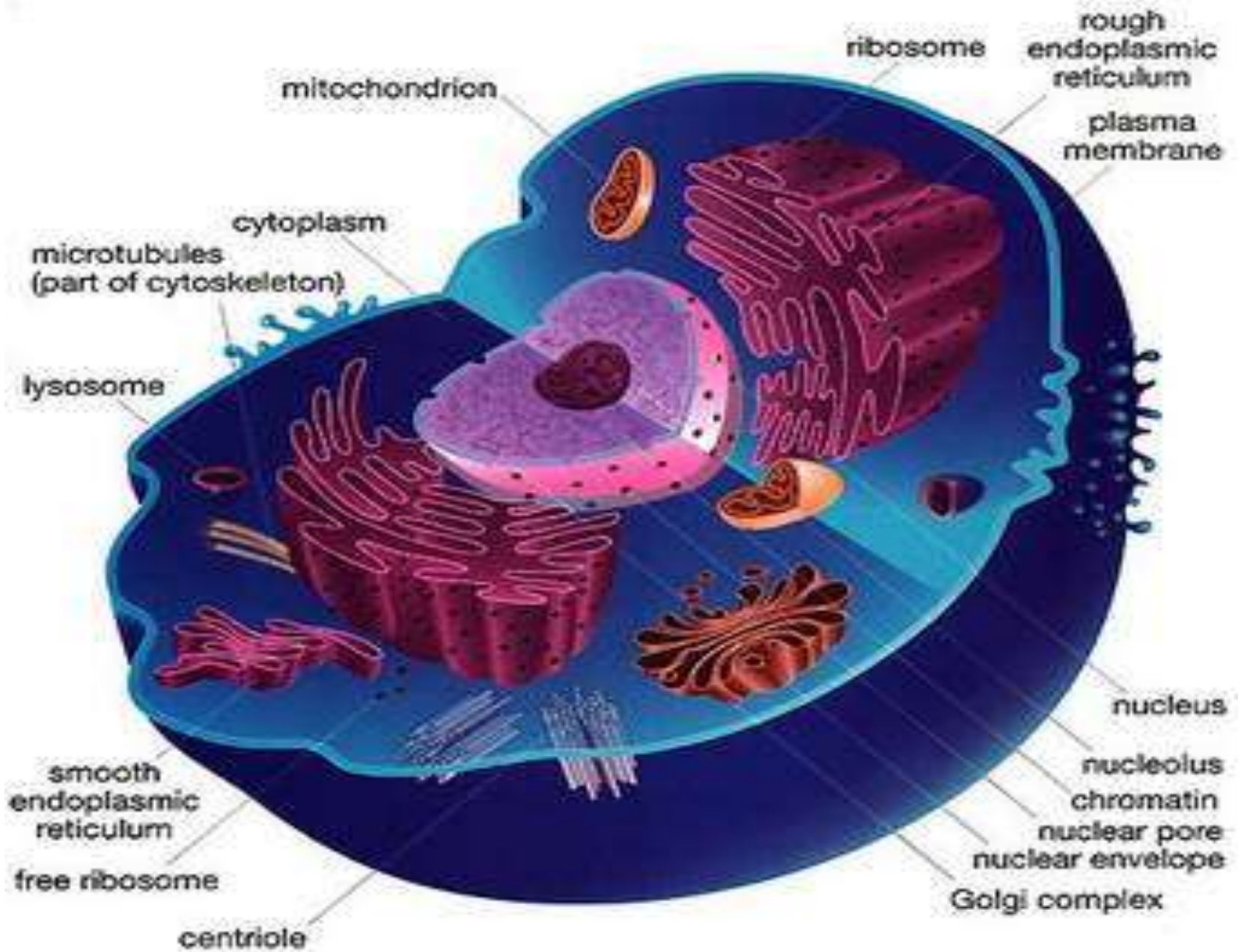




the cell
&
its organelles



Cell

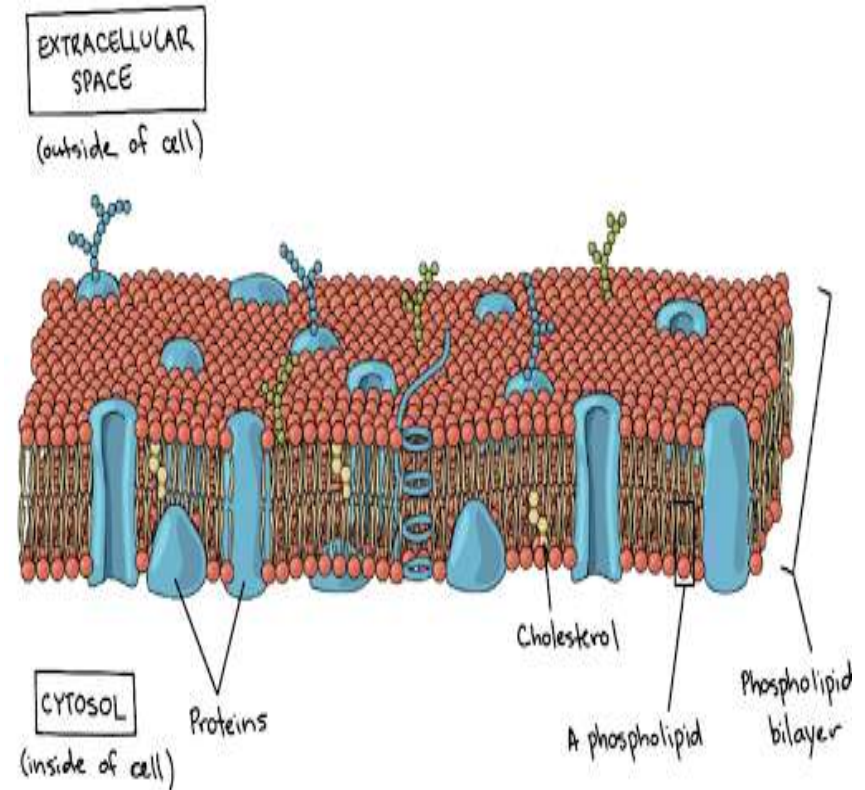
- Cell is the living structural and functional unit enclosed by a membrane. It may be unicellular or multicellular. Cells arise from pre-existing cells by the process of cell division. The study of cellular structure and function is known as cell biology or cytology.

