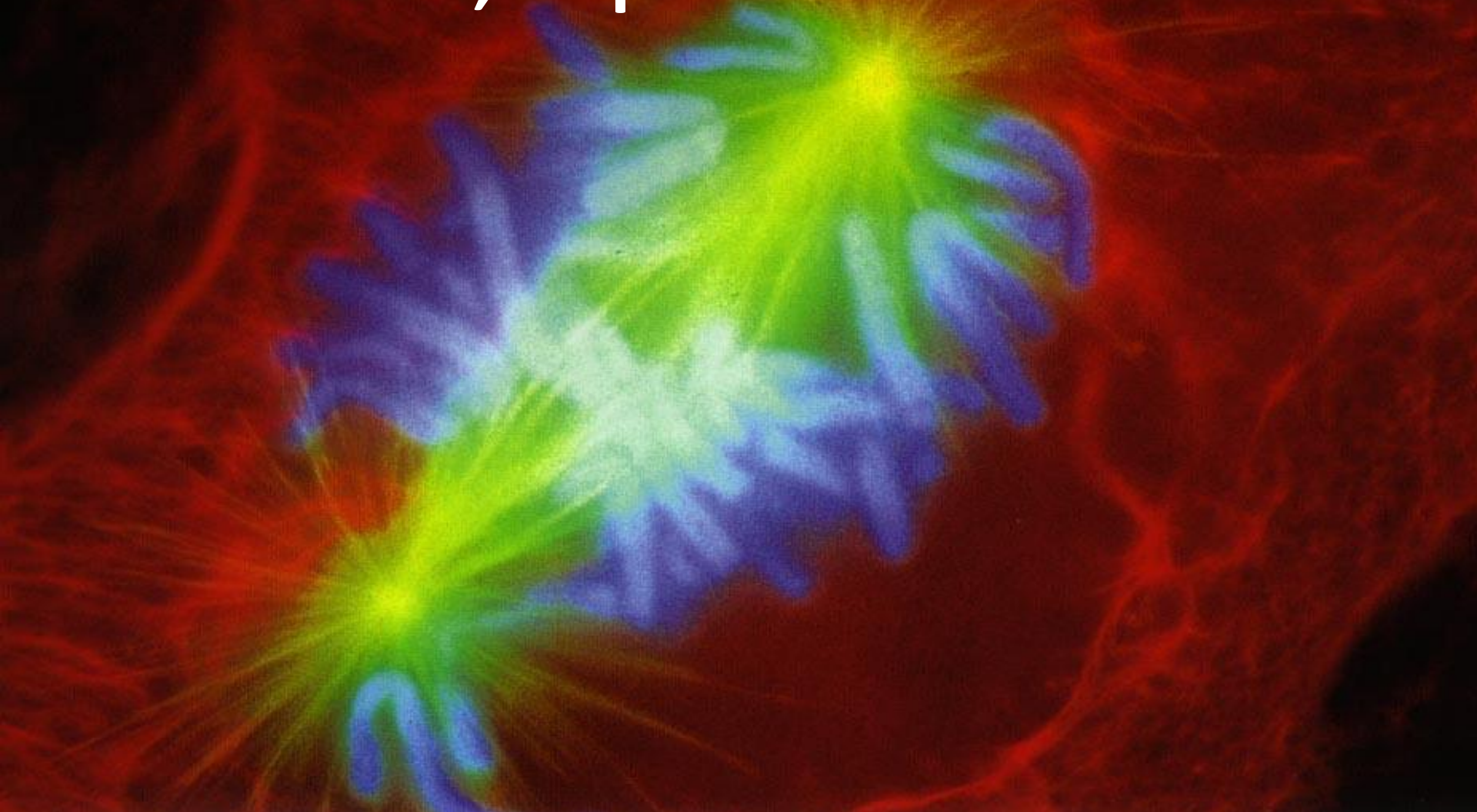


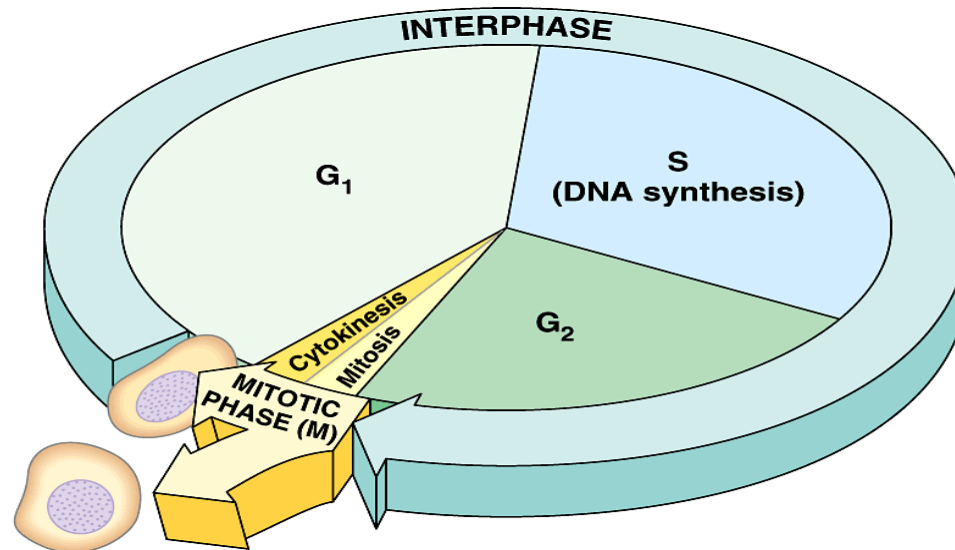
The Cell Cycle

Growth, Duplication & Division



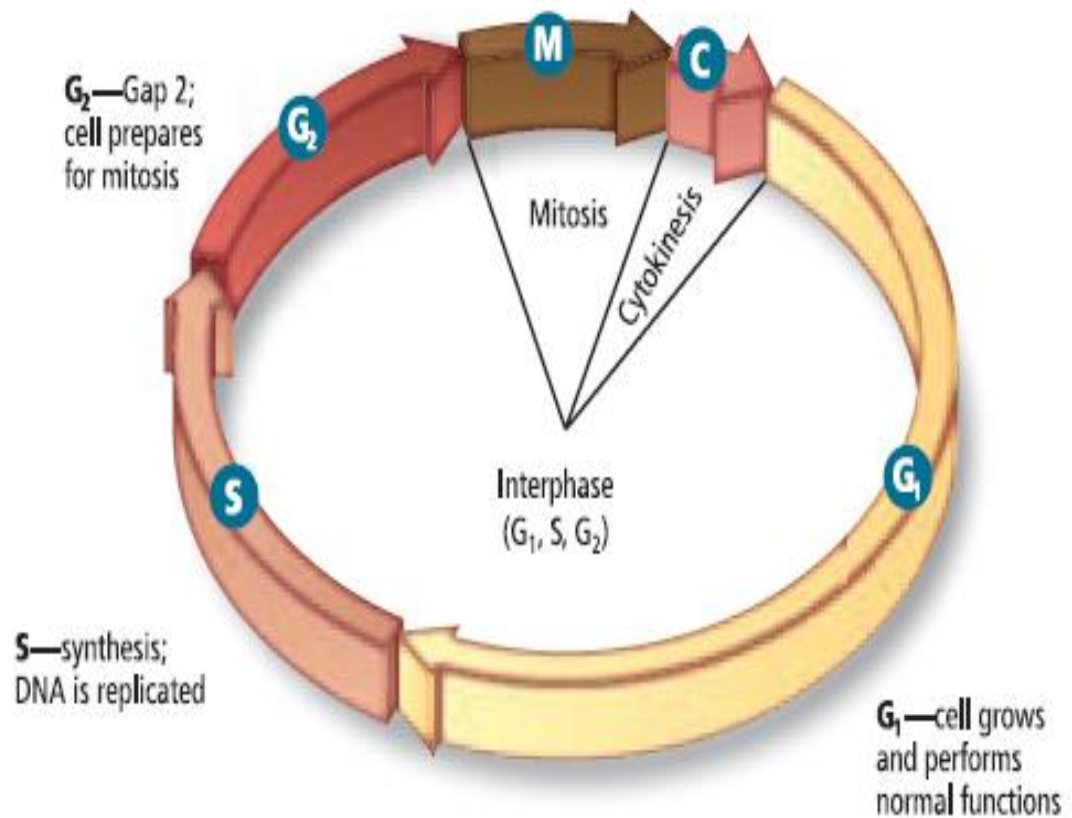
Eukaryotic Cell Cycle

- An orderly sequence of events in which a cell ***grows, duplicates its contents*** and then ***divides*** in two



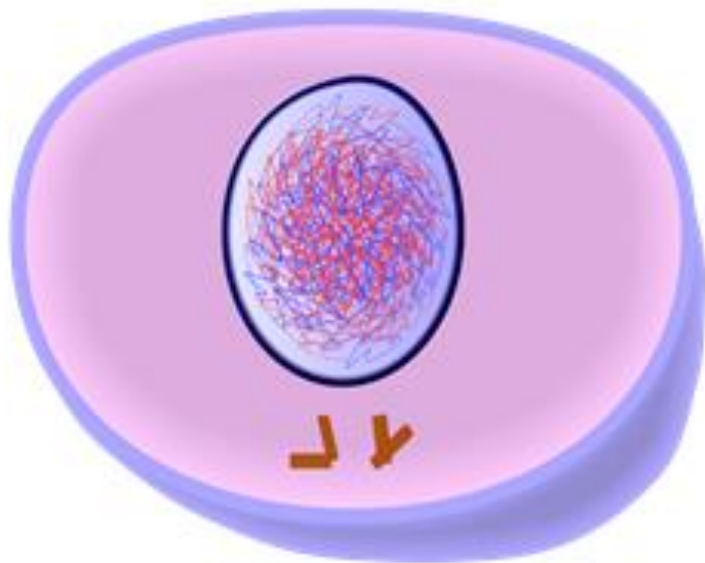
Stages of the Cell Cycle

- Interphase
- Mitosis
- Cytokinesis



Interphase

