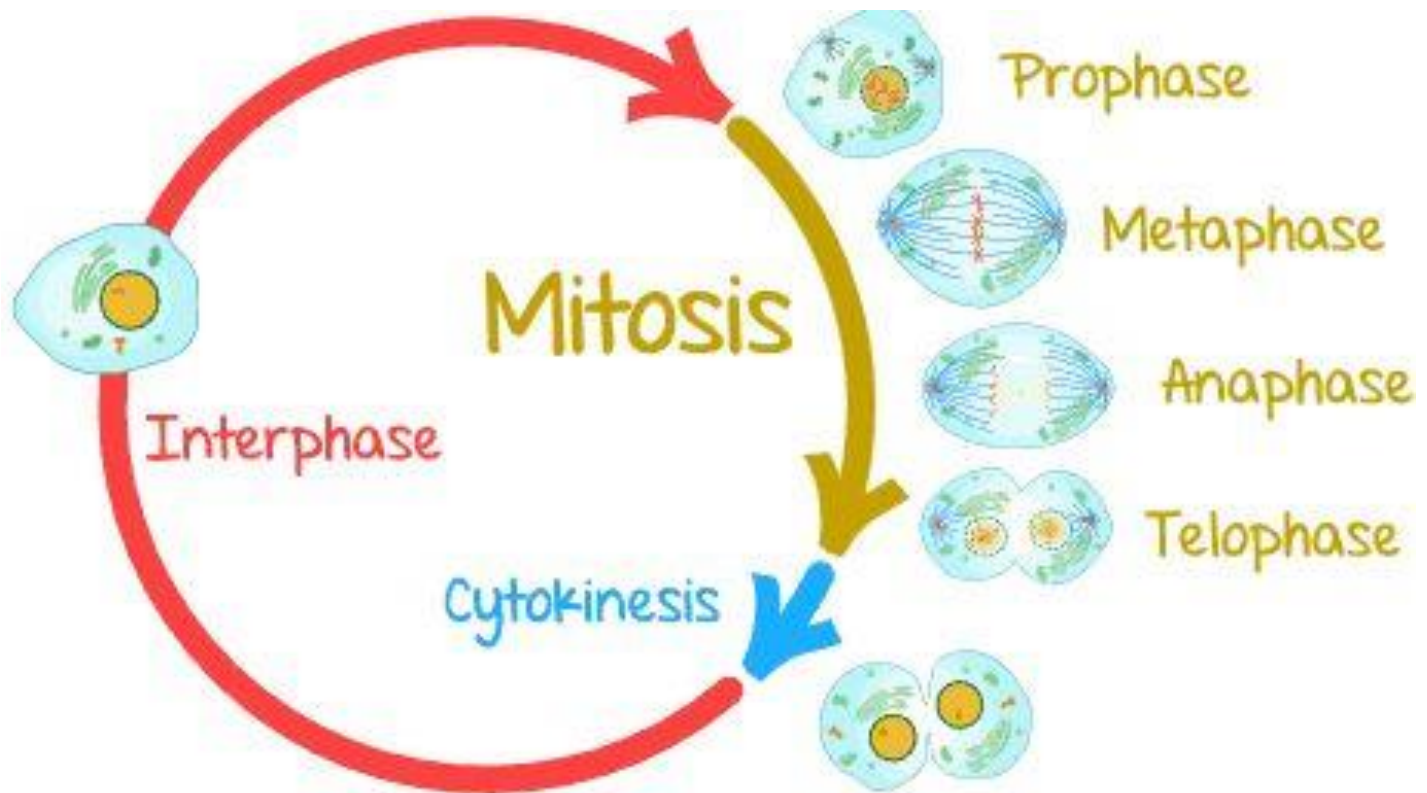


Cell cycle

- The cell cycle or cell-division cycle is the series of events that take place in a cell leading to its division and duplication of its DNA to produce two daughter cells.
- In eukaryotes the cell cycle is divided into three periods: interphase, the mitotic (M) phase, and cytokinesis.
- During interphase, the cell grows, accumulating nutrients needed for mitosis, preparing it for cell division and duplicating its DNA. During the mitotic phase, the chromosomes separate. During the final stage, cytokinesis, the chromosomes and cytoplasm separate into two new daughter cells.