3 main parts of cell are

- i. Plasma membrane
- ii. Cytoplasm
- iii. Nucleus

Plasma membrane

- Flexible outer surface of cell which separates internal environment of cell from the external environment of cell.
- It is selectively permeable in nature.
- It can be described by a structural model “fluid mosaic model”



Cytoplasm

- Cytoplasm is the region between the cell membrane and the nucleus which consists of cytosol & cell organelles.
- Cytosol is the intracellular fluid which surrounds the cell organelles. It is composed of water and different ions, glucose, amino acids, fatty acids, lipid, protein, waste products etc.
- Tiny structures present inside the cell perform different individual functions. The organelles are like endoplasmic reticulum, Golgi complex, lysosome, mitochondria, ribosome, centrosomes etc.

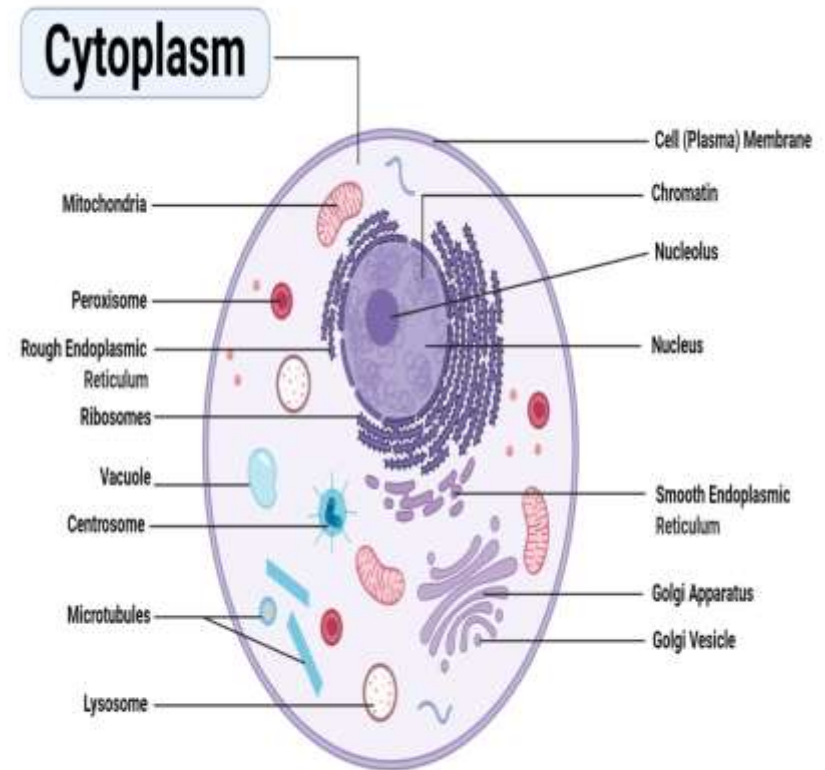
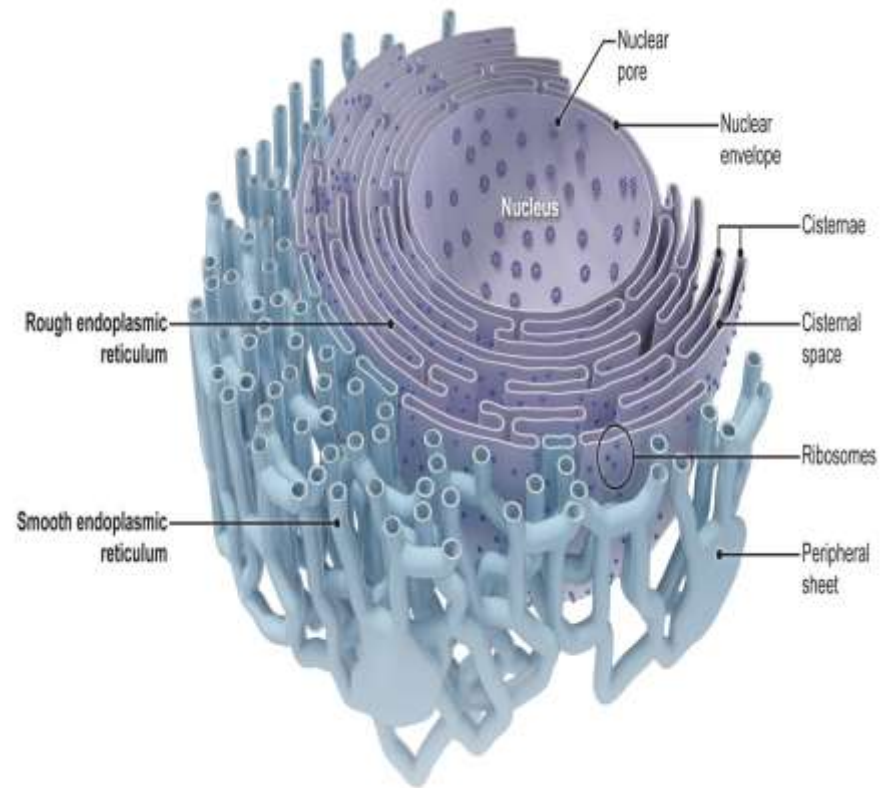