- During interphase the cell **grows**, makes organelles and **duplicates (copies) its DNA**.

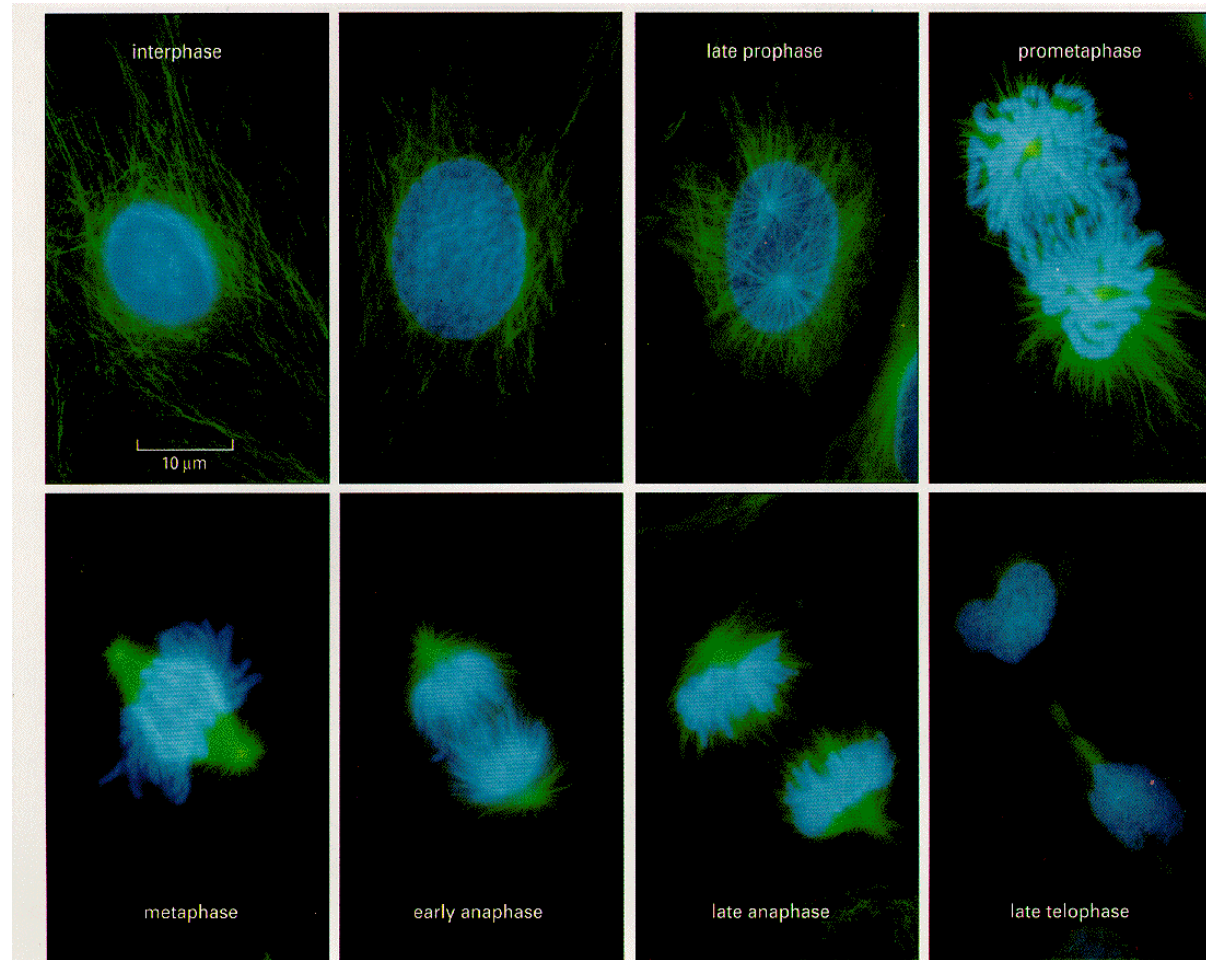


Interphase

- During interphase the cell **grows**, makes organelles and ***duplicates (copies) its DNA***.
 - **G1**: the cell **grows**, makes organelles and prepares for S-phase
 - **S-phase** “synthesis phase” This is when *DNA replication* occurs, i.e. **the cell copies its DNA**
 - **G2** the cell **grows**, makes organelles and prepares for mitosis and cytokinesis

