

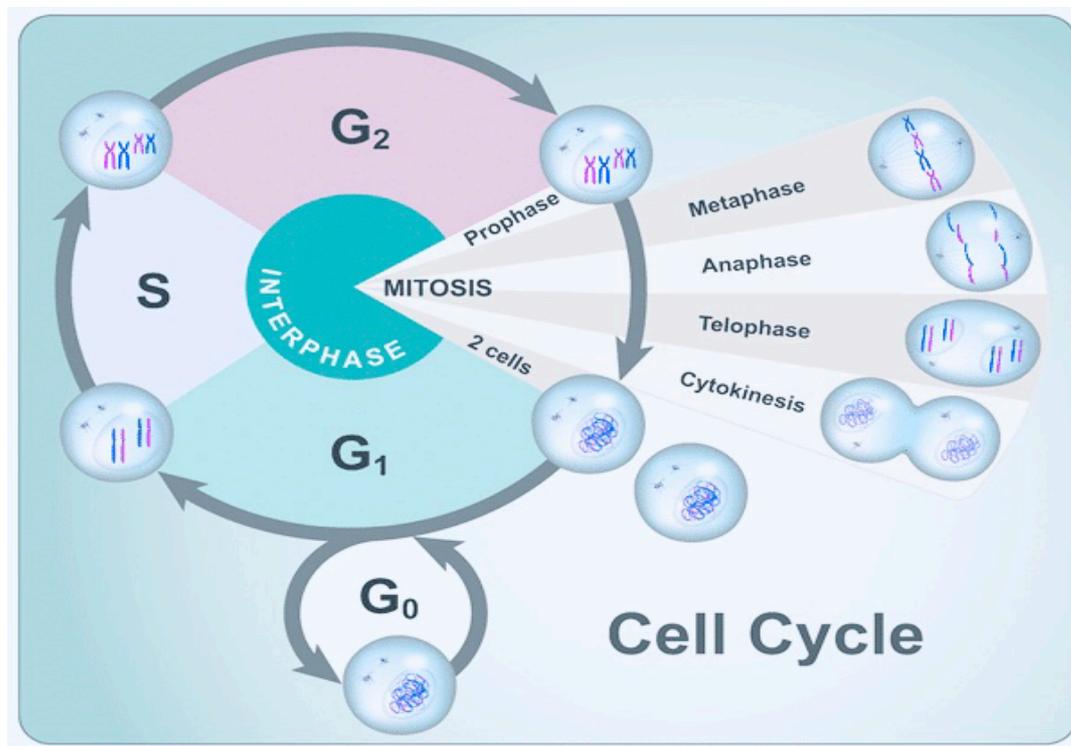
# Cell Cycle and Mitosis

## The Cell Cycle

- ▶ **Eukaryotic cells** divide in a process called **mitosis** which is a vital stage of **the cell cycle**. Mitosis produces **2 daughter cells** that are **identical** to the original cell with the **same number of chromosomes**.
- ▶ The cell cycle has 2 main stages:
  1. Growth and DNA replication phase
  2. Mitosis

### 1. **Growth and DNA Replication:**

- ▶ The first portion of the cell cycle is the **growth phase**.
  1. The cell grows, then prepares for mitosis by **replicating all of its subcellular structures** like mitochondria and ribosomes.
  2. The cell also **duplicates all of its DNA** so each new cell will have a copy of the DNA. When not dividing, the DNA is spread out in long strings but when copied ready for mitosis, it forms **X-shaped chromosomes** with both sides of the cross containing the same DNA.
  3. This growth phase contains:
    - **G1 Phase** – Gap Phase 1: Every sub-cellular structure (organelle) within the cell is doubled (except chromosomes).
    - **S Phase** – Synthesis: The DNA replicates to form two copies of each chromosome. Within the cell, each of the 23 pairs of chromosomes is duplicated, leading to 46 duplicated chromosomes.
    - **G2 Phase** – Gap Phase 2: Chromosomes within the cell are checked for errors to ensure that no errors are passed down to daughter cells.
    - **M Phase** – Mitosis: In this stage, the cell divides into two identical daughter cells.
- ▶ Mitosis is the final stage of the cell cycle.



## 2. Mitosis:

- **Mitosis** is a type of cell division that produces two identical diploid daughter cells. The daughter cells produced from mitosis are clones of each other, which means their DNA is identical.
- They are also genetically identical to the parent cell. This way all your cells have an identical DNA composition.

### Stages of mitosis

- The stages of mitosis are prophase, metaphase, anaphase and telophase.
1. **Prophase** – The chromosomes and their copies condense to become more visible. Also, the membrane around the nucleus disappears.
  2. **Metaphase** – Chromosomes and their copies line up in the middle of the cell.
  3. **Anaphase** – Chromosomes and their copies are pulled to different ends of the cell.
  4. **Telophase** – New membranes form around the chromosomes at each end of the cell. The cell membrane pinches in and eventually divides into two daughter cells, which is called cytokinesis.

**Mitosis is responsible for:**

1. Growth for multicellular organisms
2. Repair of damaged tissues
3. Replacement of cells
4. Asexual reproduction in single-celled organisms like amoeba, and it also occurs in some plants.