Figure: Animal Cell Structure with Cytoplasm, Image Copyright © Sagar Aryal, www.microbenotes.com

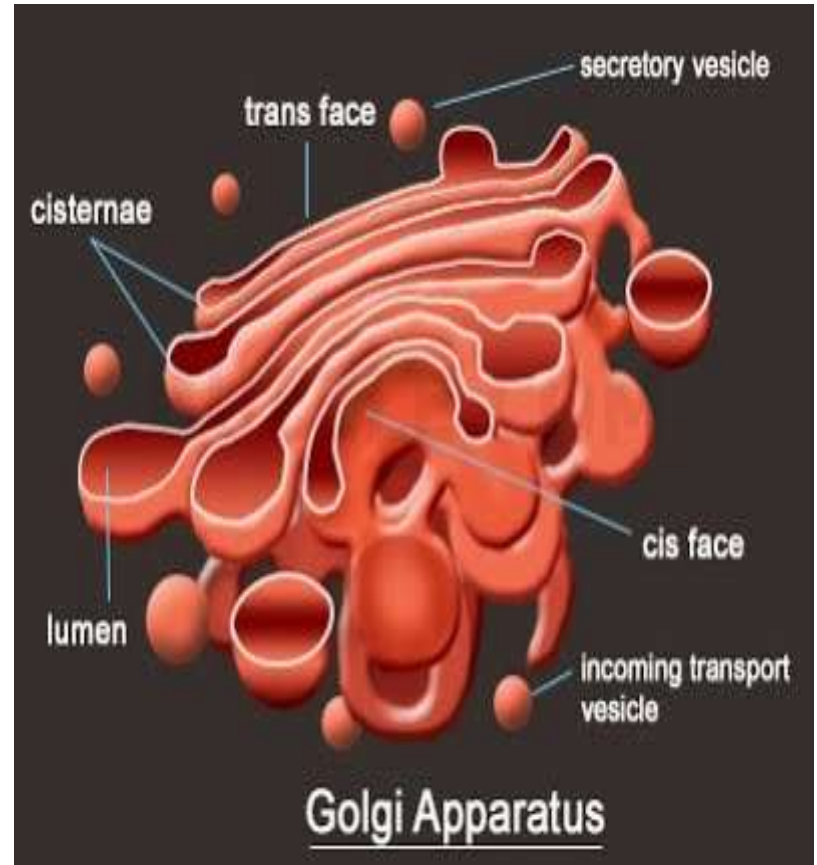
Endoplasmic reticulum

- It is a network of membrane in the form of flattened sacs.
- 2 distinct form of ER are SER & RER.
- Ribosomes are attached to the surface of RER. It is responsible for the synthesis of glycoproteins & phospholipids.
- SER doesn't contain ribosomes and it is the extension of RER. It synthesizes fatty acids & steroids.



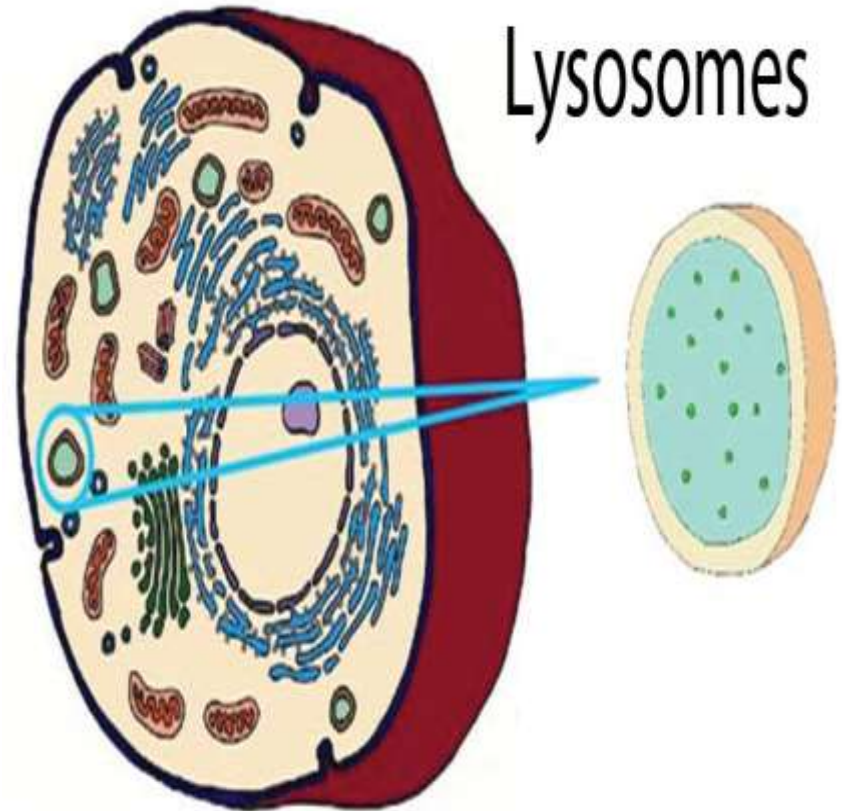
Golgi Complex

- It consists of 3-20 no of small, flattened, membranous sacs with bulging ends.
- Protein molecules enter into the Golgi complex through its cis face by transport vesicles and exit through secretory vesicle from trans face.
- Function: it helps in transport of different enzymes & proteins.