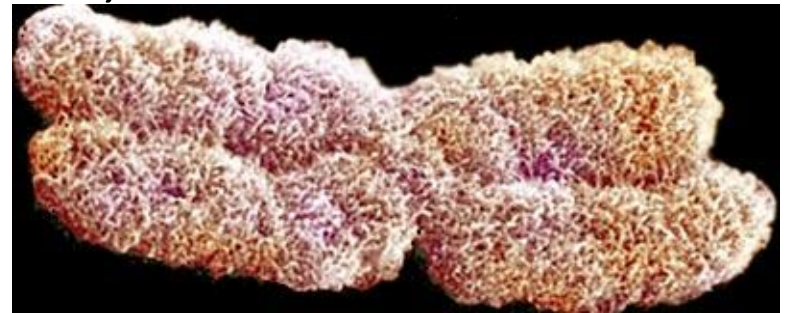
Mitosis:

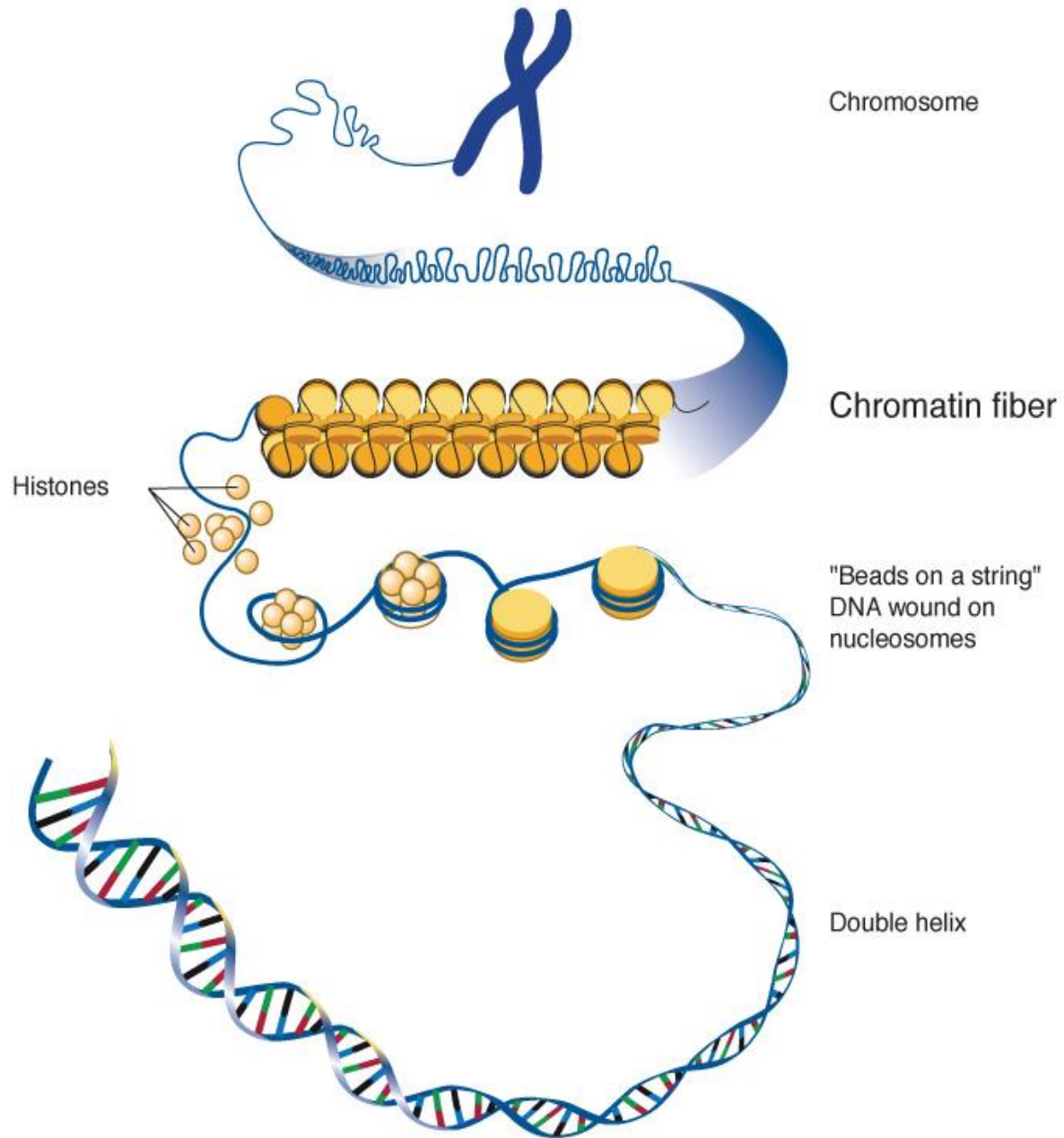
- *Division of the nucleus*
- 4 Phases
 - Prophase
 - Metaphase
 - Anaphase
 - Telophase

