

Mitosis

Significance of Mitosis

- Process of nuclear division results in formation of 2 **genetically identical daughter cells** (all cells have **same gene**).
- **Replace** dead cells. Eg; skin cells live only 2 weeks.
- **Repair, replace, regenerate** damaged cells. Eg; liver cells regenerate following an injury.
- Basis of **asexual reproduction**. Eg; unicellular organism, Amoeba sp. Produce **genetically identical** to parent cell – Binary fission.
- **Increases number** of cells, allow **growth & development**. Eg; multicellular organism, zygote divides & grows eventually complete organism.
- 2 daughter cells **genetically identical** to each other and to that of parent cell. Nucleus contain **same number of chromosomes**, **same gene** as parent cell.

Overview of mitosis

- ❖ Mitosis is a part of the cell cycle process by which chromosomes in a cell nucleus are separated into two identical sets of chromosomes, each in its own nucleus.
- ❖ Mitosis is divided into **karyokinesis** (division of the nucleus) and **cytokinesis** (division of the cytoplasm).
- ❖ The sister chromatids are held together at a specific region of the chromosome called the **centromere**.
- ❖ Mitosis is a continuous process and occurs only in **eukaryotic cells** particularly in **non-sex cells** (**somatic cells**). **Prokaryotic cells** divide by a different process called **binary fission**.
- ❖ Mitosis is divided into **four stages**: prophase, metaphase, anaphase and telophase (Greek: pro-, before; meta-, mid; ana-, back; telo-, end).
- ❖ The timing of the four stages varies from species to species and from organ to organ.

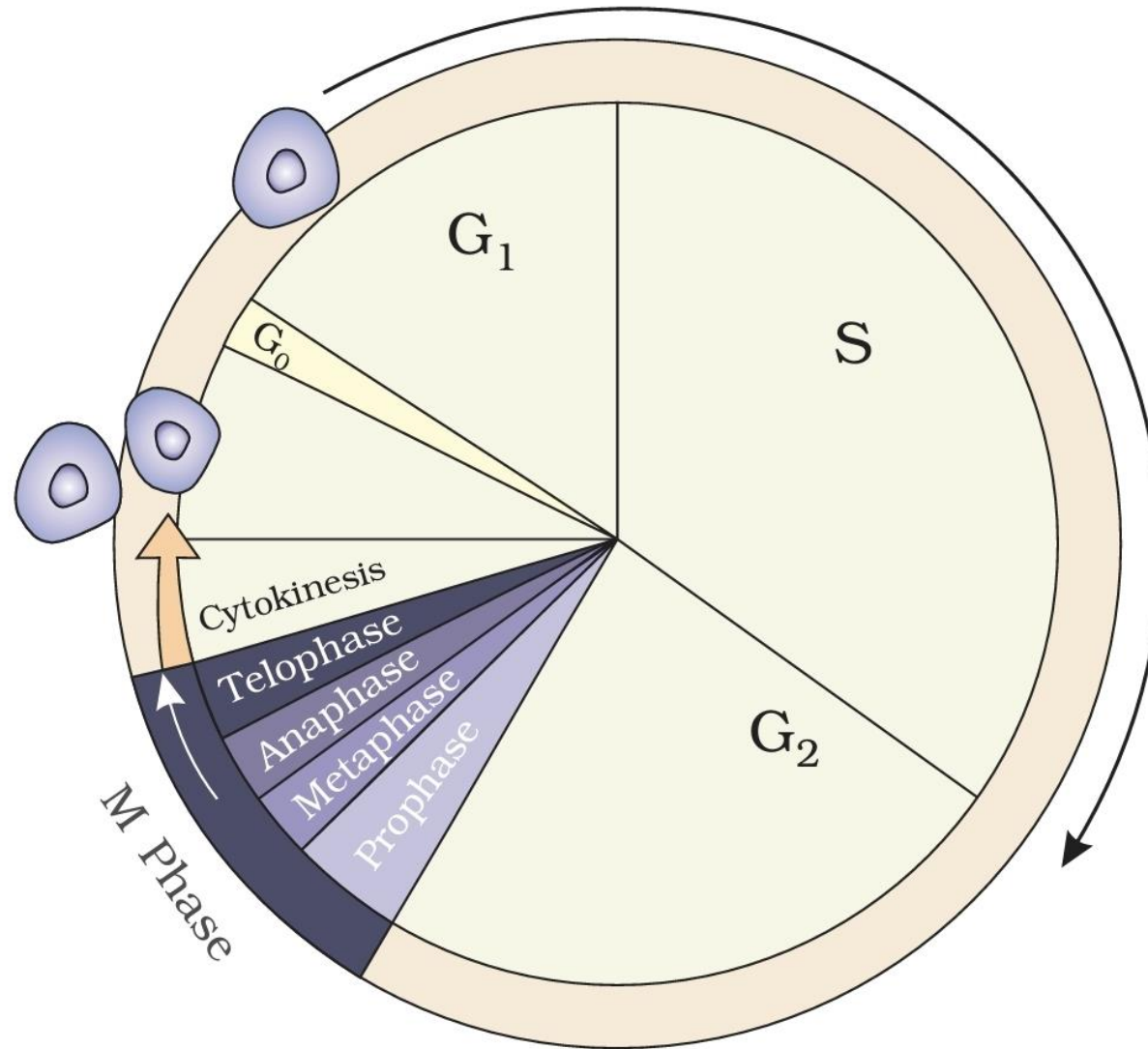
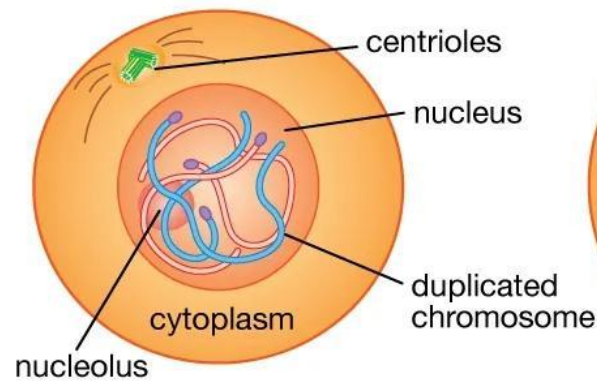
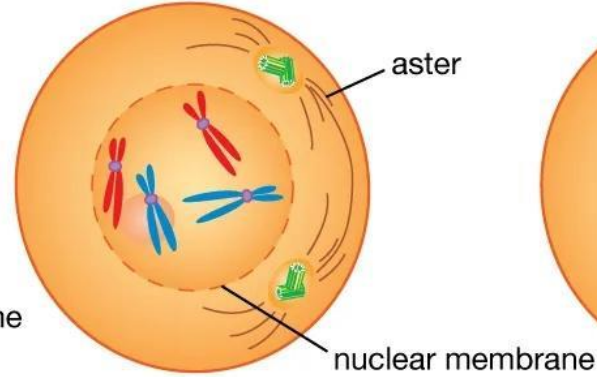


