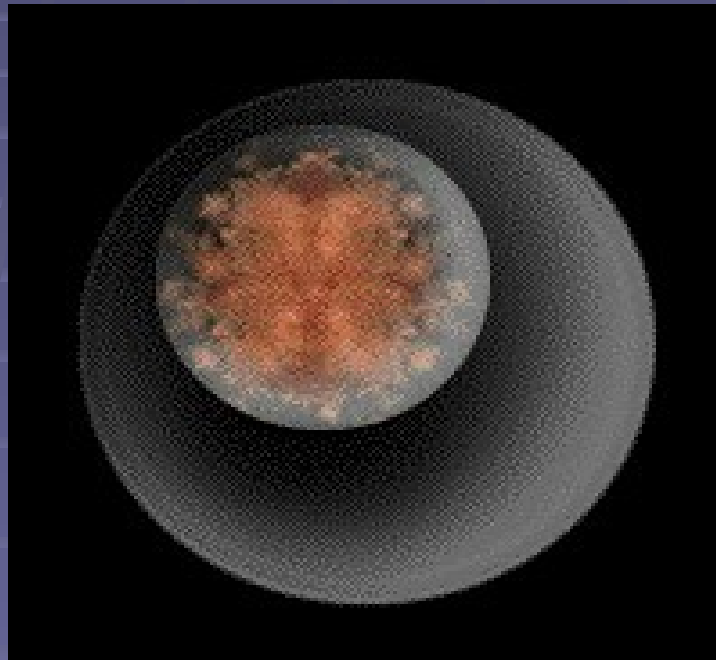


Cell Division

Mitosis



Reasons for Mitosis

There are three main reasons

A. growth

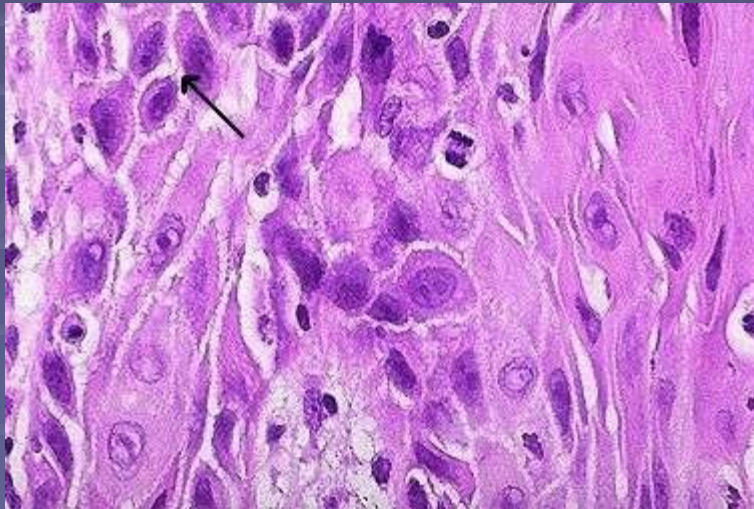
B. repair/healing

C. asexual reproduction

Cell Division by mitosis

- Some cells divide constantly: cells in the embryo, skin cells, gut lining cells, etc.

7 week old embryo



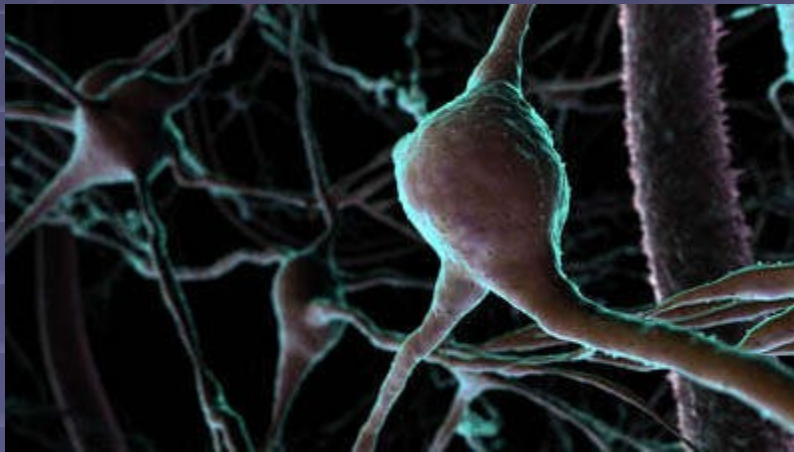
Epithelial Cell



Intestinal Cell

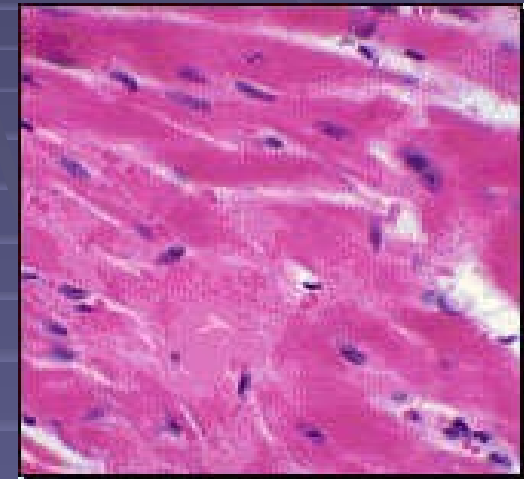
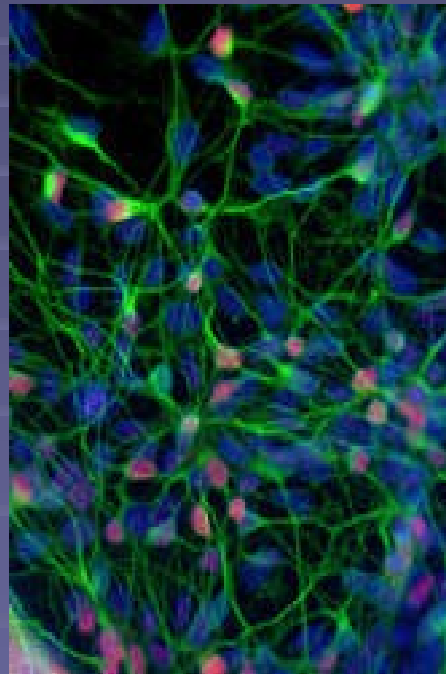
Cell Division

- Other cells divide rarely or never.



