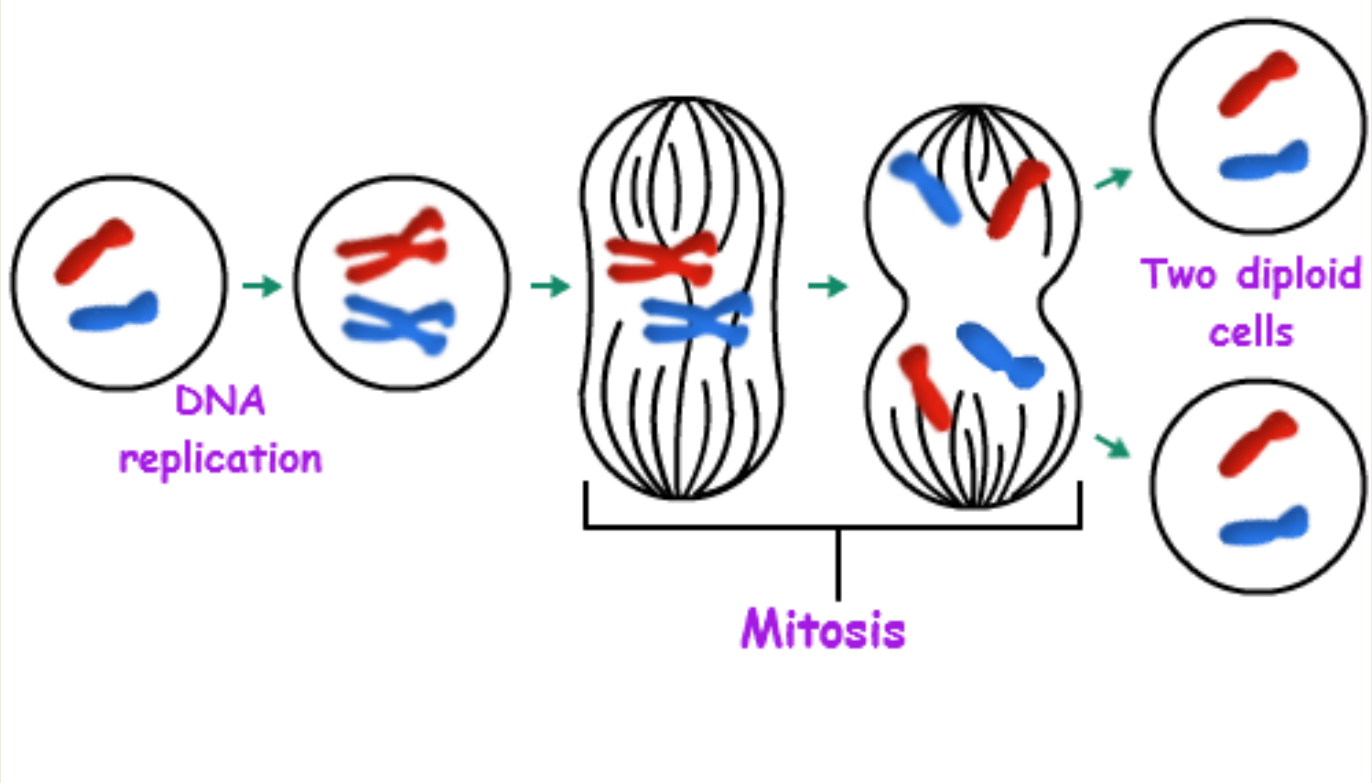
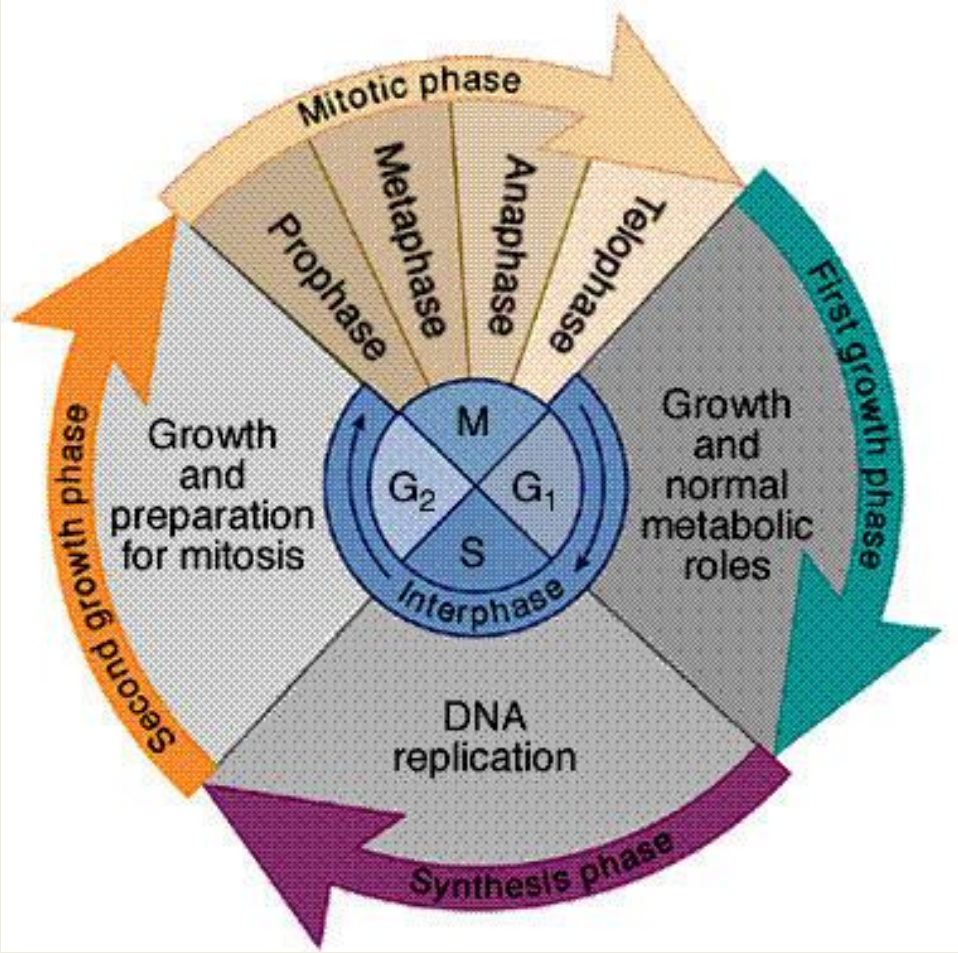
MITOSIS