Lysosomes

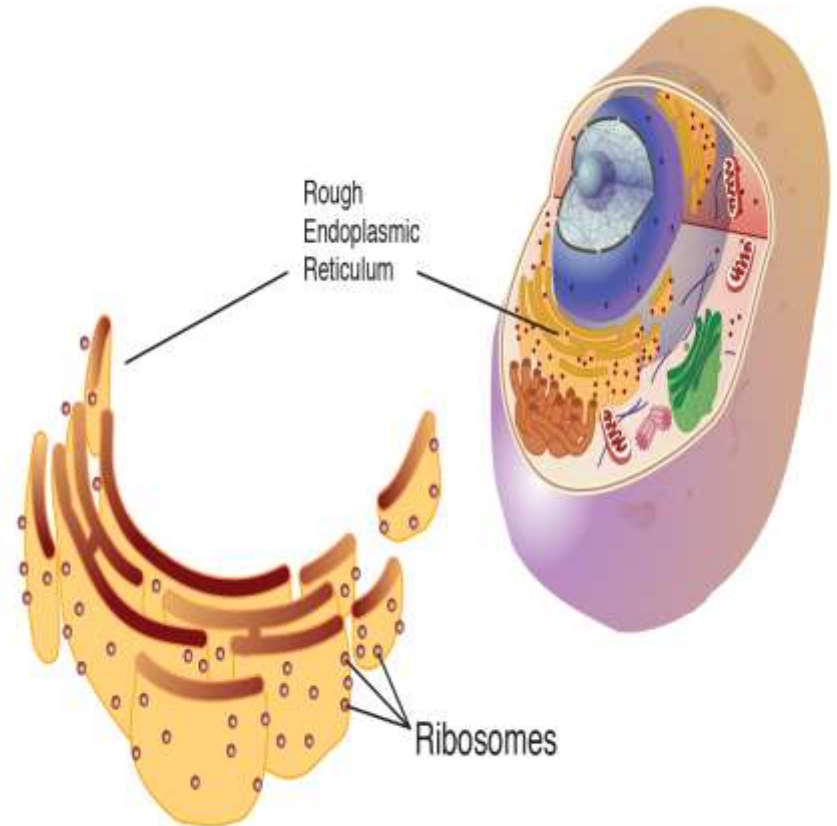
- It is a membrane enclosed vesicle which is formed from golgi complex.
- It contains more than 60 types of digestive enzymes & hydrolytic enzymes, so that it's interior has a pH of 5 which is highly acidic.
- Lysosomal enzymes act within the cell and destroy the entire cell (Autolysis). So it is called as suicidal bag.
- Lysosomes show autophagy activity that it can digest entire worn out organelles by the help of autophagosomes.



Ribosomes

It is the site of protein synthesis. It is located inside mitochondria and synthesise mitochondrial protein

It contains high amount of ribonucleic acid. There are 3 types of RNA and they are mRNA, tRNA, rRNA.

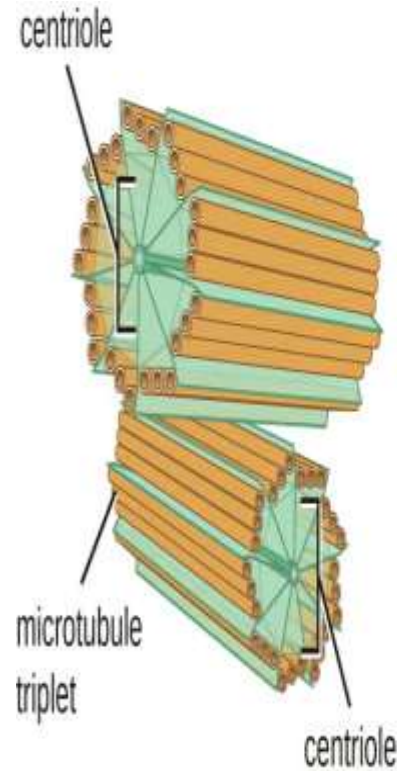


Centrosome

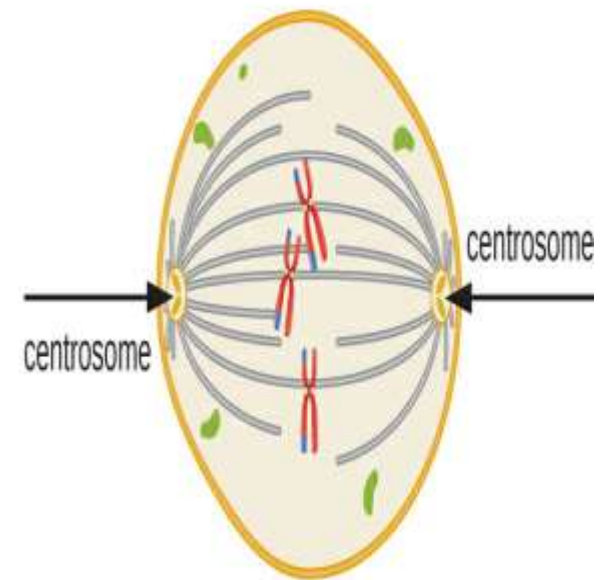
It is located near nucleus.