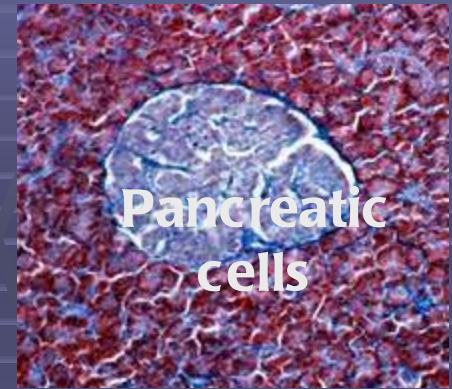
Brain Cell – Nerve cell

Spinal Cord Cell-
Nerve cell

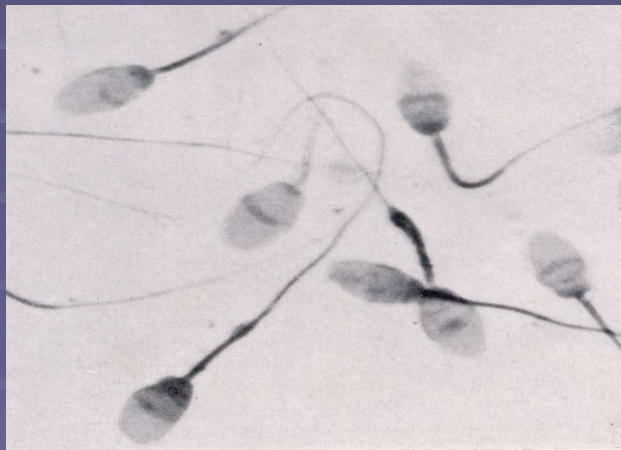


Cardiac Cell
(Heart Muscle)

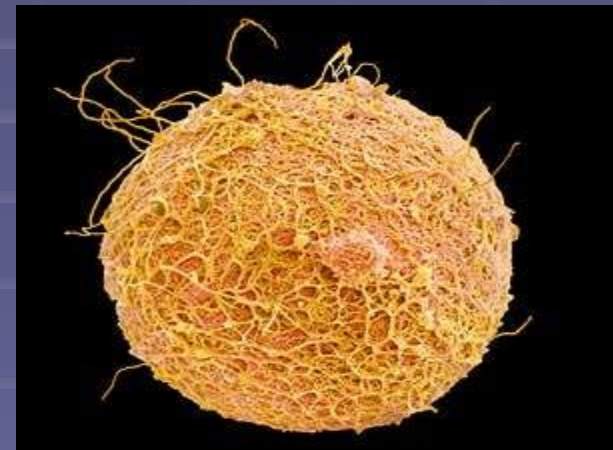
Cell Division



- 2 kinds of cell division:
 - 1. Mitosis: division of somatic cells
 - 2. Meiosis: creation of new sex cells



Sperm cells



Human egg cell

Cell Division Vocabulary

- Somatic cell – a body cell; a cell whose genes will not be passed on to future generations.
- Germ cell - a cell that is destined to become a gamete (egg or sperm); a cell whose genes can be passed on to future generations

Cell Division Vocabulary

- diploid (2N) – a cell with 2 chromosome sets in each of its cells; all body (somatic) cells

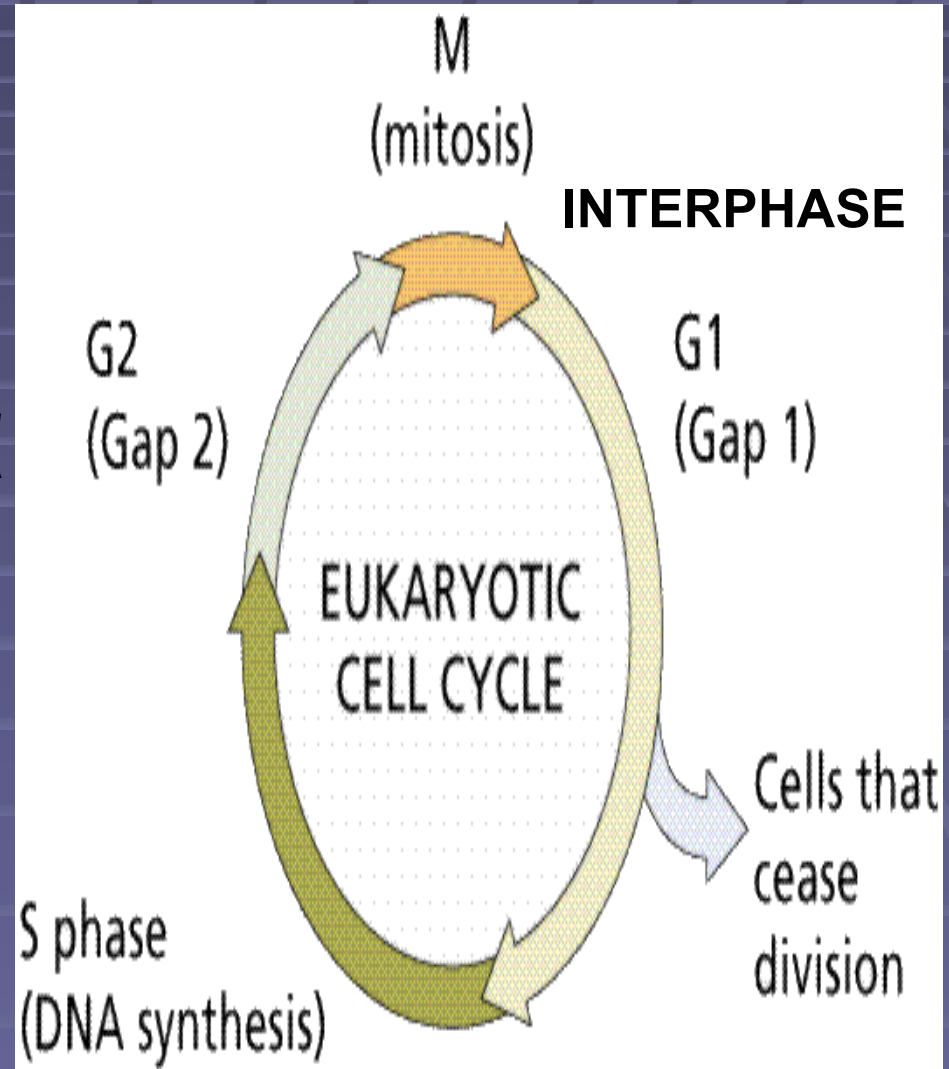
- haploid (N) – a cell with 1 chromosome set in each of its cells; all gametes (sperm, eggs)

