stops dividing.

However if cell division is **uncontrolled** this can lead to the formation of a mass of cells called a **tumour**, which can cause **cancer**.