The cell cycle



The cell cycle: G1 , S, G2,M

1- Growth and normal metabolic roles (first growth phase)

2- DNA replication (synthesis phase)

3-Growth and preparation for mitosis (second growth phase)

4-Mitotic phase

G1,S,G2 = interphase

- **Overview of Mitosis**

  Cell division is an elegant process that enables organisms to grow and reproduce. Through a sequence of steps, the replicated genetic material in a parent cell is equally distributed to two daughter cells. While there are some subtle differences, mitosis is remarkably similar across organisms.

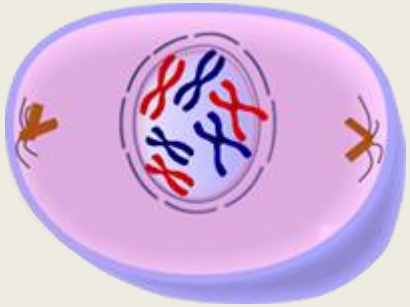
  Before a dividing cell enters mitosis, it undergoes a period of growth called interphase. Interphase is the "holding" stage or the stage between two successive cell divisions. In this stage, the cell replicates its genetic material and organelles in preparation for division.

Mitosis is composed of several stages:

- Prophase
- Metaphase
- Anaphase
- Telophase

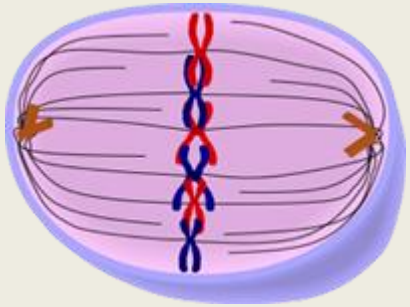
- **Prophase**

  In prophase, the chromatin condenses into discrete chromosomes. The nuclear envelope breaks down and spindles form at opposite "poles" of the cell.

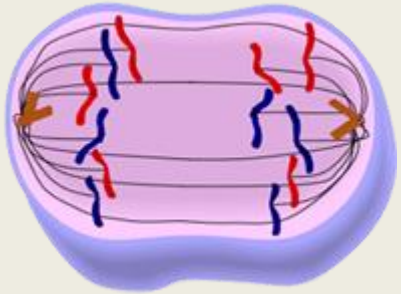


- **Metaphase**

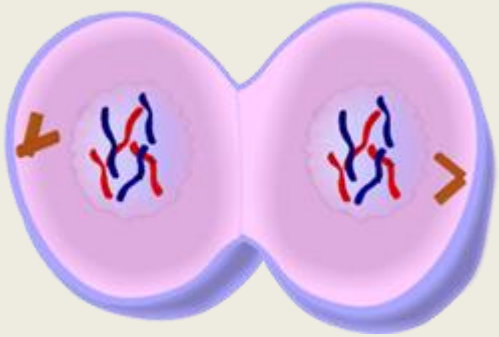
  In metaphase, the chromosomes are aligned at the metaphase plate (a plate that is equally distant from the two spindle poles).