Characteristics of Mitosis

- A DIPLOID CELL WILL GIVE RISE TO A DIPLOID CELL
- CHROMOSOME NUMBER REMAINS THE SAME
- THE DNA REMAINS IDENTICALLY THE SAME
- ONE CELL ($2N$) GIVES RISE TO TWO CELLS ($2N$)

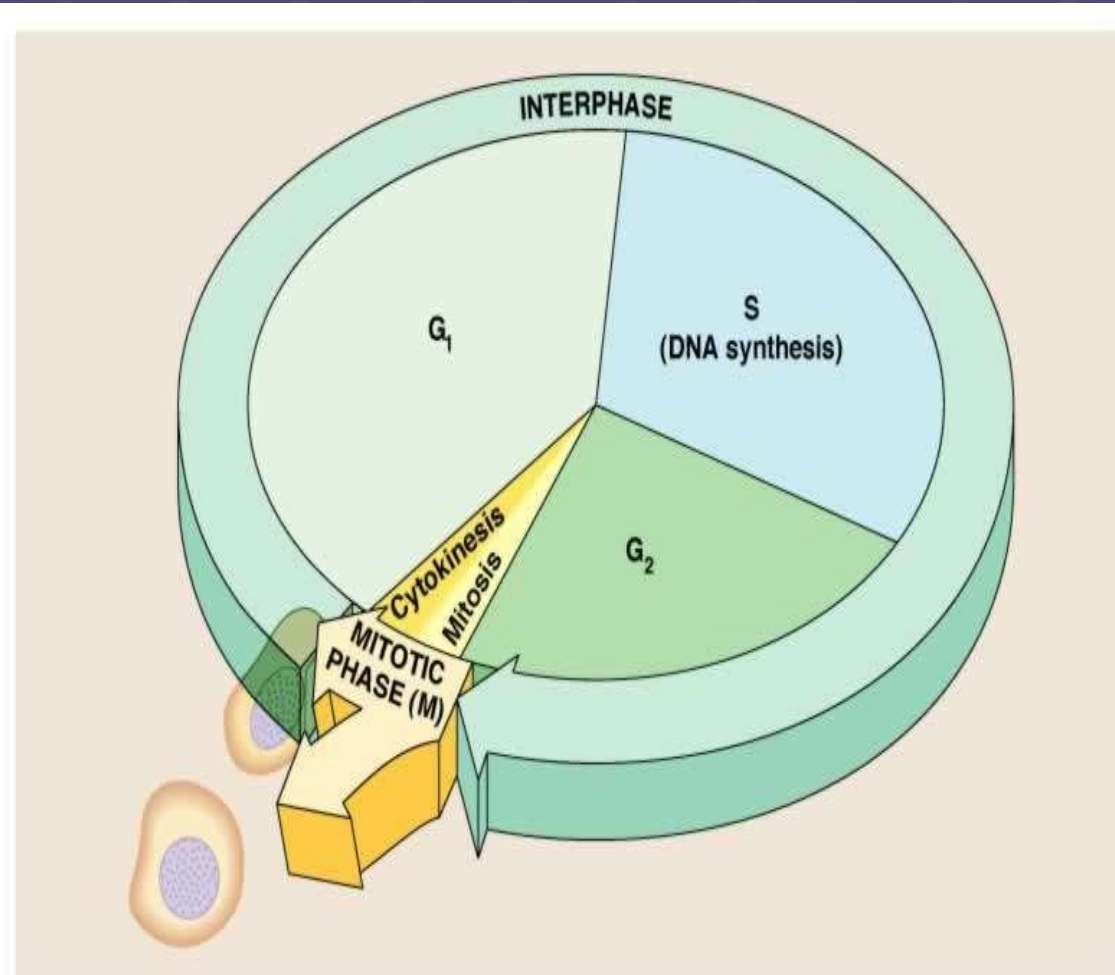
Cell Cycle

- A typical cell goes through a process of growth, development, and reproduction called the cell cycle.
- Most of the cycle is called interphase.