Figure 10.1 A diagrammatic view of cell cycle indicating formation of two cells from one cell

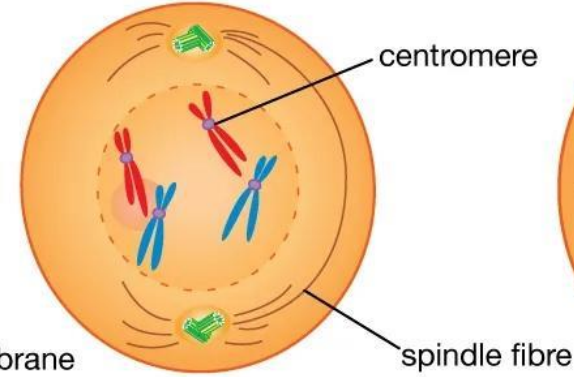
Mitosis, or somatic cell division



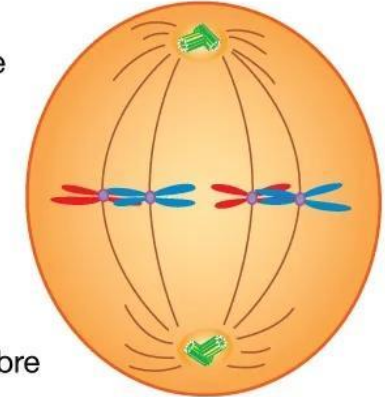
Prior to mitosis, each chromosome makes an exact duplicate of itself. The chromosomes then thicken and coil.



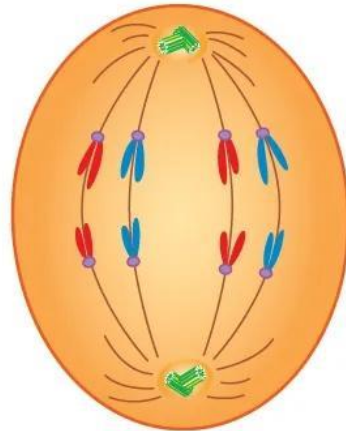
In early prophase the centrioles, which have divided, form asters and move apart. The nuclear membrane begins to disintegrate.



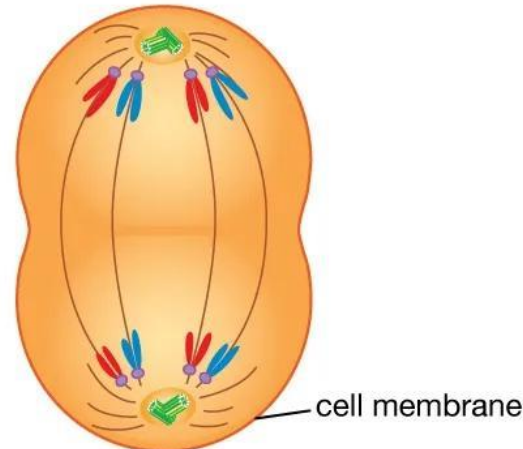
In late prophase the centrioles and asters are at opposite poles. The nucleolus and nuclear membrane have almost completely disappeared.



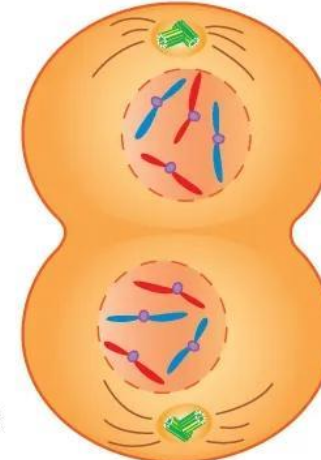
The doubled chromosomes—their centromeres attached to the spindle fibres—line up at mid-cell in metaphase.



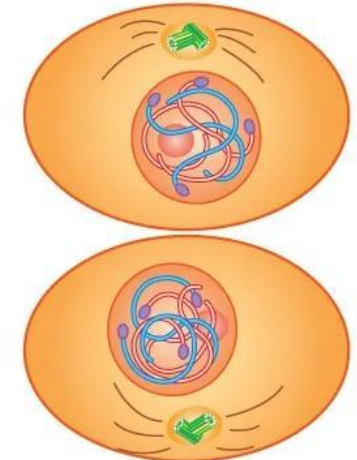
In early anaphase the centromeres split. Half the chromosomes move to one pole, half to the other pole.



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.