It consists of 2 components.

- a pair of centrioles which are cylindrical structure and composed of 9 cluster of 3 microtubules
- Pericentriolar material which contains 100 no of ring shaped complex composed of tubulin protein. It helps in growth of mitotic spindle fibers during cell division.
- During cell division centrosome replicates, so the offsprings have the capacity for cell division.



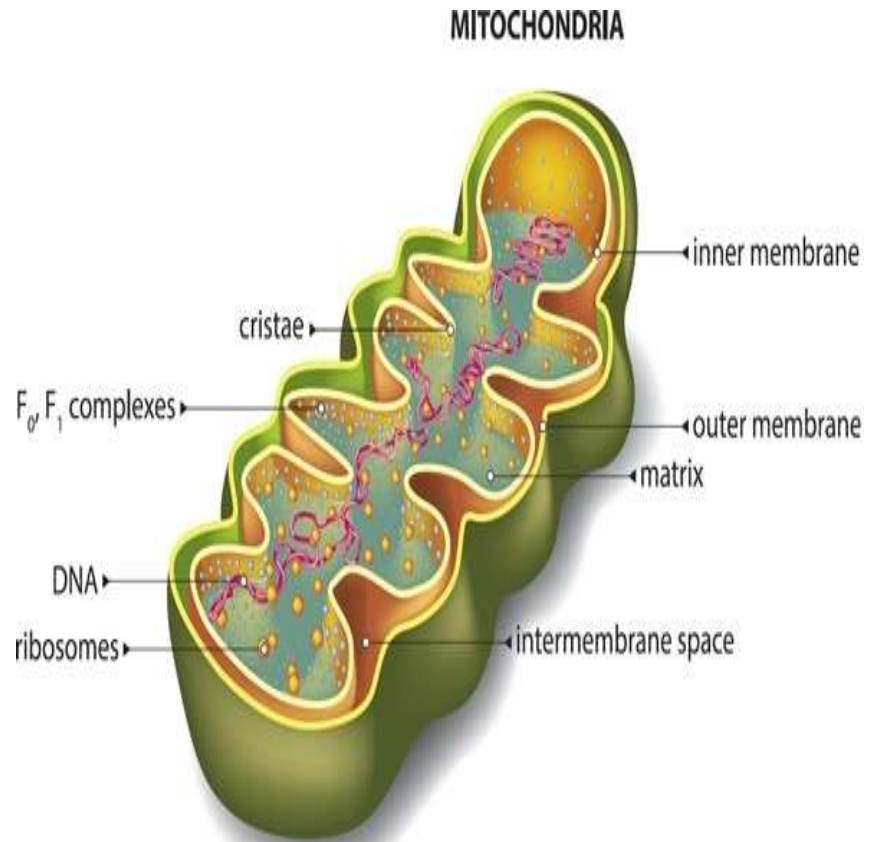
(a)



(b)

Mitochondria

- It consists of an outer mitochondrial membrane and inner mitochondrial membrane with fluid filled space between them.
- They generate ATP through aerobic respiration, so known as “power house of cell”.
- It helps in synthesis of proteins & protein metabolism.



Nucleus

- Spherical oval shaped structure
- Surrounded by double membrane nuclear membrane that separates it from cytoplasm
- A spherical str. Inside the nucleus nucleolus that produce ribosome.
- It contains cells hereditary unit genes which controls cell str. & its activity.
- Genes are arranged along chromosomes. Human body cell has 46 or 23 pairs of chromosomes.