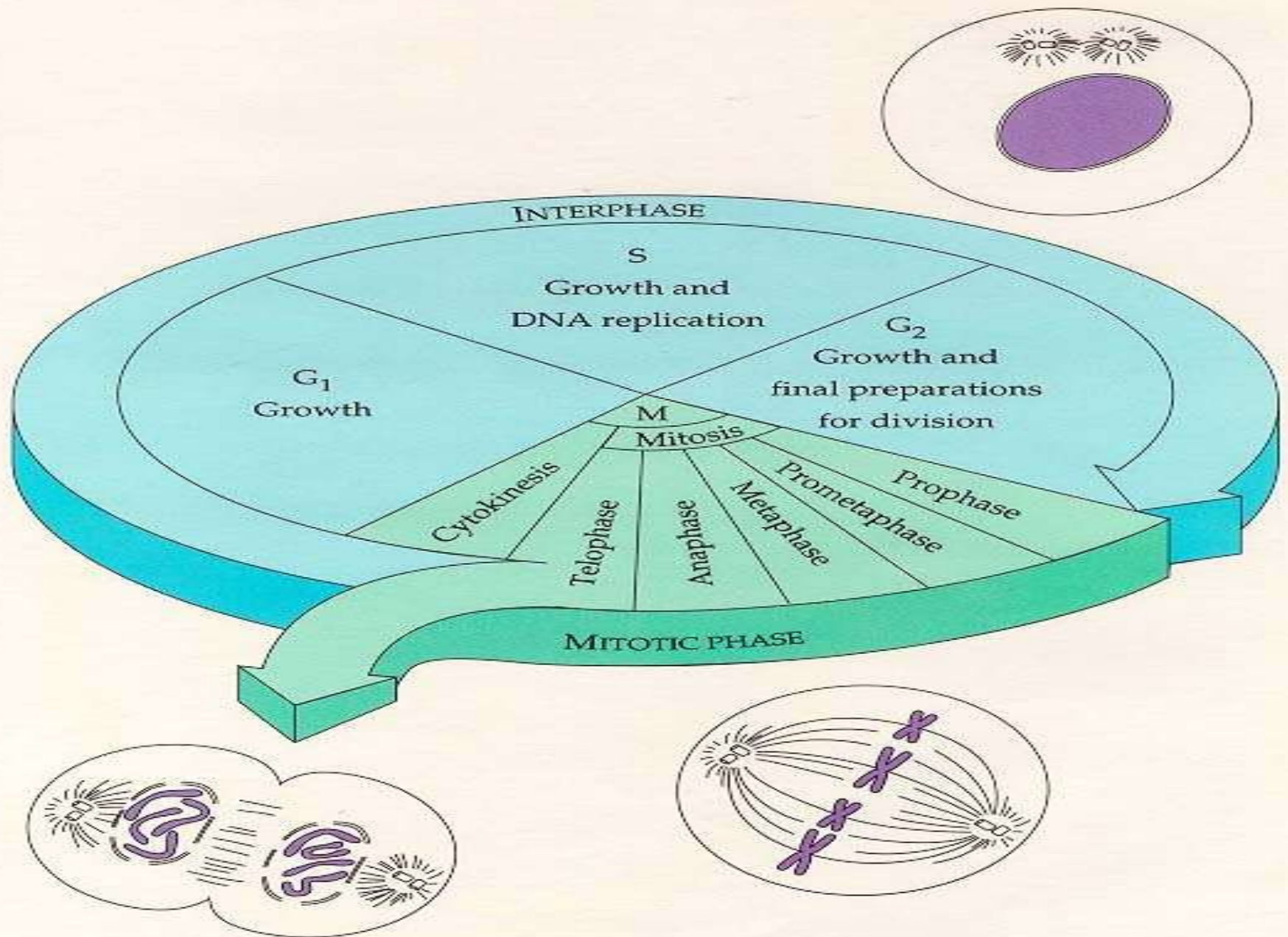


Cell Cycle

- The longest phase in the cell cycle is interphase.
- The 3 stages of interphase are called G_1 , S, and G_2 .

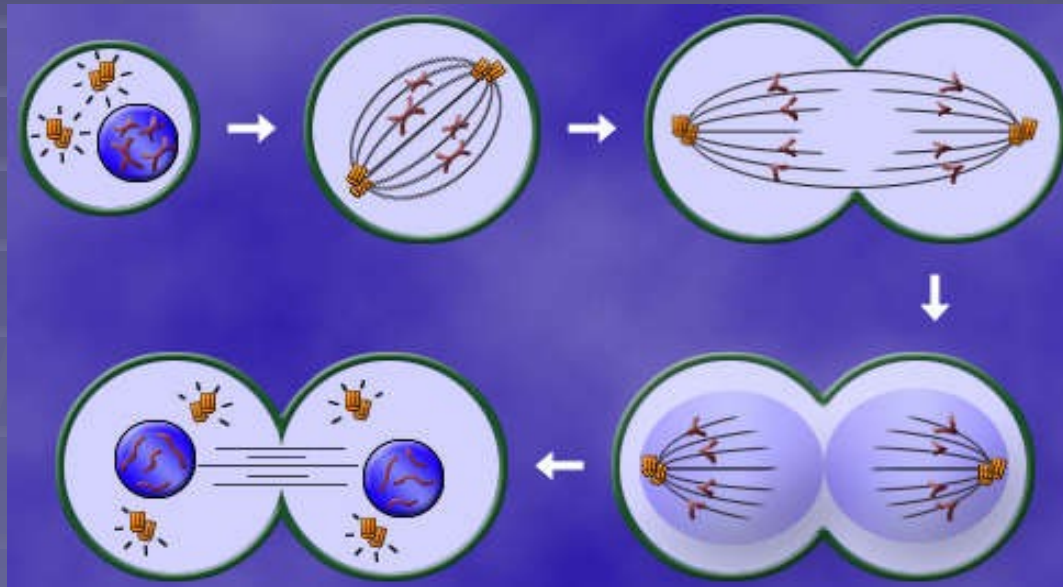


The cell cycle (Figure 11.5)