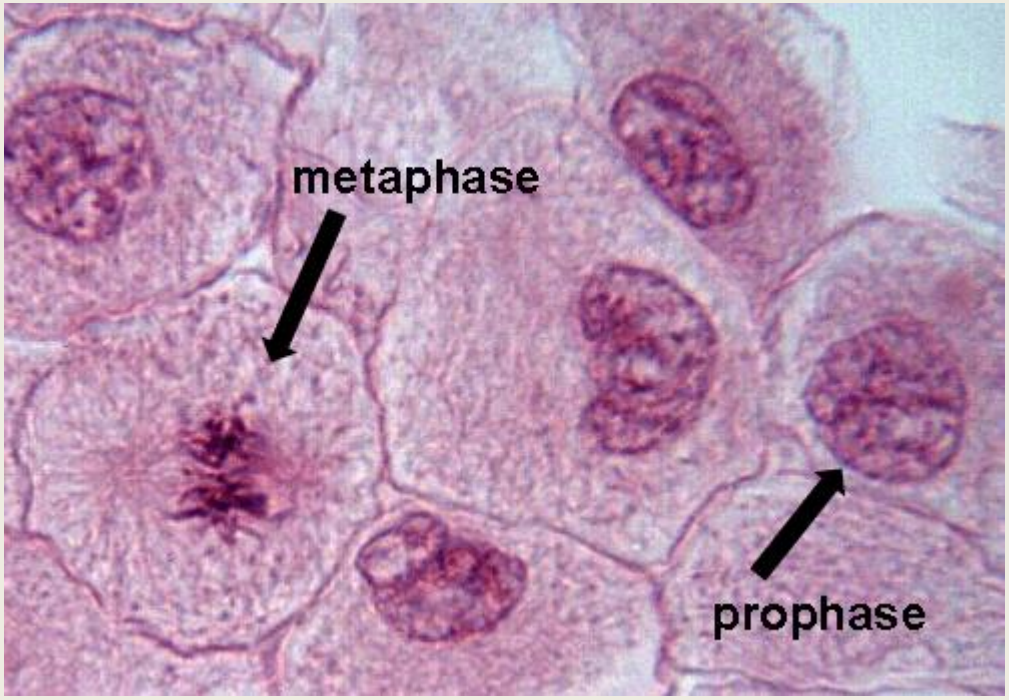
- **Anaphase**
  In anaphase, the paired chromosomes (sister chromatids) move to opposite ends of the cell.

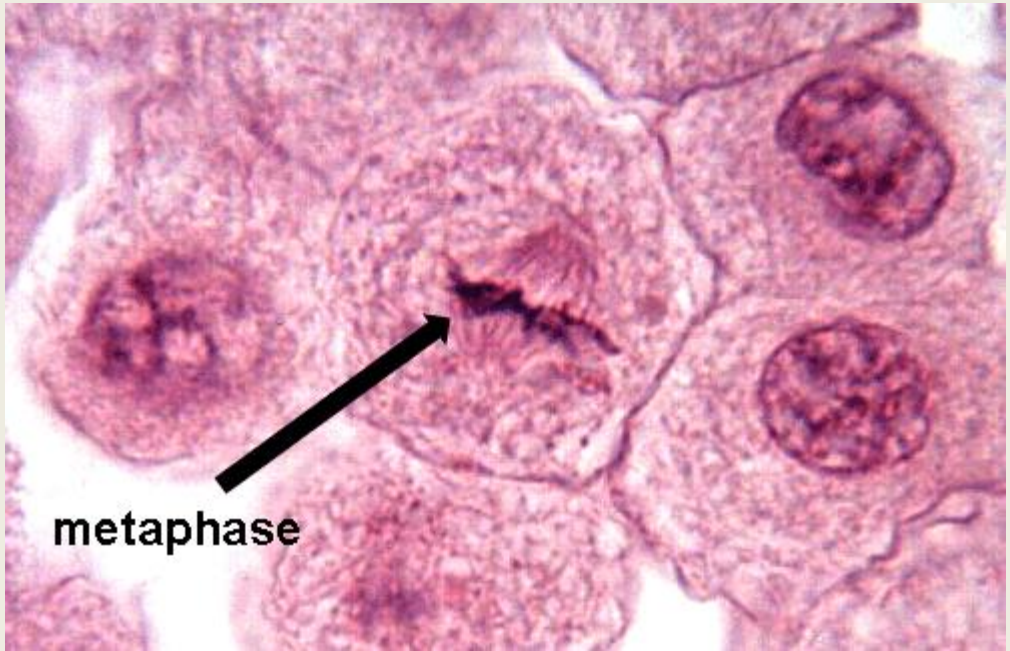


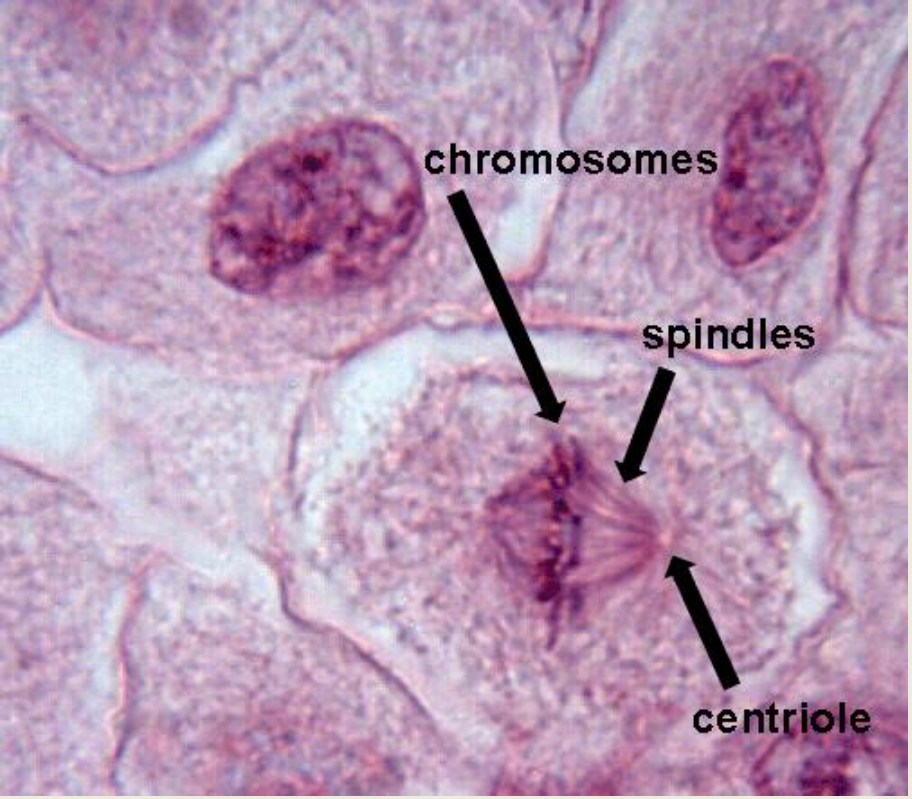
- **Telophase**
  In this last stage, the chromosomes are cordoned off in distinct new nuclei in the emerging daughter cells. Cytokinesis is also occurring at this time.