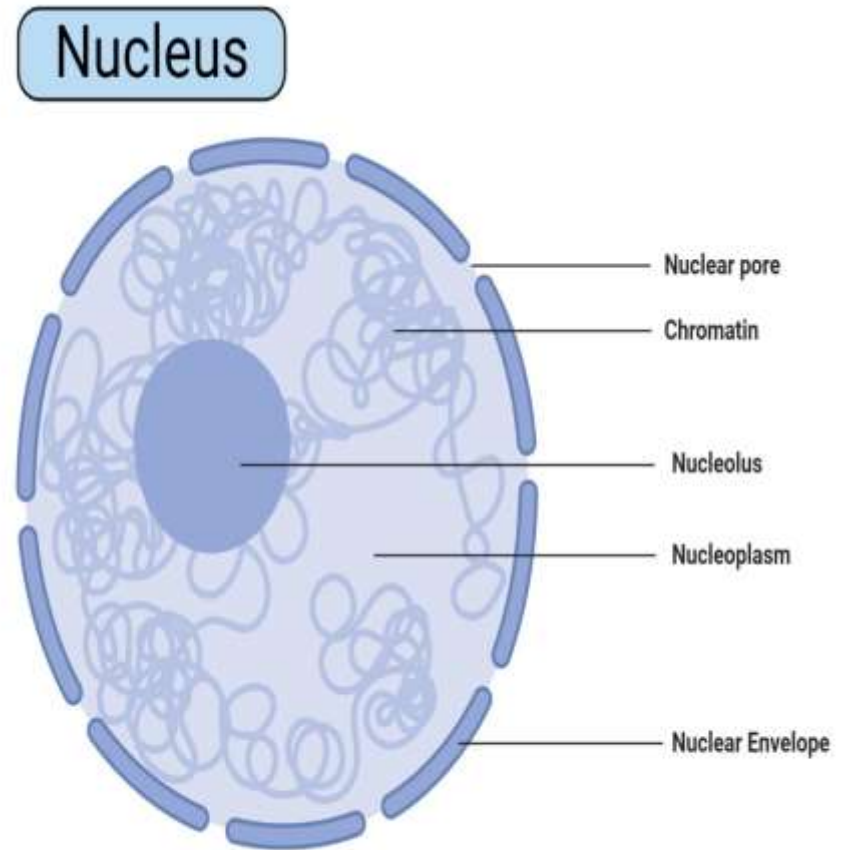
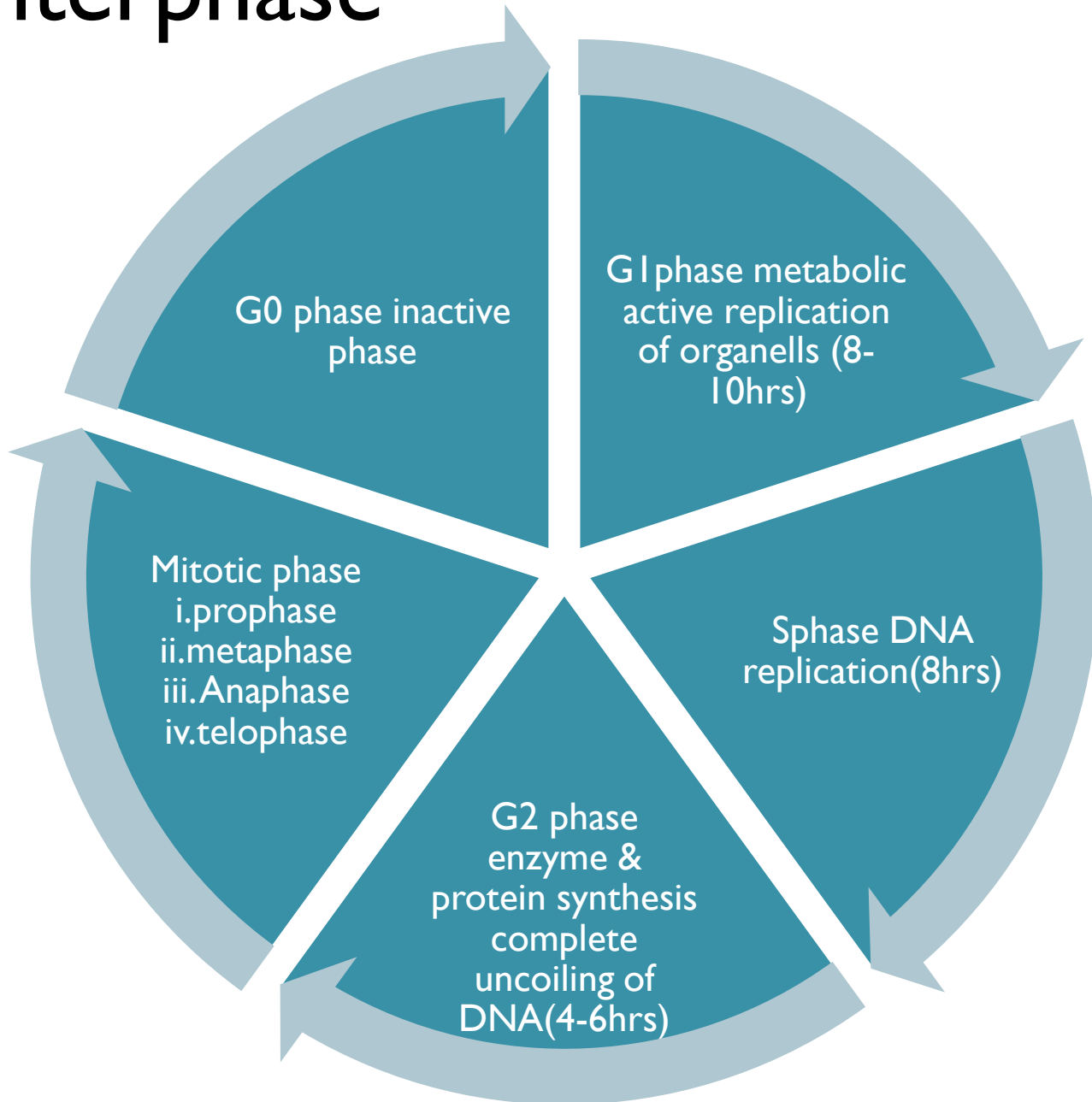