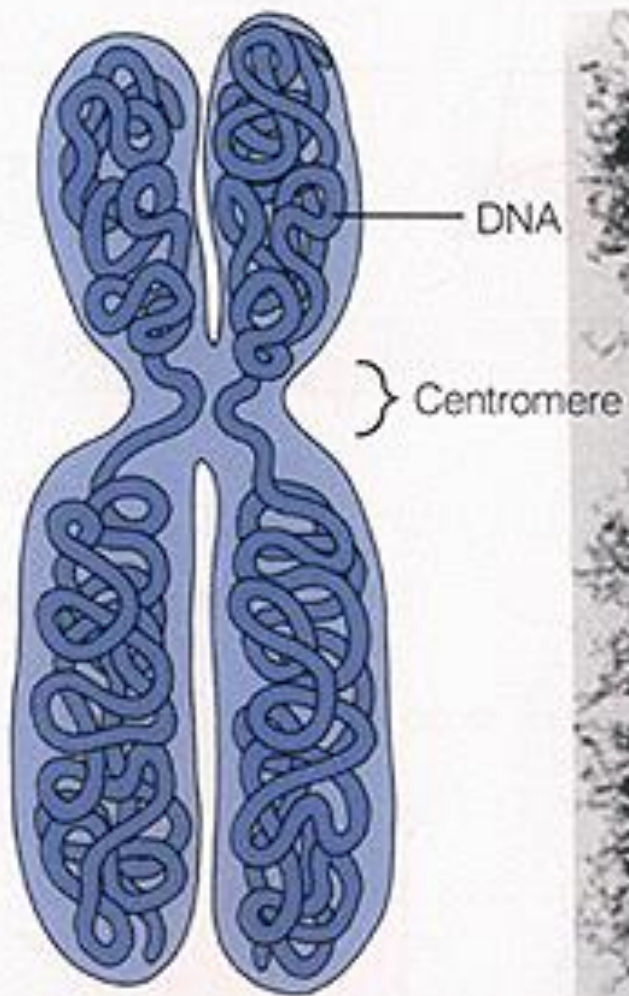


DNA

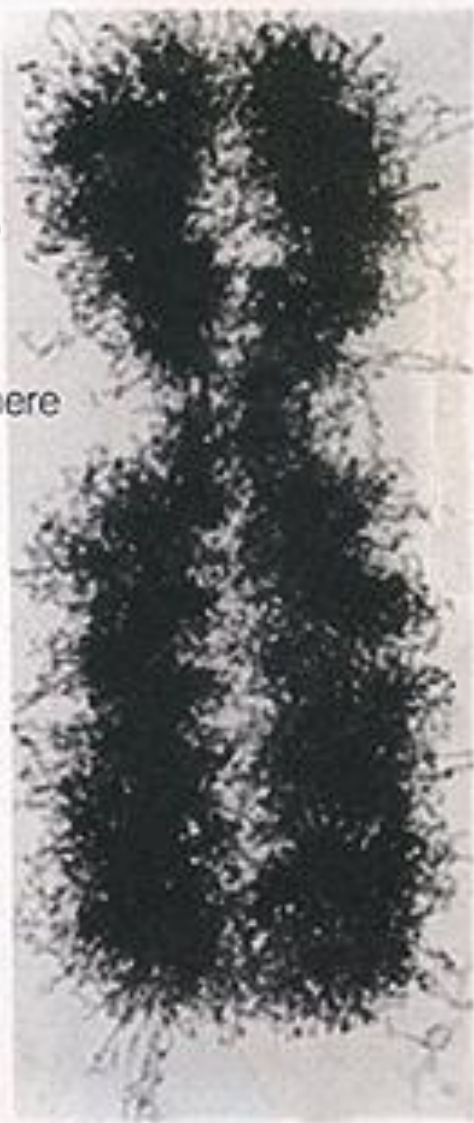
- DNA can be found in one of two forms during the cell cycle: **chromatin** or **chromosome**. Both consist of DNA wrapped around proteins
 - **Chromatin** is the *relaxed or uncondensed* form of DNA. In this state, DNA looks like thread or spaghetti
 - A **Chromosome** forms when chromatin becomes *highly condensed*. In this state, DNA looks like a rod or an X (two rods)







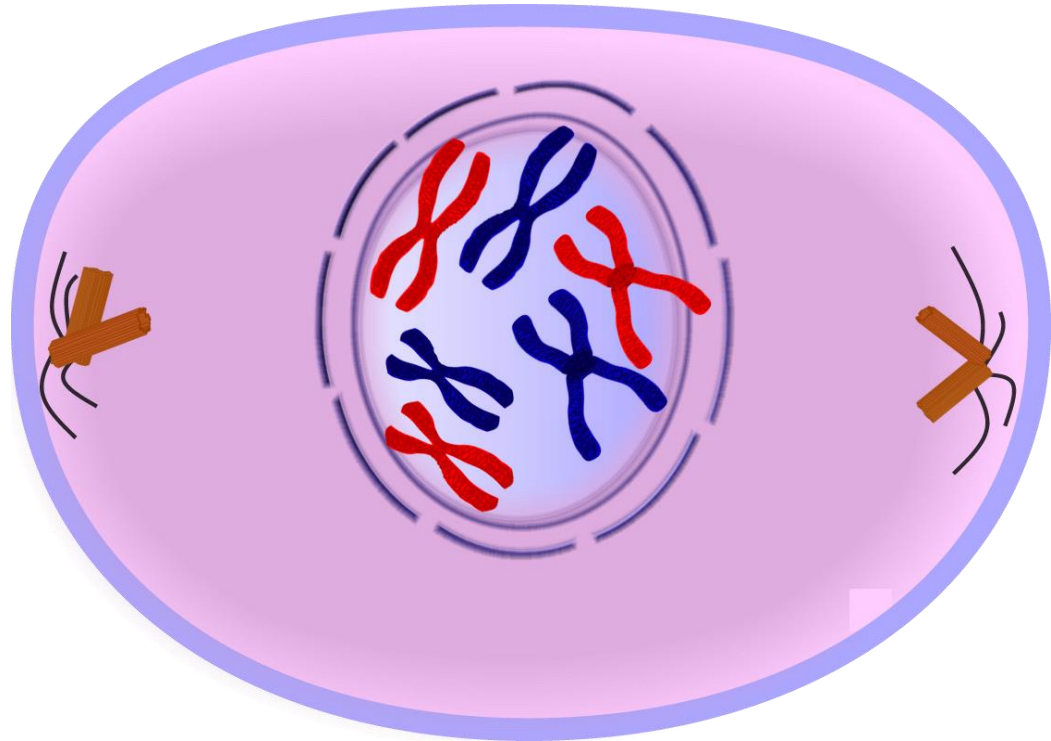
Two chromatids



(b)