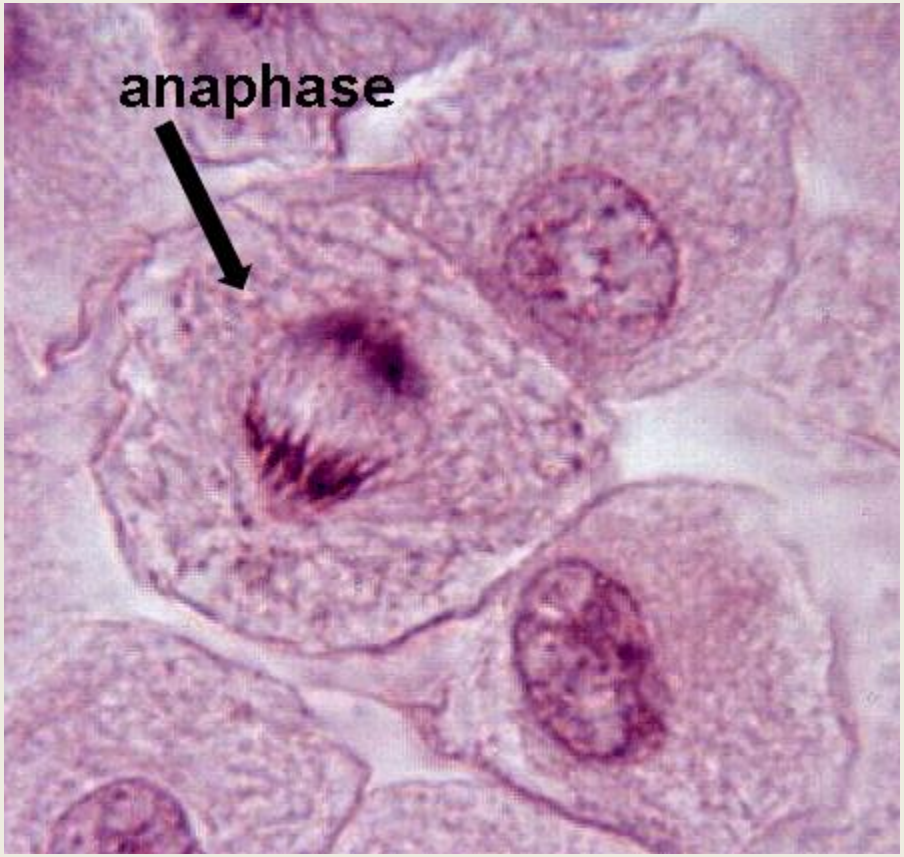


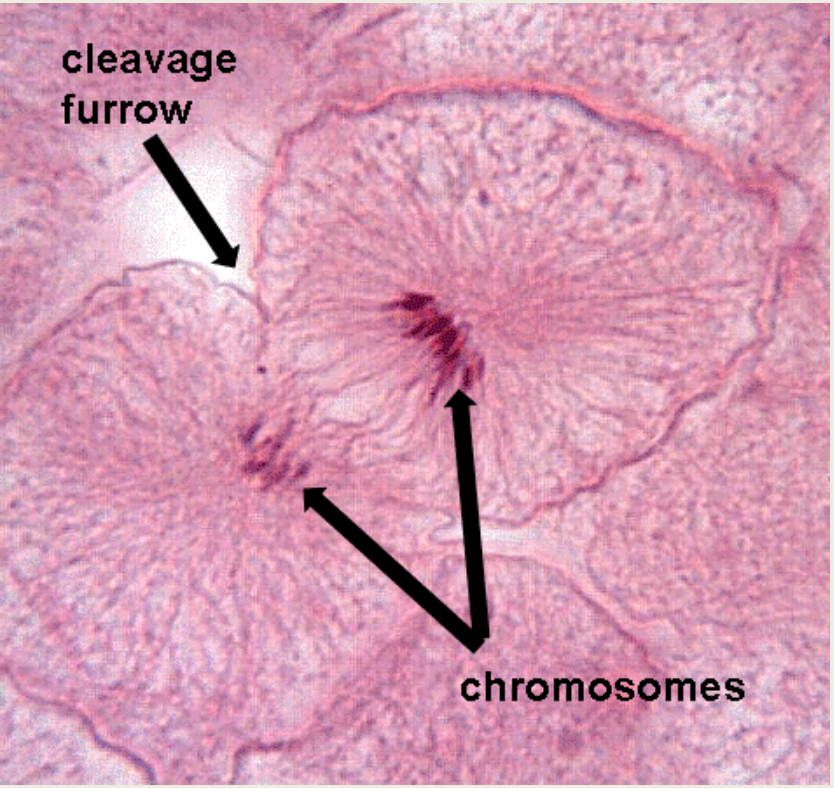
At the end of mitosis, two distinct cells with identical genetic material are produced.

