CIE Biology A-level

Topic 5: The mitotic cell cycle

Notes

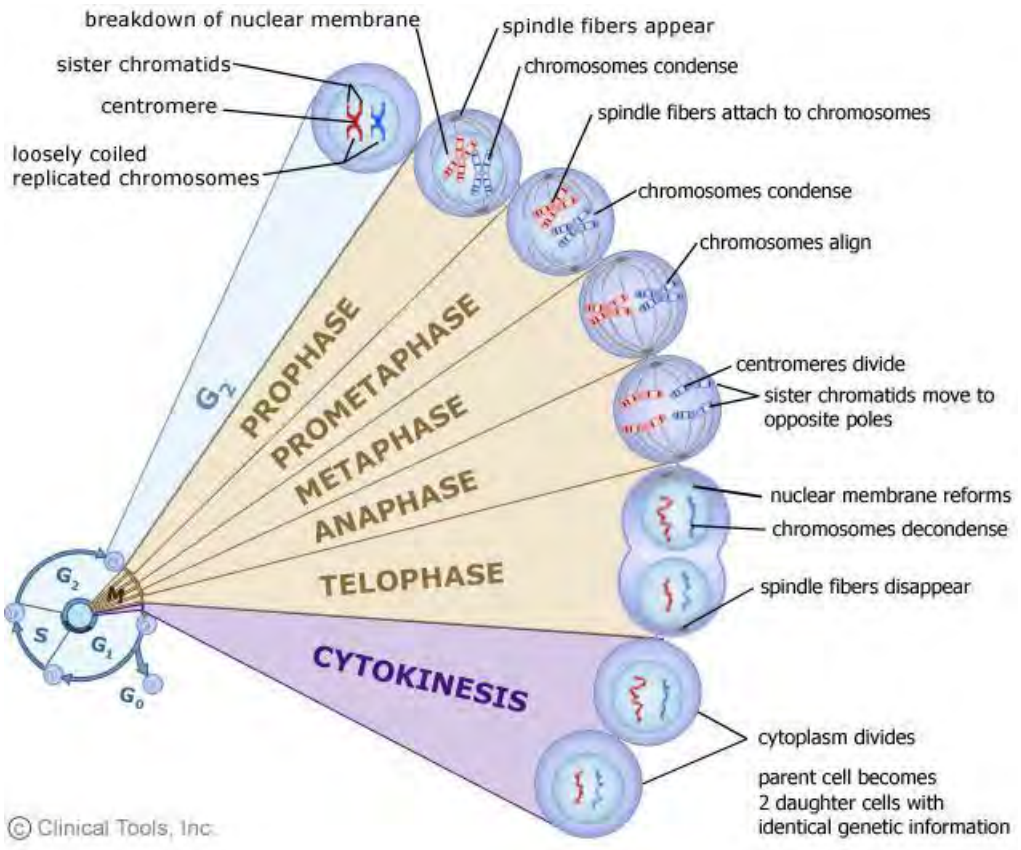
Key words:
Chromosome - thread-like structures composed of nucleic acid and protein
Chromatin – complex of DNA and proteins
Histone proteins – proteins which package DNA into nucleosomes; part of chromatin
Chromatids – components of chromosome: a chromosome is made up of two chromatids
Centromere – the point which links sister chromatids
Telomere – end of chromosome which serves to protect it by permitting continued replication and preventing the loss of genes
Stem Cell – an unspecialised cell which retains the ability to differentiate.

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 plays an important role in cell replacement and tissue repair by stem cells. Uncontrolled cell division can, however, result in the formation of a **tumour**.

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:

- **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
- **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 G1 in which the cell receives a signal committing the cell to replicate DNA, the cell grows and prepares to enter the S phase. During S phase, the genome is completely duplicated. Afterwards, cell enters G2 phase where it prepares for mitosis.