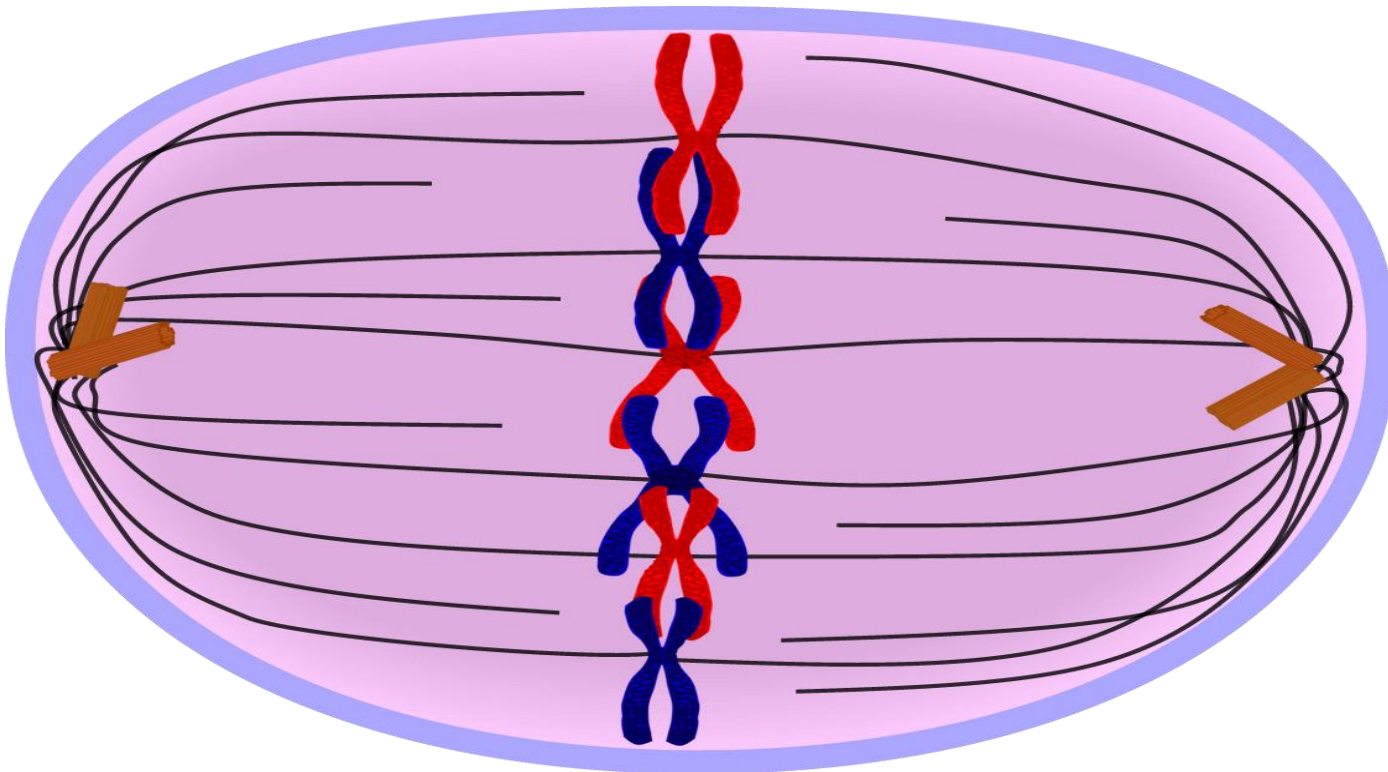
Prophase

- Chromatin condenses into chromosomes
- The nuclear membrane breaks down
- Mitotic spindle begins to form between the poles



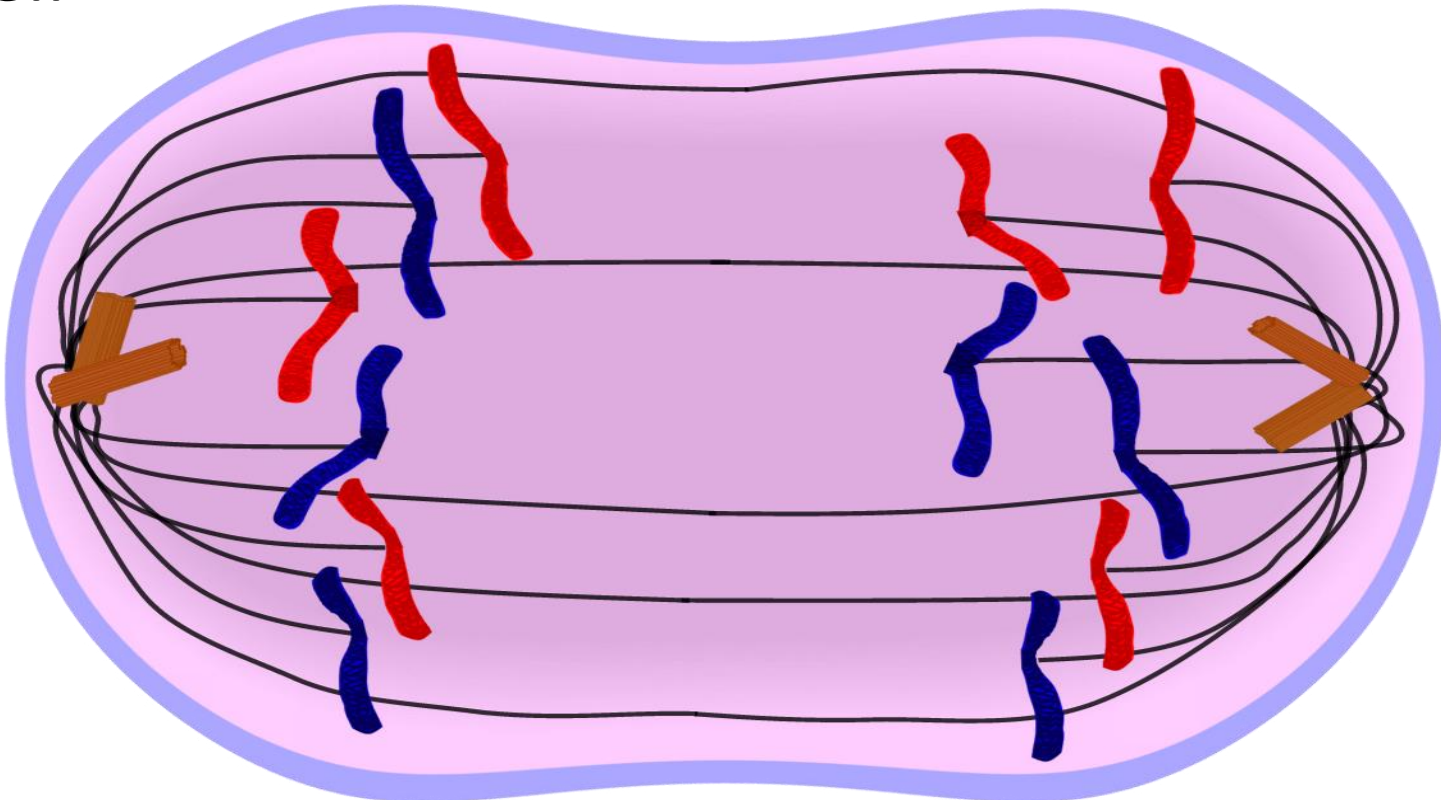
Metaphase

- Chromosomes attach to the mitotic spindle and line up along the equator of the cell