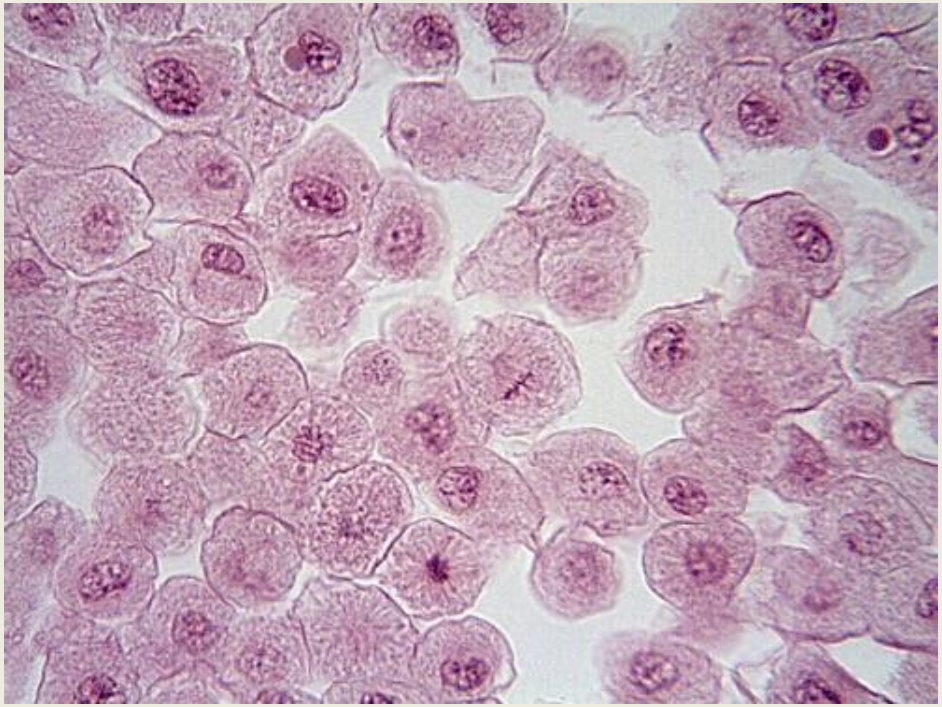

metaphase
prophase

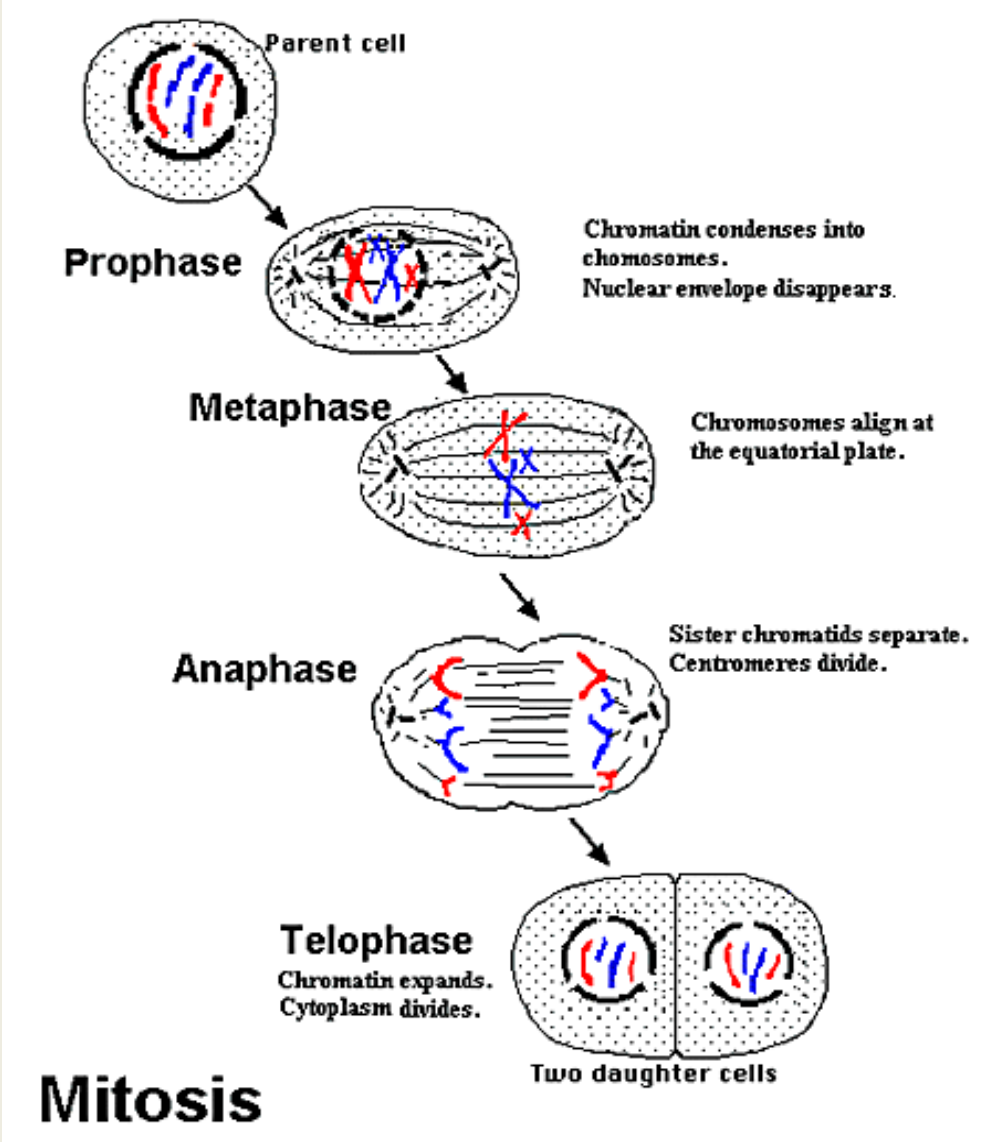

metaphase

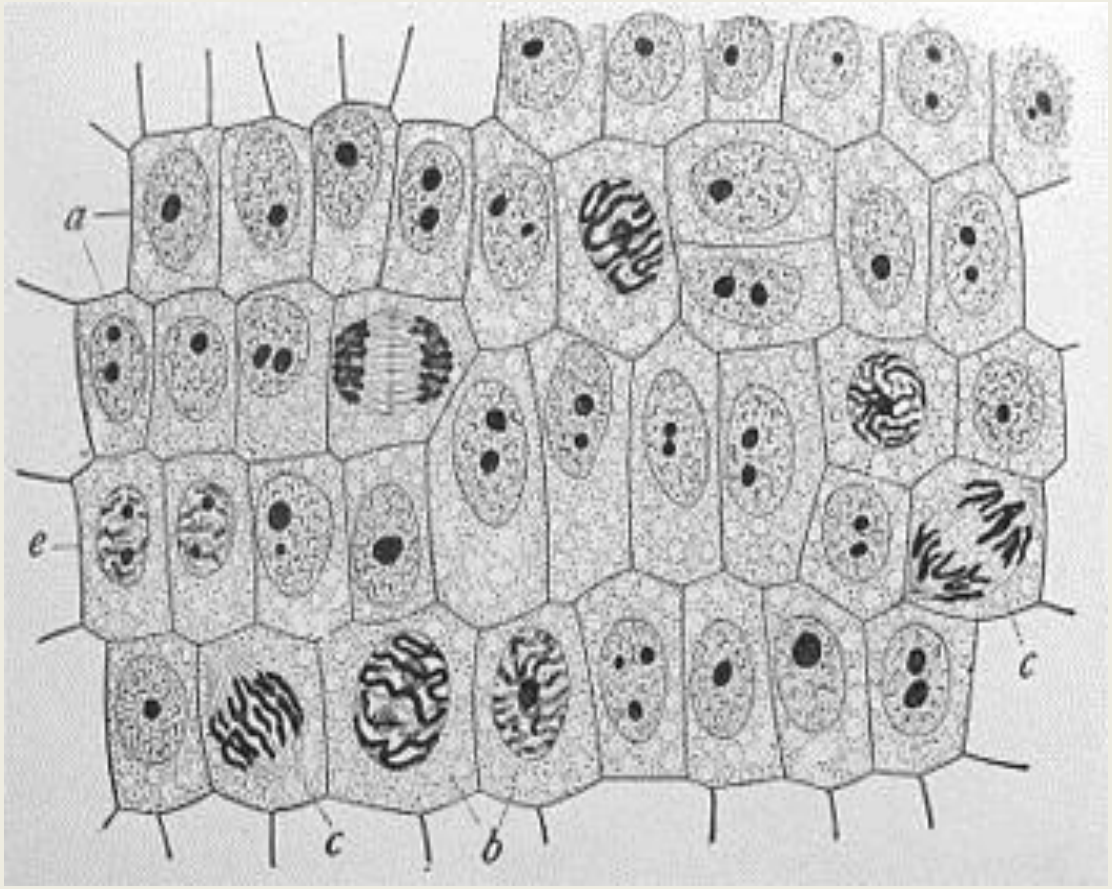

chromosomes
spindles
centriole

