Cell Processes and Energy

Section 4: Phases of Mitosis

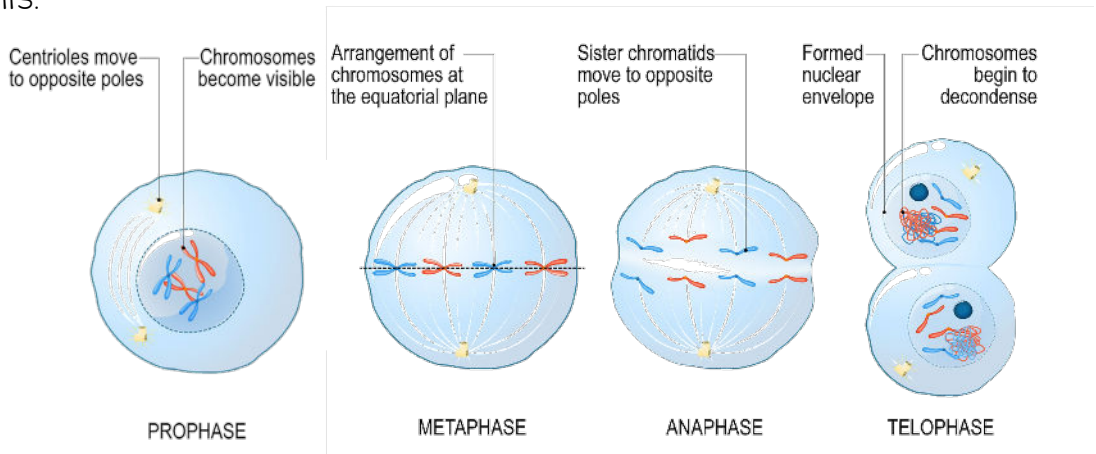
The mitotic phase, or mitosis, is the stage of the cell cycle in which the nucleus divides. Mitosis ensures that each new cell receives an identical set of genetic information. This process is divided into four main stages: **prophase, metaphase, anaphase, and telophase**.

The first and longest stage is **prophase**. During this stage, the chromatin in the nucleus condenses to form visible **chromosomes**. Each chromosome is made of two identical **sister chromatids** joined at a region called the **centromere**. The nucleolus disappears, and the cell begins to form a structure called the **mitotic spindle**. This spindle, made of microtubules, helps move chromosomes during cell division.

The second stage is **metaphase**, which is typically the shortest stage. During metaphase, the chromosomes are pulled toward the center of the cell and line up along the middle, or equator. Spindle fibers attach to the centromere of each chromosome, connecting them to opposite ends, or poles, of the cell.

The third stage is **anaphase**. In this stage, the sister chromatids separate at the centromere. Each chromatid is now considered an individual chromosome. The spindle fibers shorten, pulling the chromosomes apart and moving them toward opposite poles of the cell. This ensures that each side of the cell receives an identical set of chromosomes.

The final stage is **telophase**. During telophase, the chromosomes reach opposite ends of the cell and begin to unwind back into chromatin. Two new nuclei form as nuclear membranes reappear around each set of chromosomes. At the same time, the cell begins to divide its cytoplasm through **cytokinesis**, eventually forming two identical daughter cells.



Review:

1. During what phase are chromosomes pulled towards the center of the cell?
2. Describe what happens during anaphase.
3. During what phase do two nuclei form?