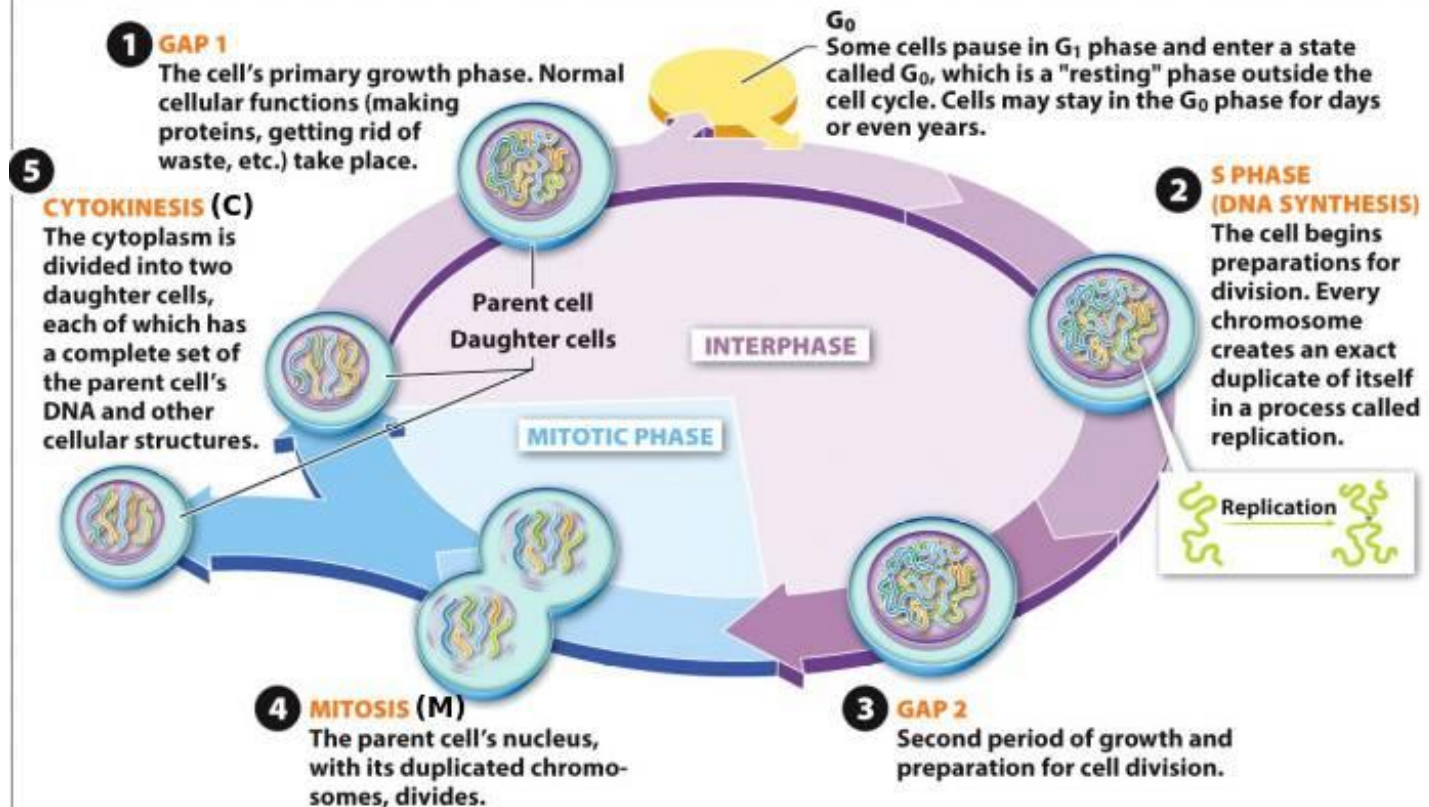
Interphase

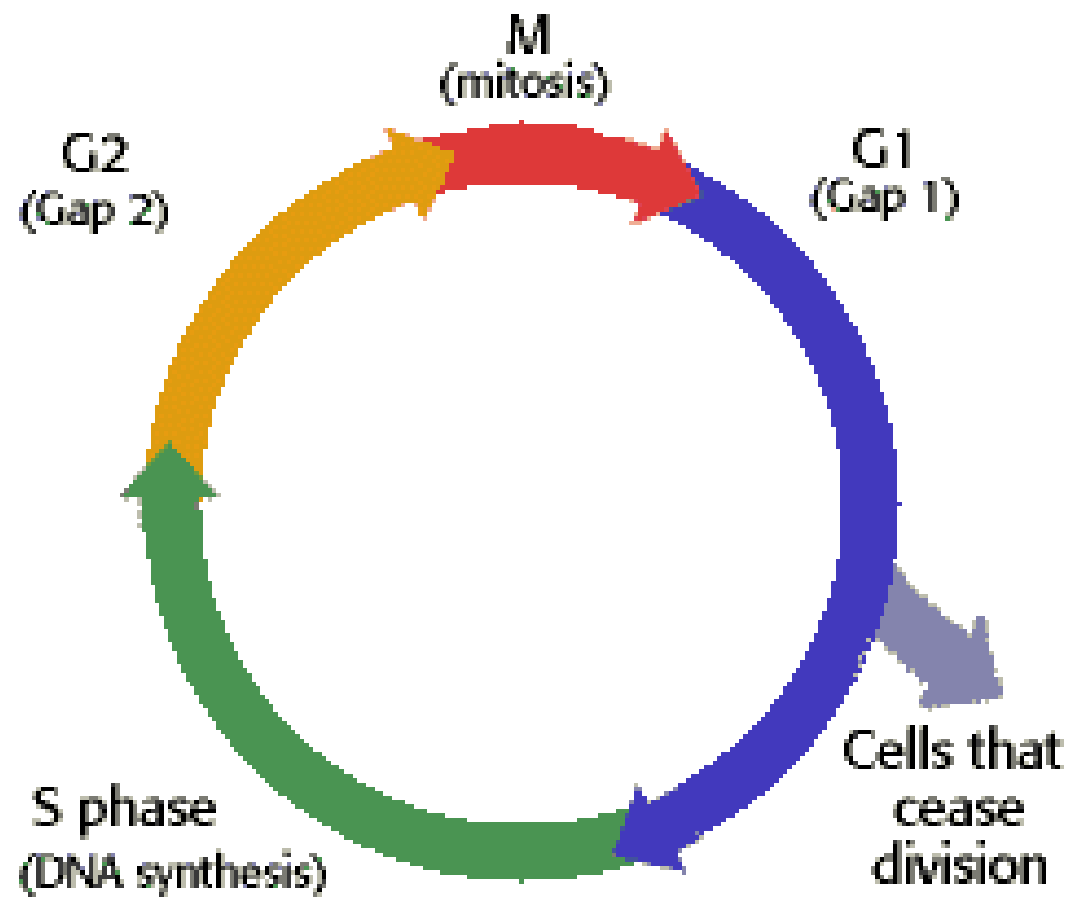
- Interphase itself consists of 3 phases:
 1. G1 (Gap 1) phase - Cells increase in size in Gap 1. Cell is getting ready for DNA synthesis.
 2. S (Synthesis) phase - DNA replication occurs during this phase.
 3. G2 (Gap 2) phase - During the gap between DNA synthesis and mitosis, the cell will continue to grow

G0 phase

- Sometimes cell can enter G0 phase (quiescence)
- G0 is a resting phase where the cell has left the cycle and has stopped dividing.
- Non-proliferative (non-dividing) cells in multicellular eukaryotes generally enter the quiescent G0 state from G1 and may remain quiescent for long periods of time, possibly indefinitely (as is often the case for neurons).