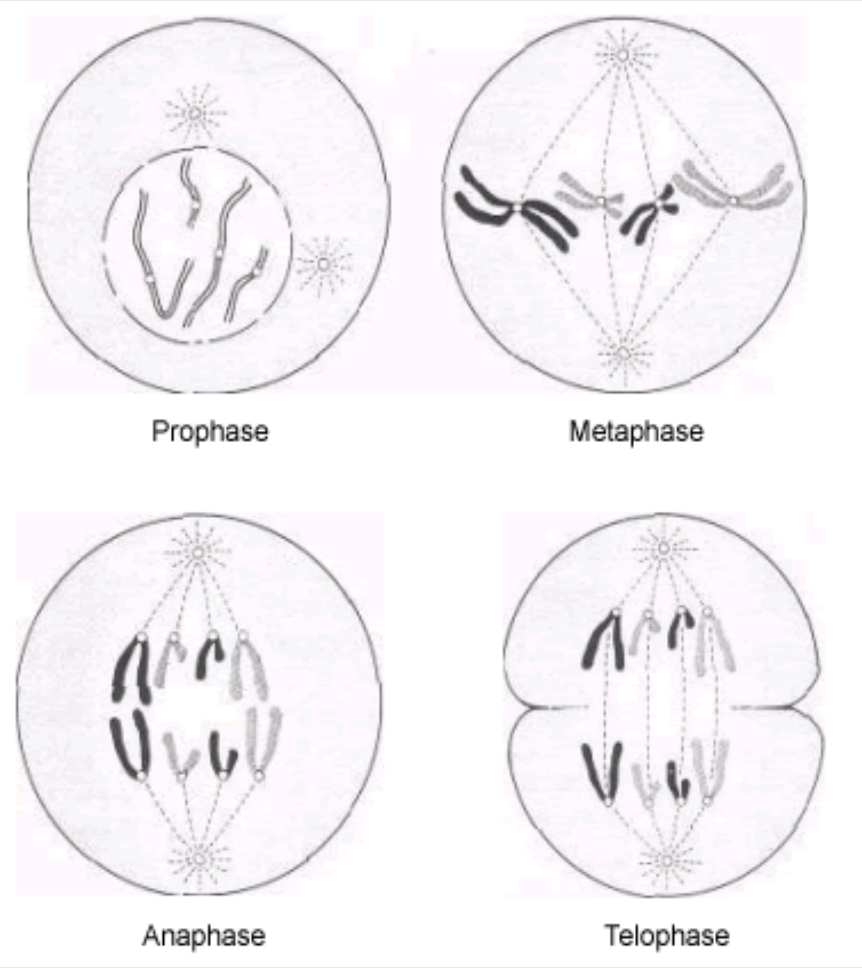

anaphase

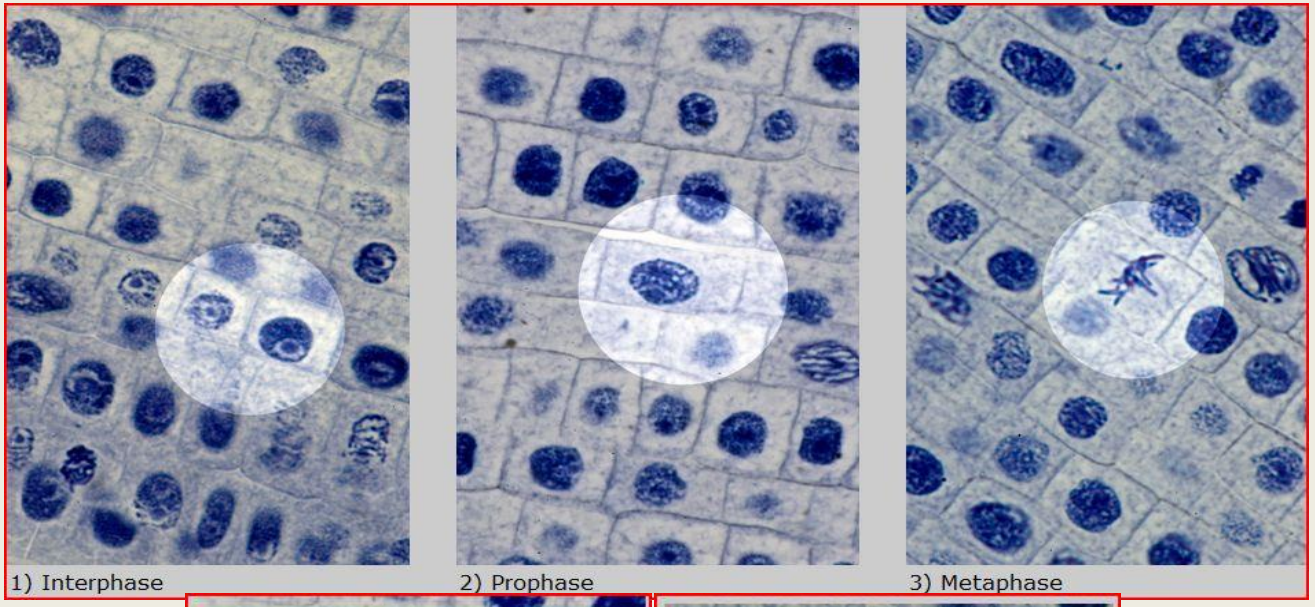

cleavage
furrow
chromosomes




Parent cell
Prophase
Chromatin condenses into chomosomes.
Nuclear envelope disappears.
Metaphase
Chromosomes align at the equatorial plate.
Anaphase
Sister chromatids separate.
Centromeres divide.
Telophase
Chromatin expands.
Cytoplasm divides.
Two daughter cells
Mitosis