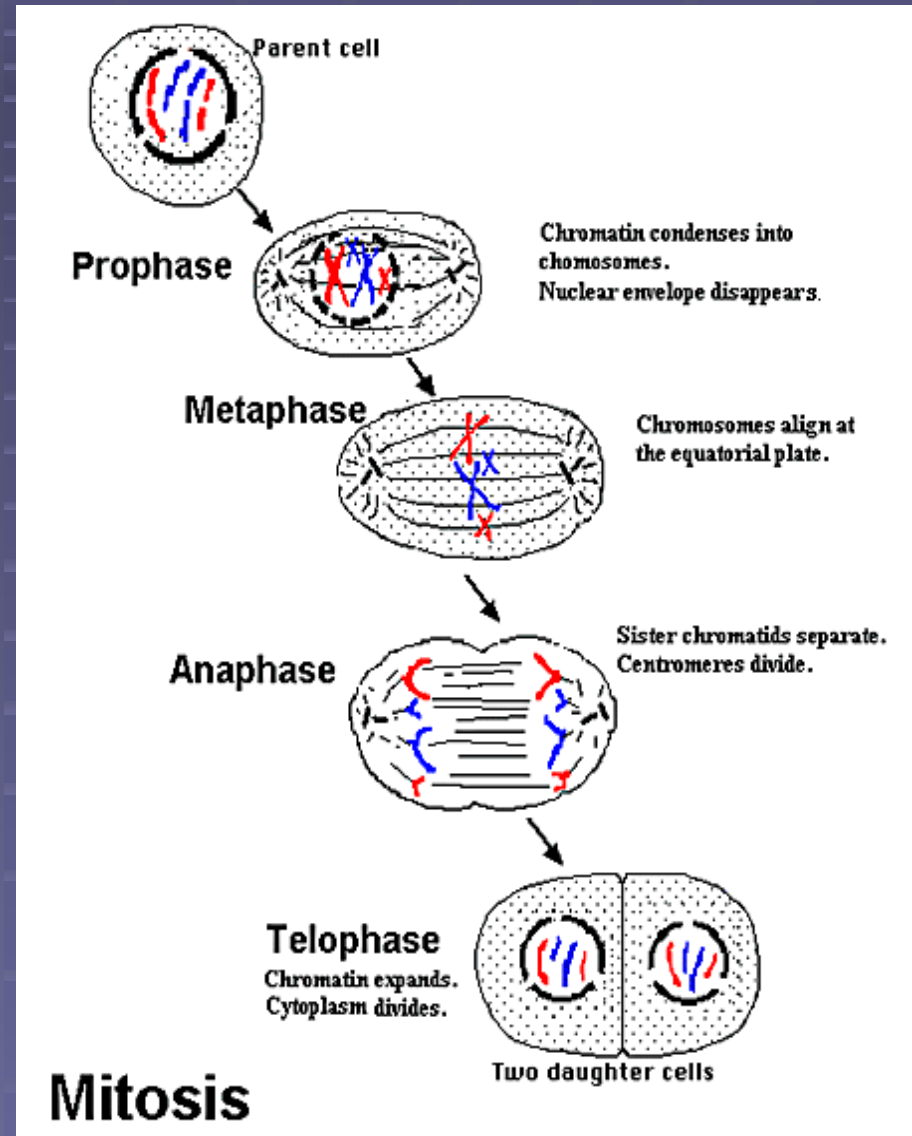
Cell Division

- All living cells come from other living cells.
- During mitosis, the nucleus of the cell divides, forming two nuclei with identical genetic information.



Mitosis

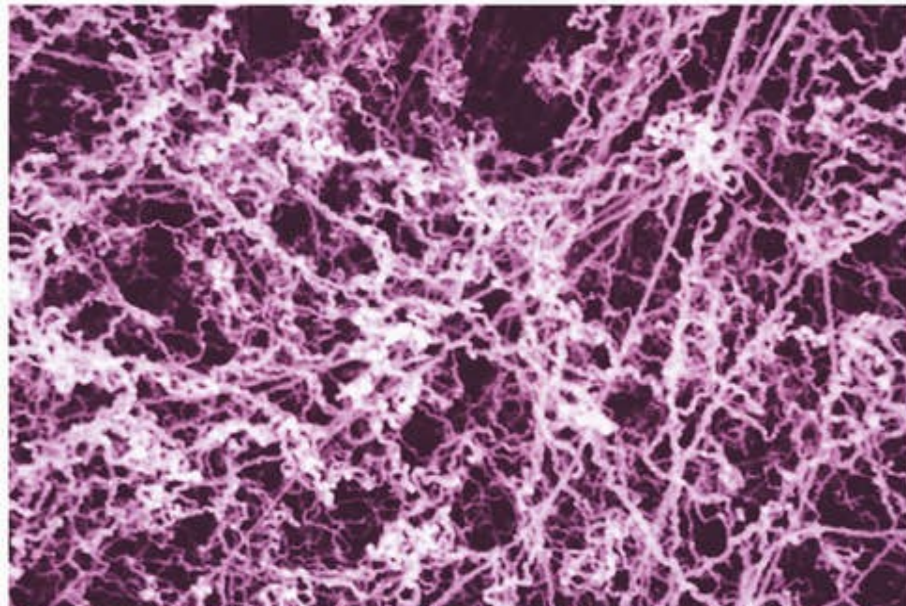
- Mitosis produces two genetically identical cells.
- Mitosis is referred to in the following stages: prophase, metaphase, anaphase, and telophase.



