

CAIE Biology A-level

Topic 5 - Mitotic Cell Cycle

Definitions and Concepts

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Anaphase - The third stage in mitosis where the chromosomes are pulled apart to the poles of the cell by the spindle fibres.

Asexual reproduction - The production of genetically identical offspring from one parent through the process of mitosis.

Bivalent - A pair of homologous chromosomes.

Centromere - A structure on a chromosome that holds the sister chromatids together.

Chromatid - One strand of a replicated chromosome.

Chromosome - A structure consisting of a long, coiled molecule of DNA and its associated proteins, by which genetic information is passed from generation to generation.

Cytokinesis - The division of the cytoplasm at the end of mitosis to produce two new daughter cells.

Deoxyribonucleic acid (DNA) - An information storing molecule made up of deoxyribonucleotide monomers joined by phosphodiester bonds to form a double helix.

Differentiation - The process where a cell develops certain features so that it is specialised to carry out a certain function.

G₁ (Gap 1) phase - The first growth phase in interphase during which the cell synthesises proteins and RNA, duplicates its organelles and increases in size before DNA replication in S phase.

G₂ (Gap 2) phase - The second growth phase of interphase during which the cell continues to increase in size and synthesise biomolecules.

Histone proteins - Proteins that, together with DNA, form chromosomes in the nuclei of eukaryotic cells.

Homologous chromosomes - Two chromosomes with the same gene loci but different alleles, one inherited from each parent.

Interphase - The longest stage of the eukaryotic cell cycle. It consists of G₁ phase, S phase and G₂ phase and occurs before mitosis.

Metaphase - The second stage of mitosis in which replicated chromosomes align at the equator of the cell.

Mitosis - The division of a cell to produce two genetically identical daughter cells.

Mitotic spindle - A structure mainly consisting of microtubules that is formed by the cytoskeleton between centrioles. Chromosomes attach to the spindle via the kinetochore at their centrosome.



Prophase - The first stage in mitosis where the nuclear envelope breaks down, the centrosomes move to opposite poles of the cell, the mitotic spindle begins to form and the chromosomes condense.

Sister chromatids - A pair of identical chromatids formed by DNA replication, joined by a centromere.

S (synthesis) phase - The second phase in the cell cycle where the DNA in the cell is replicated.

Stem cell - A type of undifferentiated cell which has the ability to divide many times and differentiate into many different cell types.

Telomere - A sequence of repeating nucleotides at each end of a chromosome. During DNA replication, the end of the lagging strand either is not replicated or remains as an RNA-DNA complex. Without telomeres, the chromosome would get shorter with continued replication and some genetic information may be lost.

Telophase - The final stage of mitosis in which new nuclear envelopes begin to form around the separated sets of chromosomes.

Tumour - An abnormal growth of tissue resulting from uncontrolled mitosis.