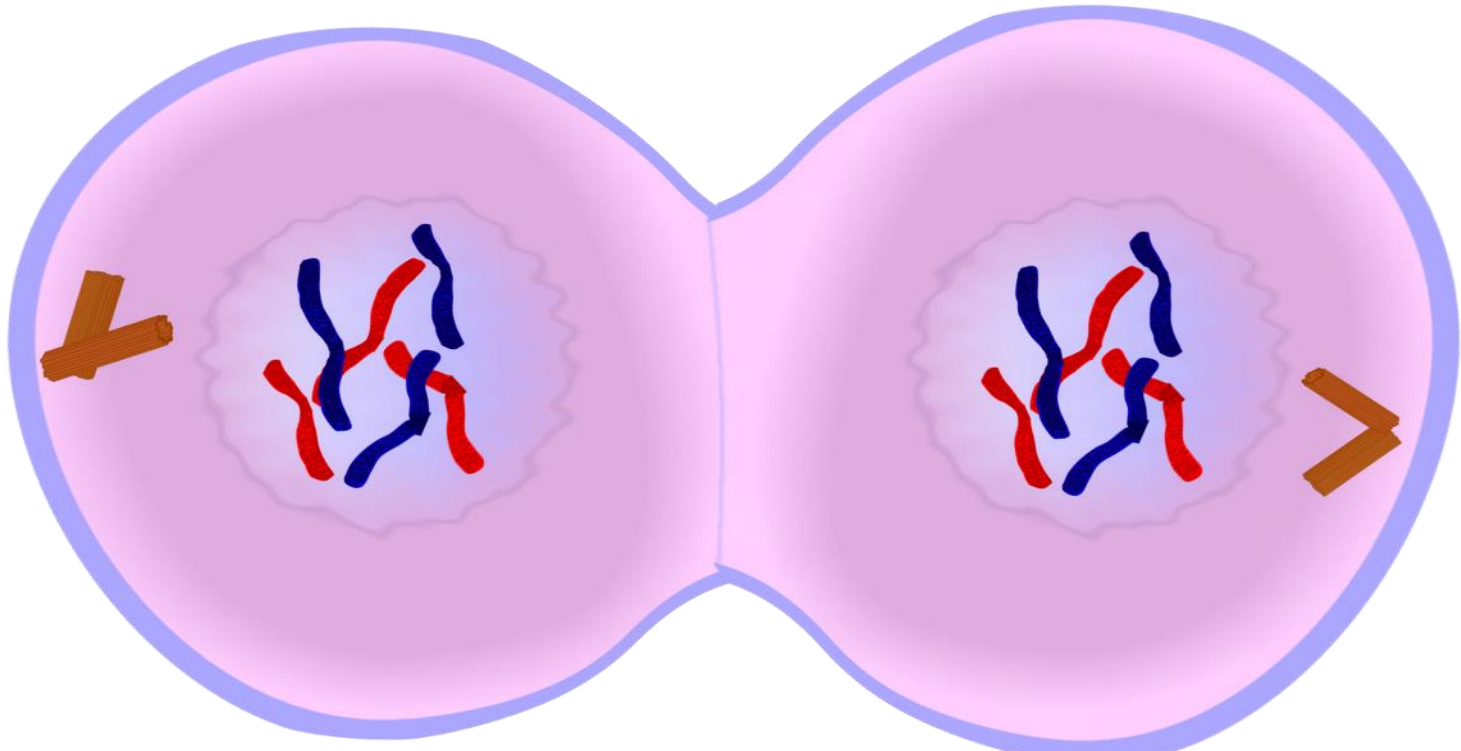
Anaphase

- Microtubules of the mitotic spindle shorten, pulling chromosomes to opposite ends of the cell



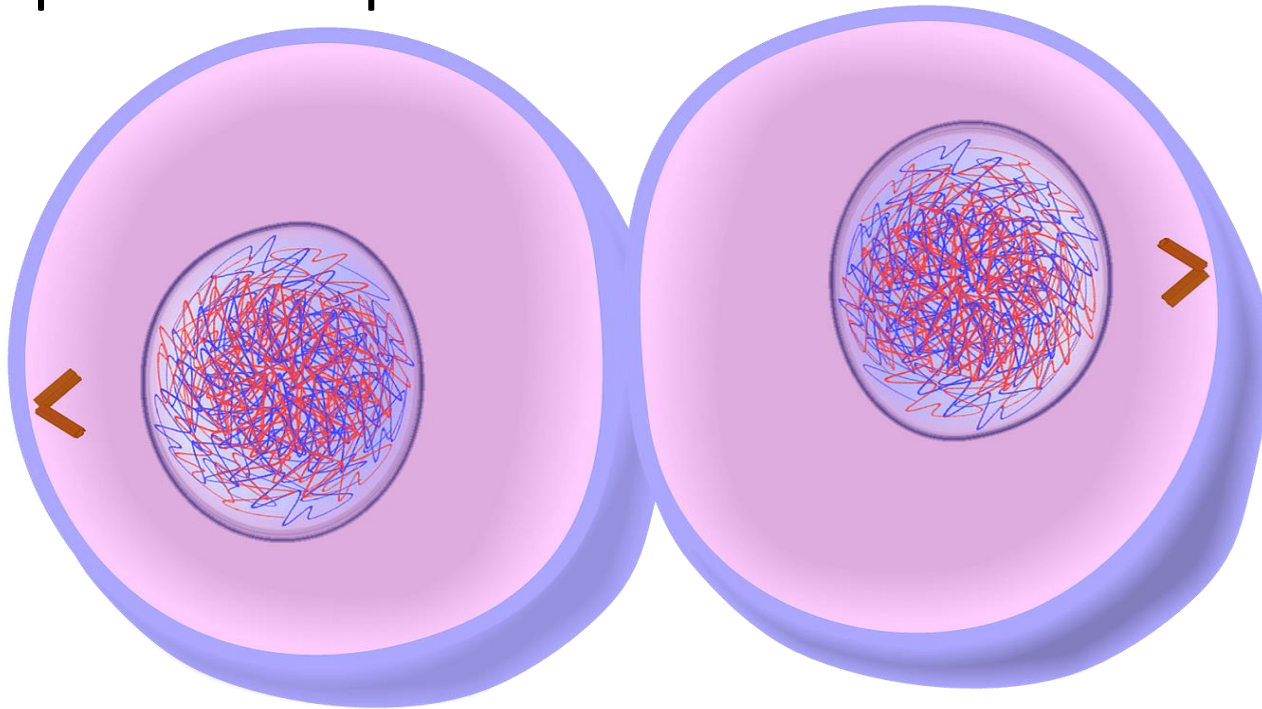
Telophase

- Nuclear envelope reforms
- Chromosomes decondense
- The mitotic spindle is disassembled