Figure: Nucleus, Image Copyright © Sagar Aryal, www.microbenotes.com

Cell Division

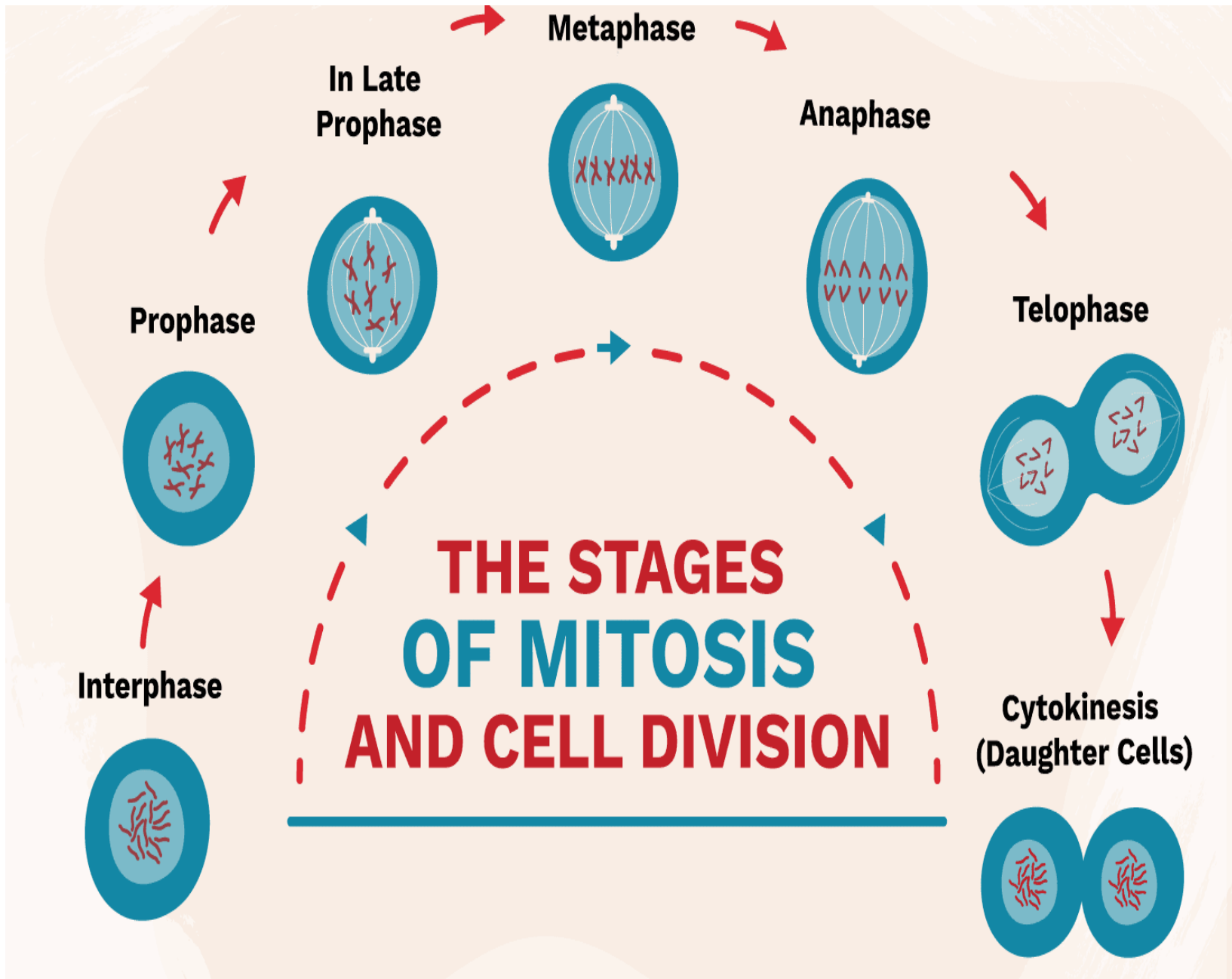
- The process by which the cells reproduce is cell division.
- The process is of two types.
 - Somatic cell division (division of cells other than germ cells)
 - Nuclear division-mitosis → interphase
 - Cytoplasmic division-cytokinesis → Mitotic phase
 - Reproductive cell division (division of germ cells)-meiosis

Interphase



Metaphase

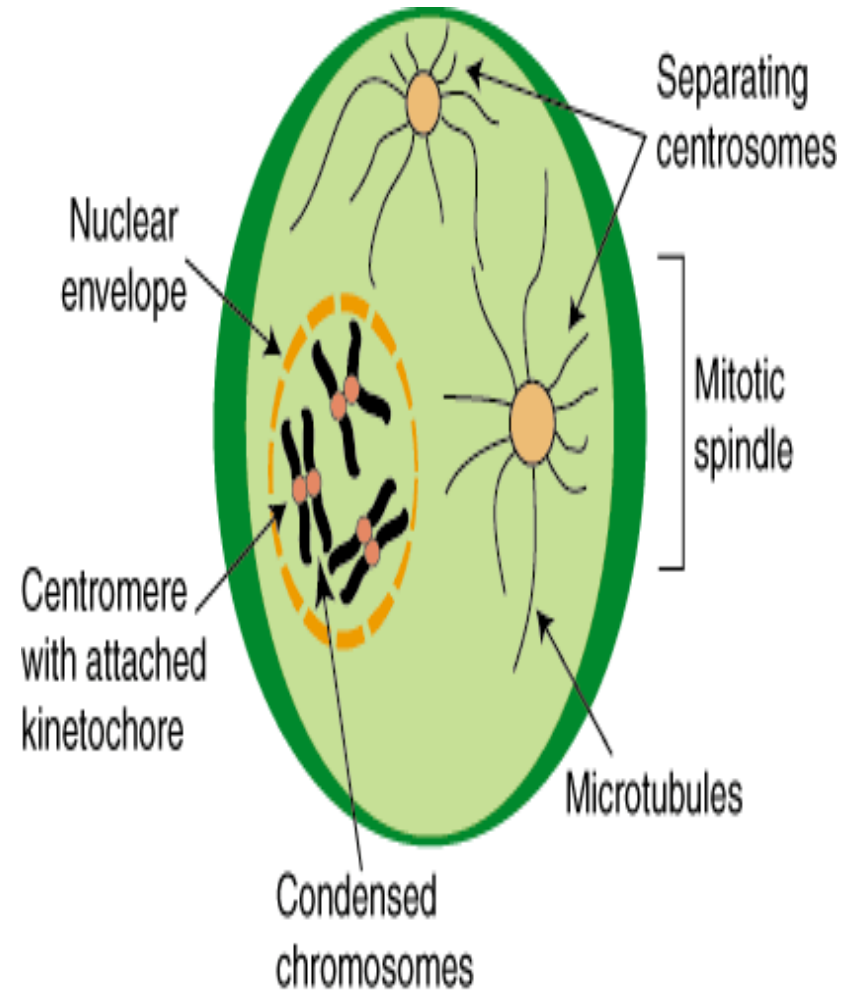
- Formation of two identical cells
- Consists of 4 phases
 - Prophase
 - Metaphase
 - Anaphase
 - Telophase