Prophase

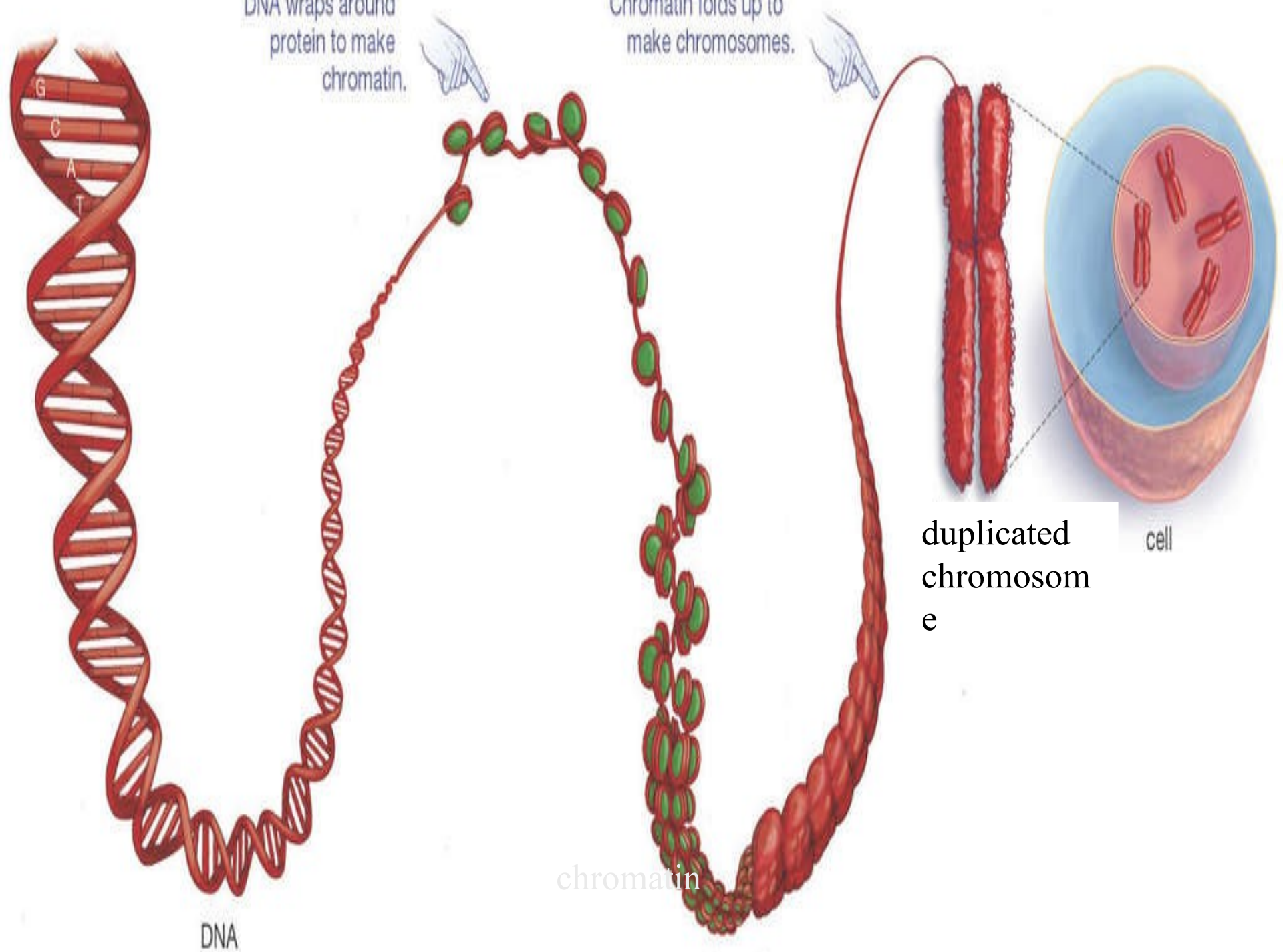
- In prophase, the cell begins the process of division.
- The chromosomes condense.

(a) DNA in uncondensed form



(b) DNA condensed into duplicated chromosomes





DNA wraps around protein to make chromatin.

Chromatin folds up to make chromosomes.

DNA

chromatin

duplicated chromosome

cell

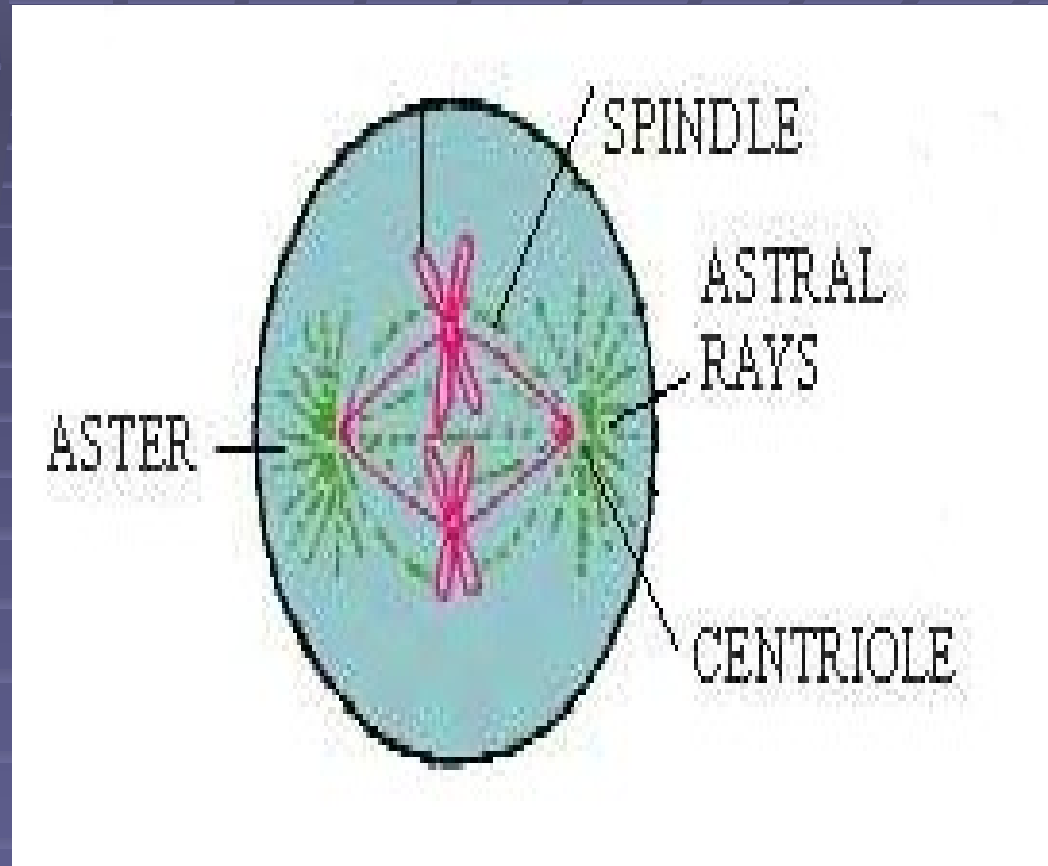
Prophase

- Nuclear envelope disappears.