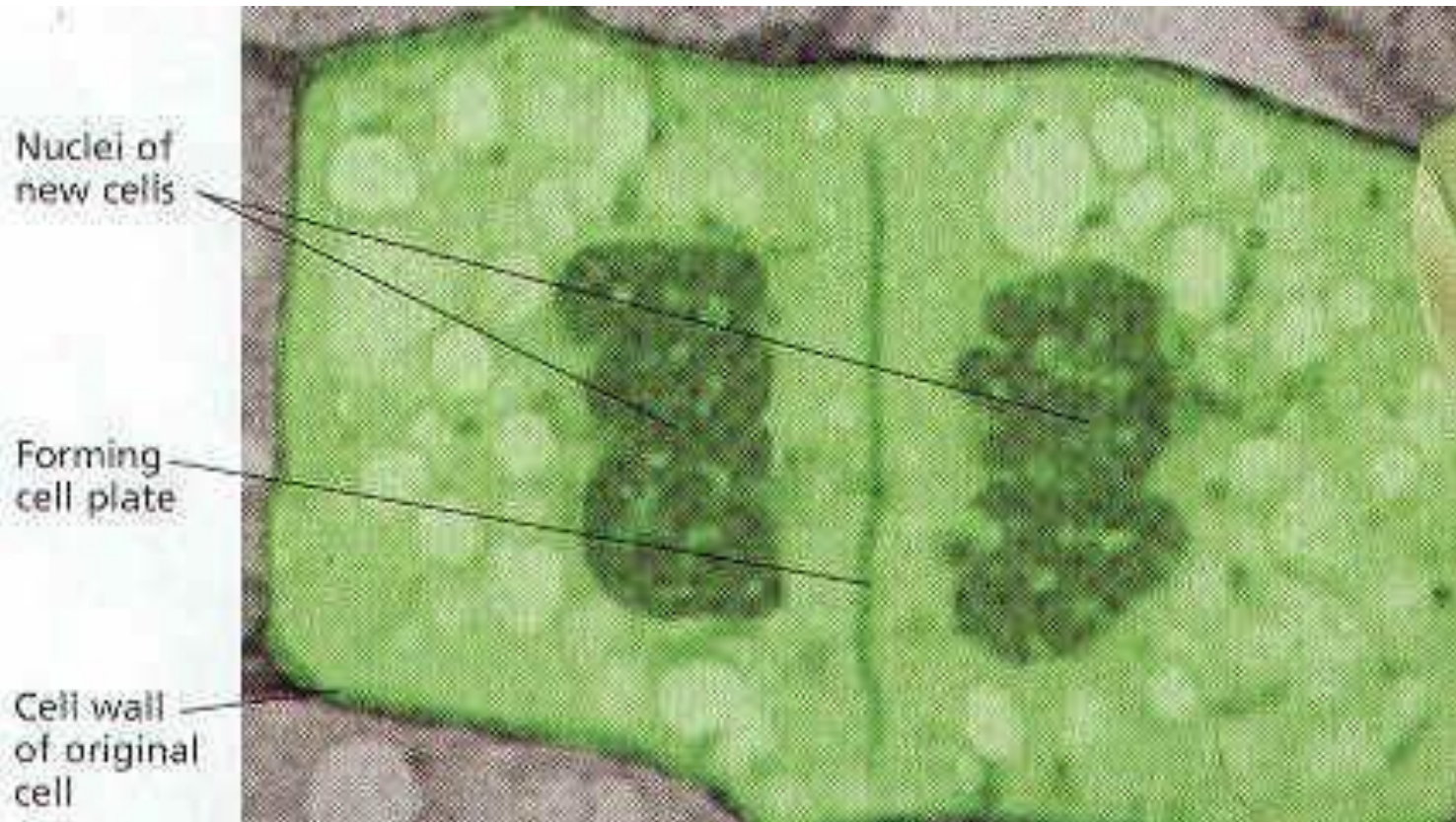


Cytokinesis

- *Division of the cytoplasm (cytosol & organelles)*
 - In animal cells a cleavage furrow forms along the equator and pinches inward until the cell divides



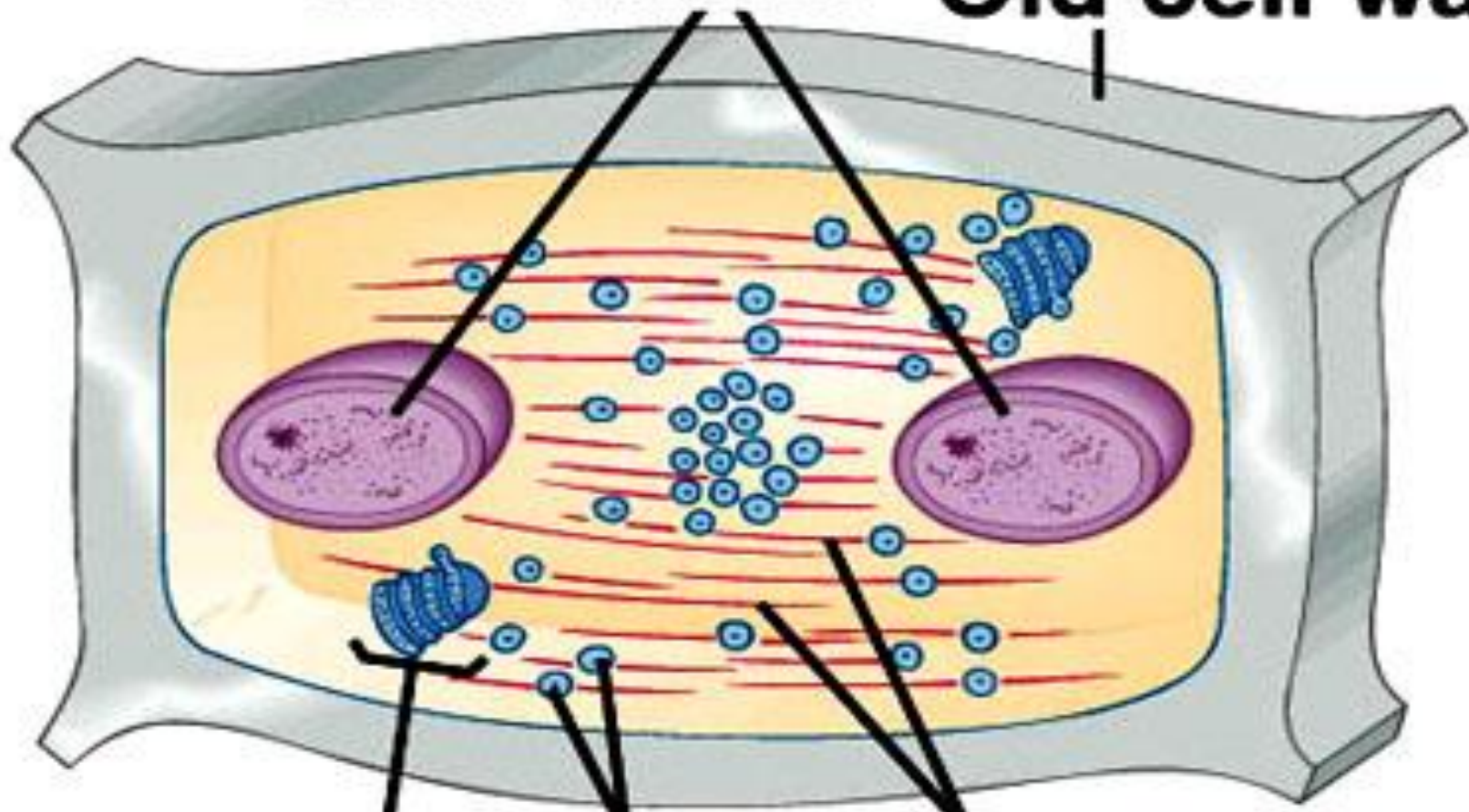
In plant cells a **cell plate** forms between the two daughter nuclei and grows until it divides the cell.