a
e
c
c
b

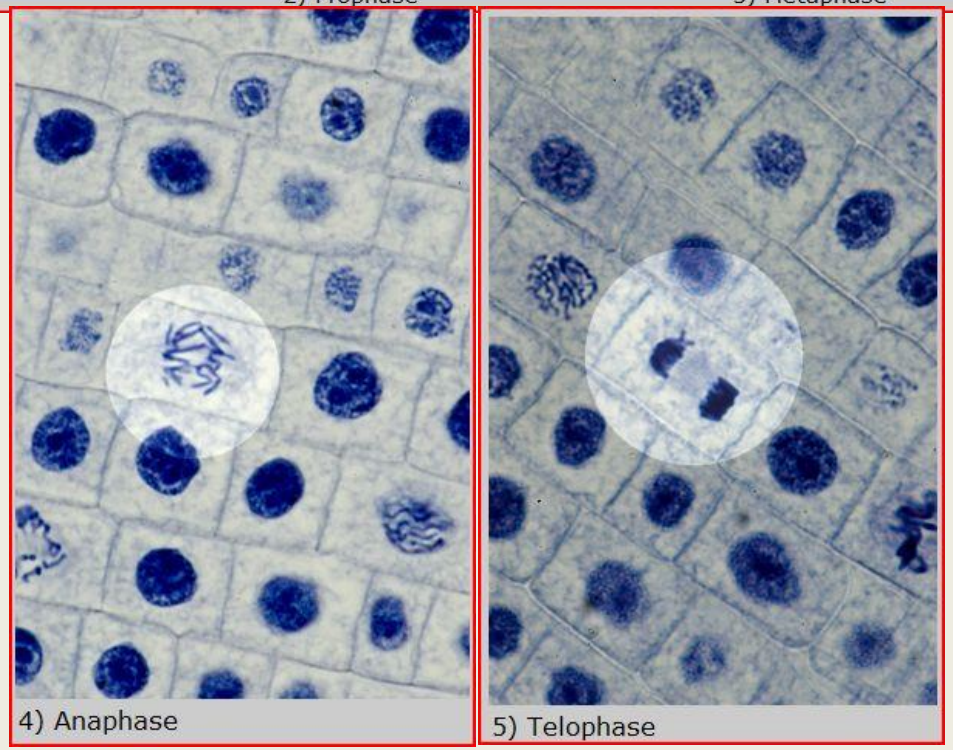

Prophase
Metaphase
Anaphase
Telophase



1) Interphase

2) Prophase

3) Metaphase



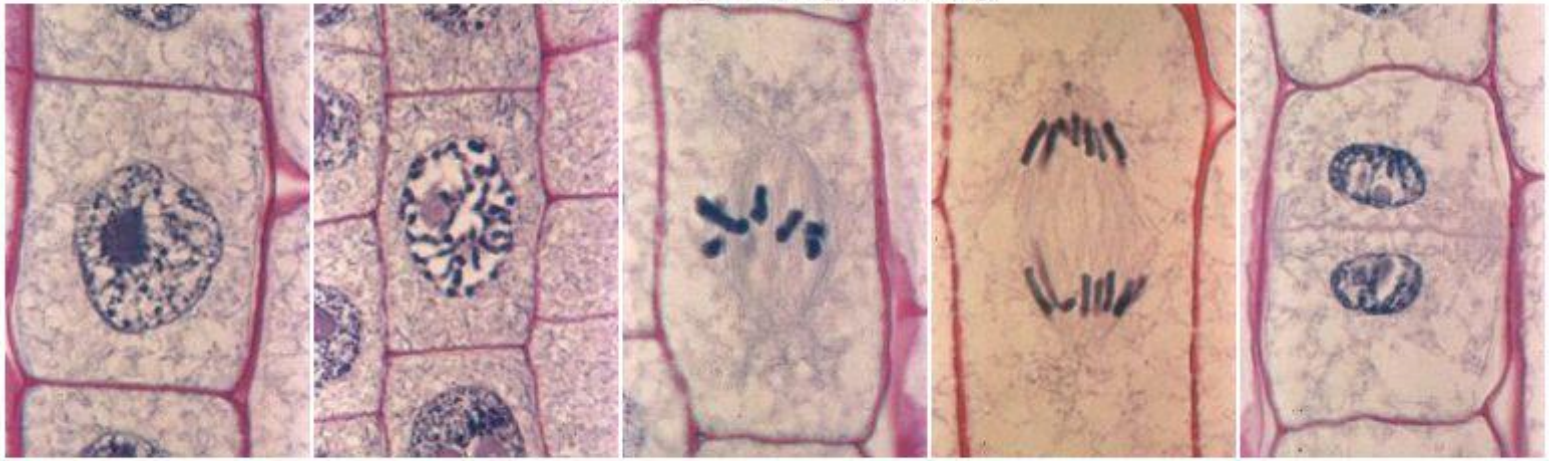
4) Anaphase

5) Telophase

Plant mitosis and interphase in *Allium* (onion) root-tip cells:

Look for mitotic cells in the **meristem** (behind the **root cap**) of *Allium* (onion) root **tip.**

Allium (onion) root tip



Interphase **prophase** **metaphase** **anaphase** **telophase**