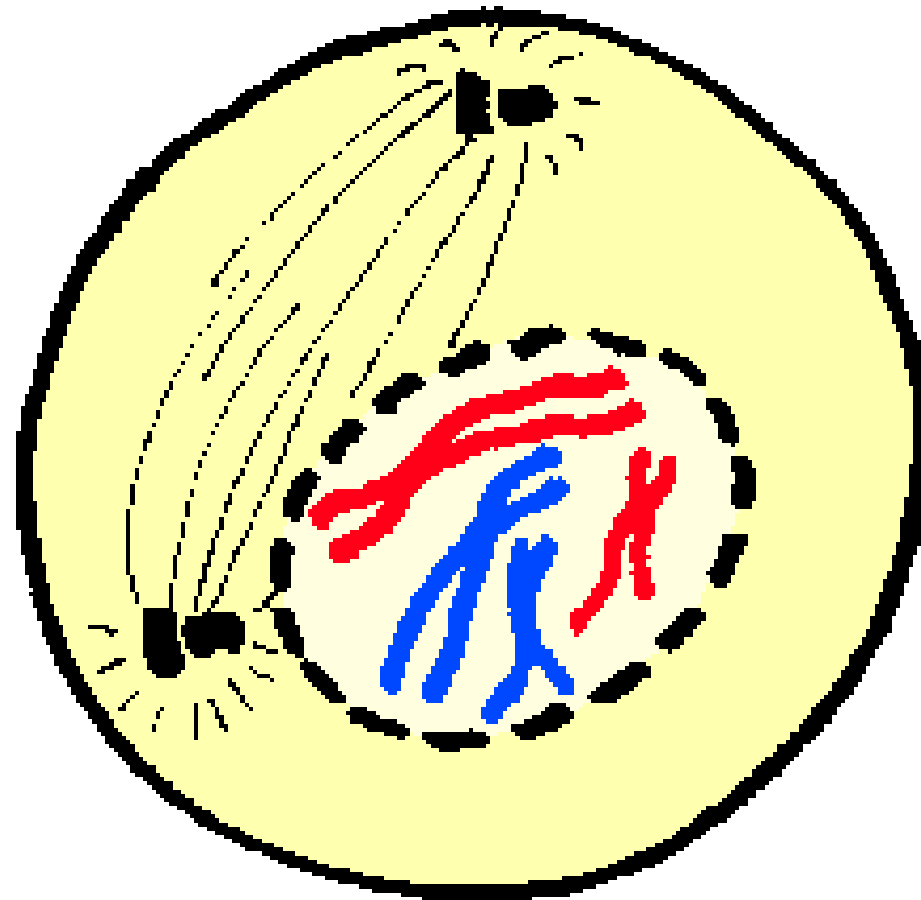
Prophase

- Centrioles migrate to opposite poles of the cell.
- Asters and spindle fibers form.

