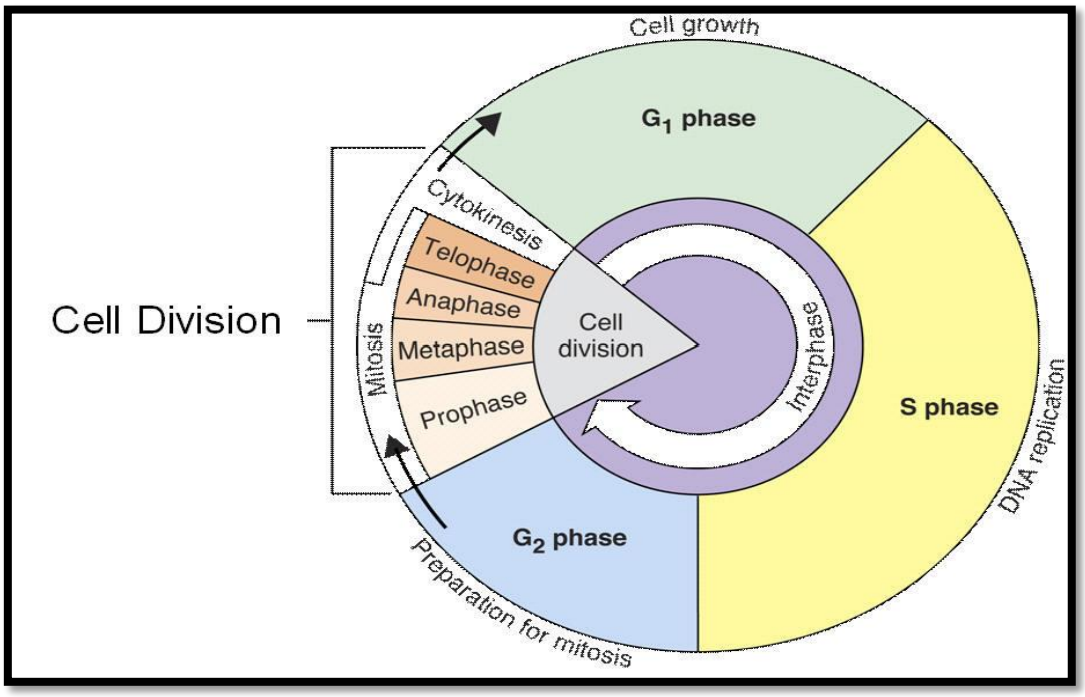
The Cell Cycle

The cell cycle represents a self-regulated sequence of events that controls **cell growth** and **cell division**.

The goal of the cell cycle : is to produce two daughter cells, each containing chromosomes identical to those of the parent cell.

Phases of the Cell Cycle

The cell cycle incorporates two principal phases**: the interphase**, and the **M phase (mitosis) .**



A) Interphase

It represents continuous growth of the cell and is subdivided into three phases.

1- The G1 phase (Growth)

It is usually the longest and the most variable phase of the cell cycle, and it During the G1 phase, the cell gathers nutrients.

2- The S phase (Synthesis) (DNA replication)

Initiation of DNA synthesis marks the beginning of the S phase. which is about(7.5 to 10 hours) in duration. The DNA of the cell is doubled during the S phase.

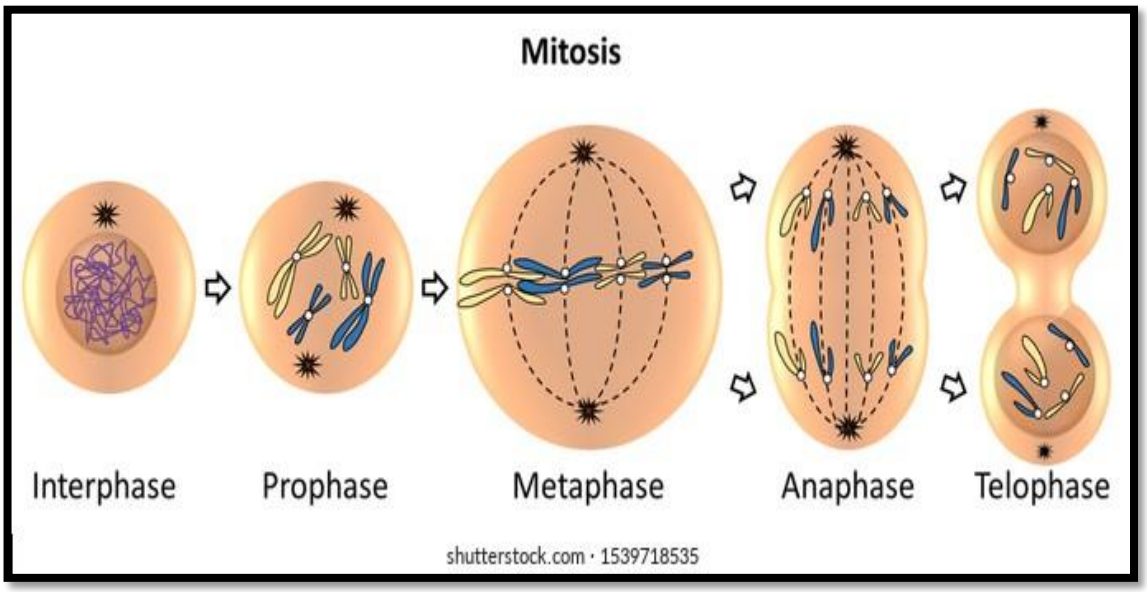
3- The G2 phase (cell preparation for cell division)

During this phase, the cell examines its replicated DNA in preparation for cell division. The G2 phase may be as short (1 hour).

B) Mitosis

Mitosis: is a process of chromosome segregation and nuclear division followed by cell division that produces two daughter cells with the same chromosome number and DNA content as the parent cell.

″ The process of cell division includes division of both the nucleus **(karyokinesis**) and the cytoplasm **(cytokinesis) .**



Phases of Mitosis:

1. Prophase:

1- The replicated chromatin condenses and become visible as chromosomes.

2- Each chromosome can be seen to consist **of two chromatids**.

3- The sister chromatids are held together by the ring of proteins at the **centromere**.

4- In late prophase, the nuclear envelope begins to disintegrate, and the nucleolus completely disappears.

5- In addition, a highly specialized protein complex called a **kinetochore** appears on each chromatid opposite to the centromere.

2. Metaphase:

1- The chromosomes contract and take up a position at the equator of the cell.

2- The chromosomes are attached to the spindle fibers by the centrosome

3- Anaphase:

1- Separation of sister chromatids.

2- The separated chromatids are pulled to opposite poles of the cell.

4. Telophase:

1- Reconstitution of a nuclear envelope around the chromosomes at each pole.

2- The chromosomes uncoil and become indistinct.

3- The nucleoli reappear, and the cytoplasm divides (cytokinesis) to form two daughter cells.