Cytokinesis in Plant Cells

Cell Plate Formation

New nuclei Old cell wall



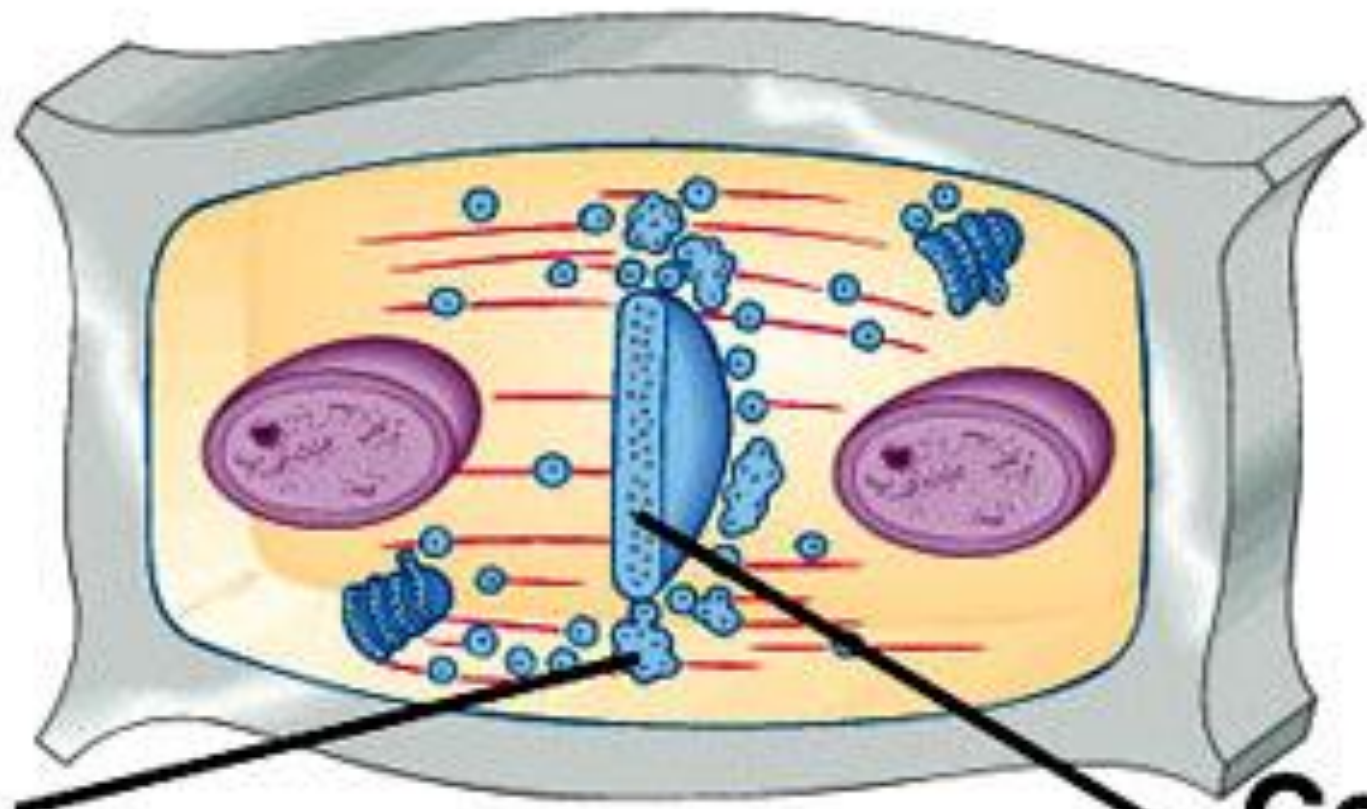
Golgi

vesicle

Spindle

Cytokinesis in Plant Cells

Cell Plate Formation



Fusing vesicle

Cell plate

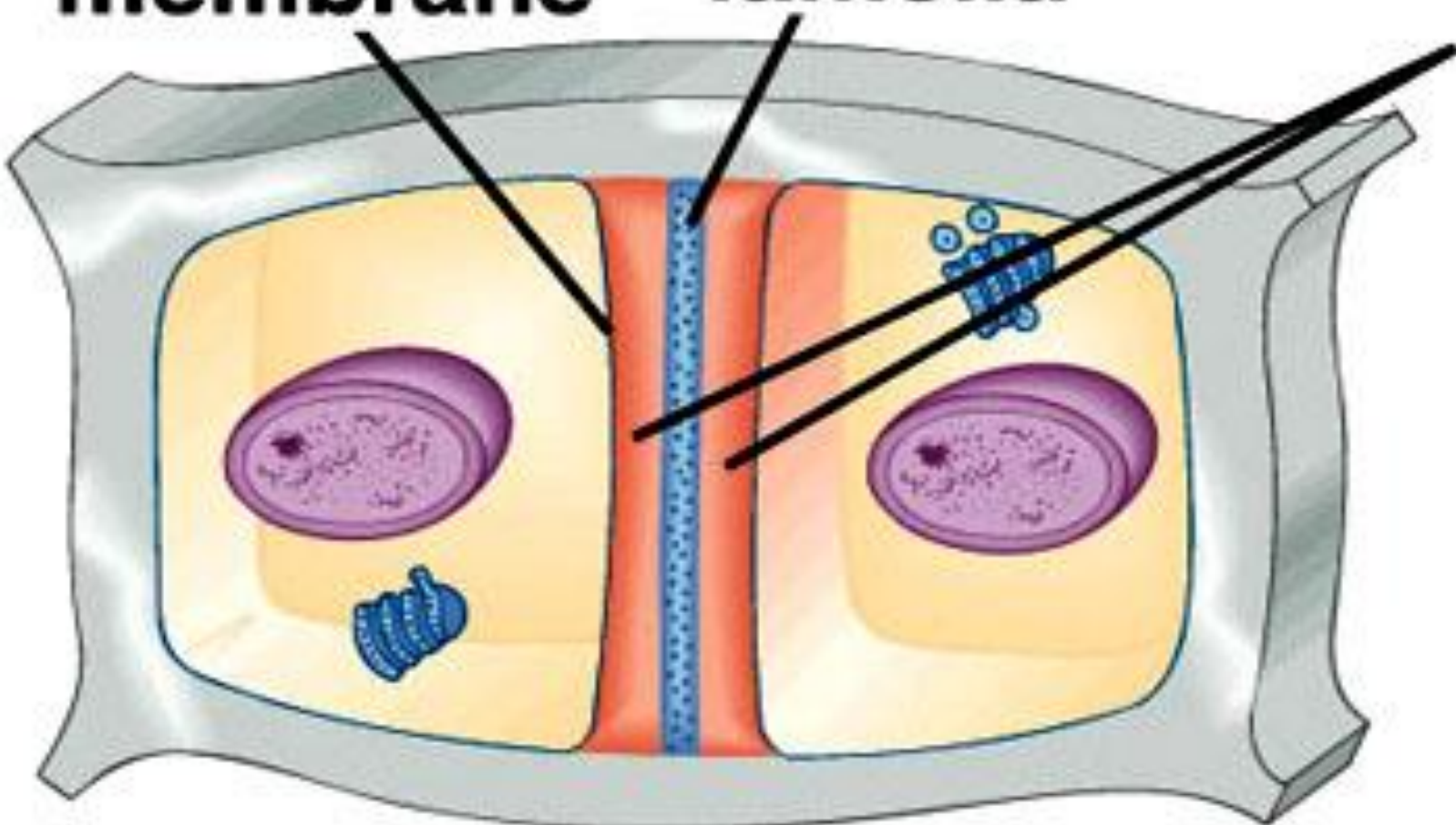
Cytokinesis in Plant Cells

Cell Plate Formation

plasma
membrane

Middle
lamella

New
cell
walls



The End Result:

- The cell cycle produces two daughter cells that are genetically identical to the parent cell



Cell cycle regulation

1. a. Cyclins -Proteins that bind to receptor enzymes that initiate the next step.
b. Checkpoints.

2. Cancer (Rapid, uncontrolled growth of cells)
 - a. Cells spend less time in Interphase.
 - b. Carcinogens.
 - c. Tumors- Benign vs. Malignant
- Metastasis

 - d. Why doesn't everyone get it?

Note: Stem Cells