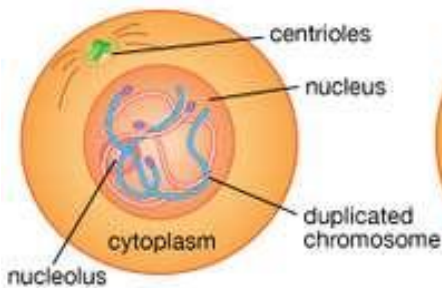
EUKARYOTIC CELL CYCLE



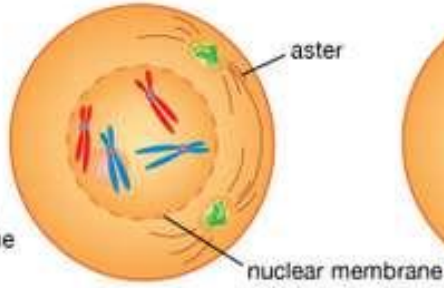


Mitosis

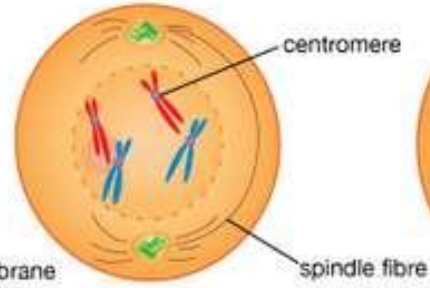
Mitosis, or somatic cell division



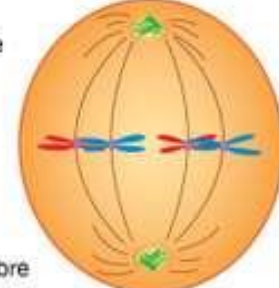
Prior to mitosis, each chromosome makes an exact duplicate of itself. The chromosomes then thicken and coil.



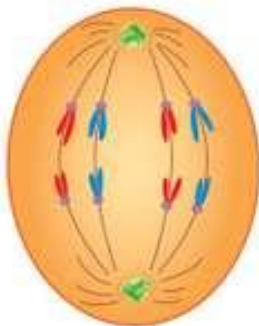
In early prophase the centrioles, which have divided, form asters and move apart. The nuclear membrane begins to disintegrate.



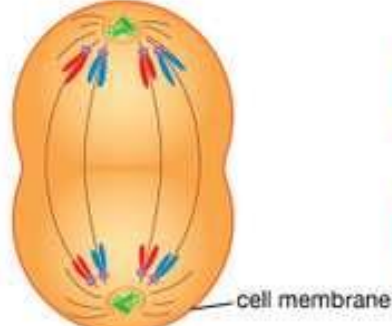
In late prophase the centrioles and asters are at opposite poles. The nucleolus and nuclear membrane have almost completely disappeared.



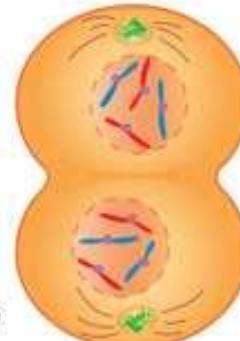
The doubled chromosomes—their centromeres attached to the spindle fibres—line up at mid-cell in metaphase.



In early anaphase the centromeres split. Half the chromosomes move to one pole, half to the other pole.



In late anaphase the chromosomes have almost reached their respective poles. The cell membrane begins to pinch at the centre.



The cell membrane completes constriction in telophase. Nuclear membranes form around the separated chromosomes.



At mitosis completion, there are two cells with the same structures and number of chromosomes as the parent cell.

Cell cycle Checkpoints

- Cell cycle checkpoints are used by the cell to monitor and regulate the progress of the cell cycle.
- Checkpoints prevent cell cycle progression at specific points, allowing verification of necessary phase processes and repair of DNA damage.
- The cell cannot proceed to the next phase until checkpoint requirements have been met.
- Checkpoints typically consist of a network of regulatory proteins that monitor and dictate the progression of the cell through the different stages of the cell cycle.