**THE STAGES
OF MITOSIS
AND CELL DIVISION**

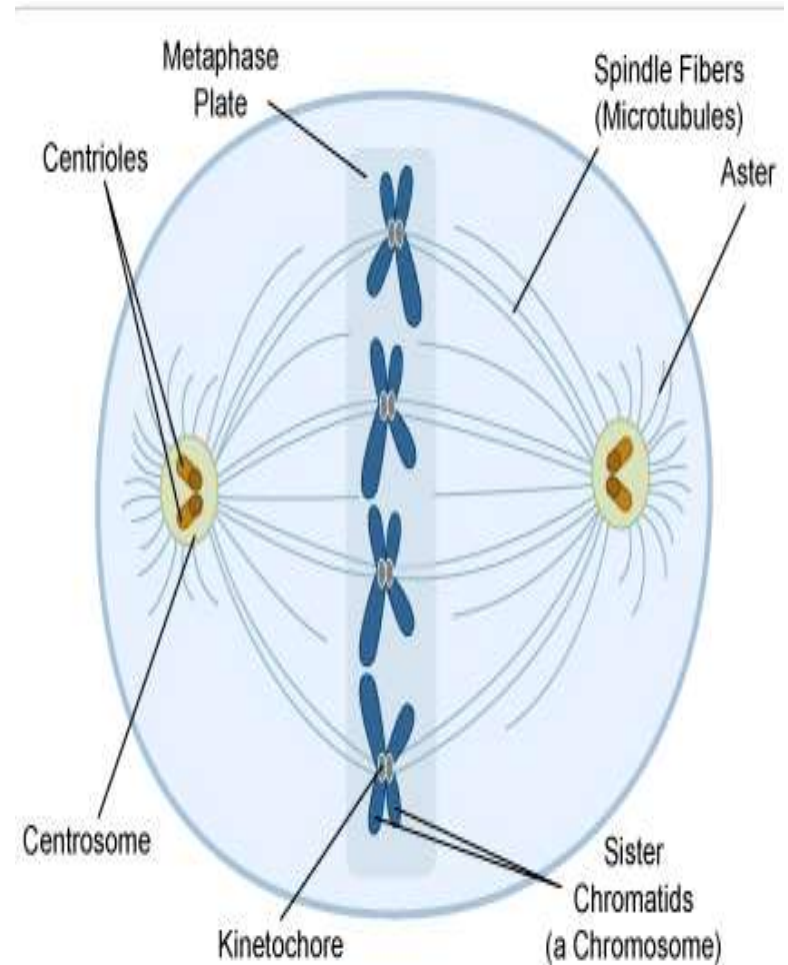
Prophase

- Chromosomes shortens
- Pericentriolar material forms mitotic spindle fibre
- Nucleolus disappears
- Nuclear envelope breaks down



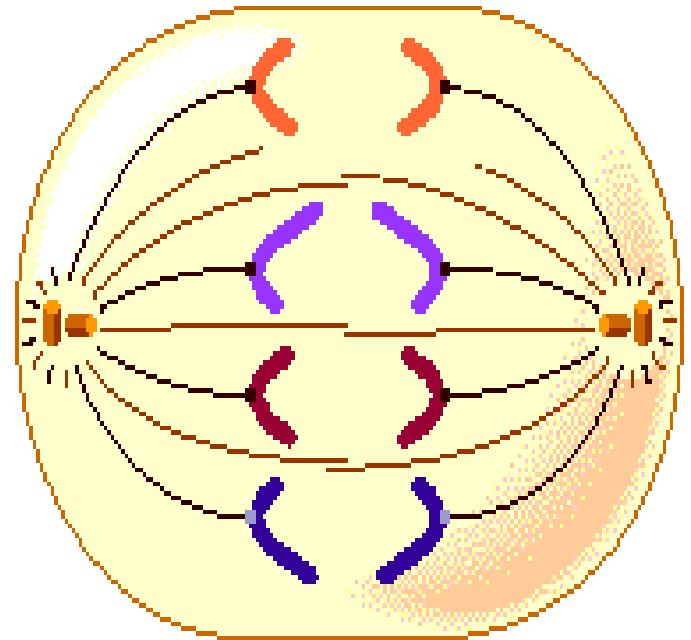
Metaphase

- Centrioles arranged at both the ends
- Sister chromatids arranged at the centre and forms metaphasic plate



anaphase

- Centromeres split
- Separates the pairs of chromatids & move to opposite poles
- Appear as v shape
- Cytokinesis occurs



Telophase

- Final stage
- Chromatin threads disappear
- Nuclear envelope forms
- Mitotic spindle breaks up
- Nucleus appear
- Cleavage furrow forms & divide into 2 cells