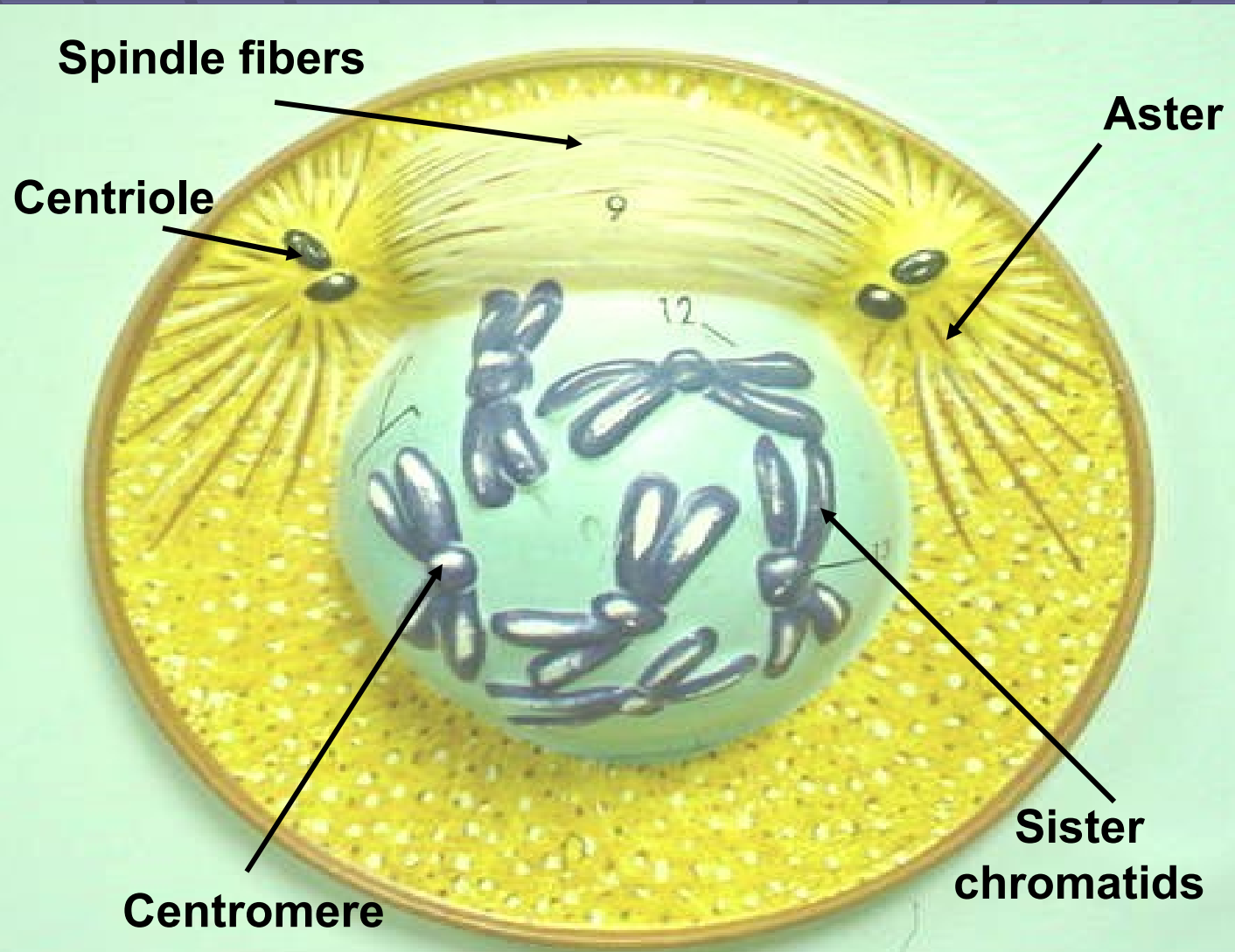


Aster and the mitotic apparatus
in an animal cell

Draw Prophase

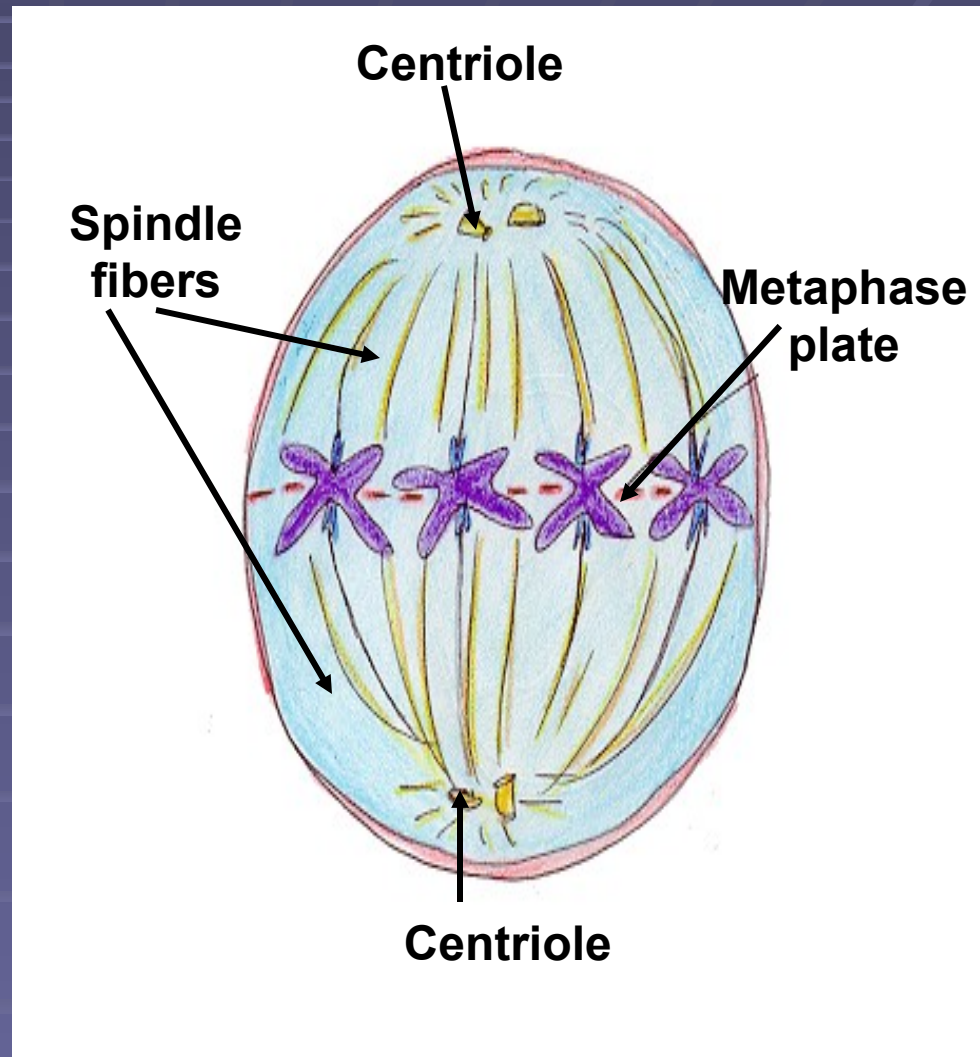


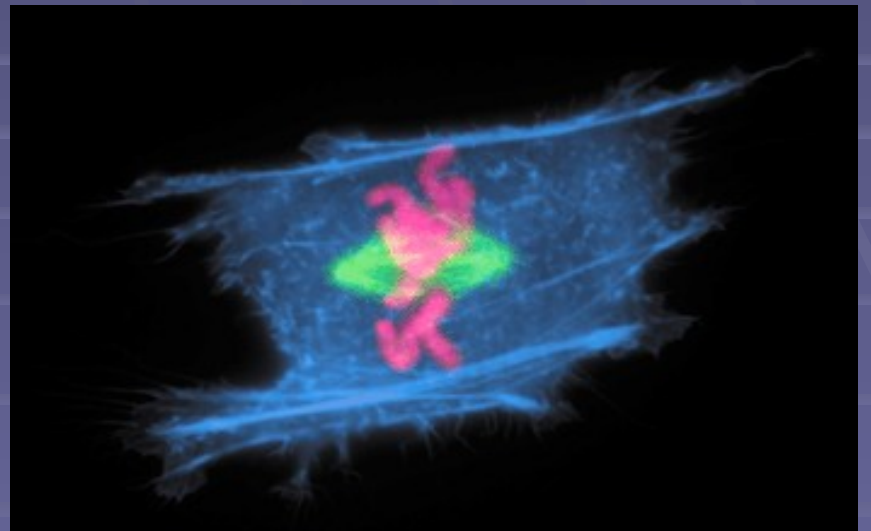
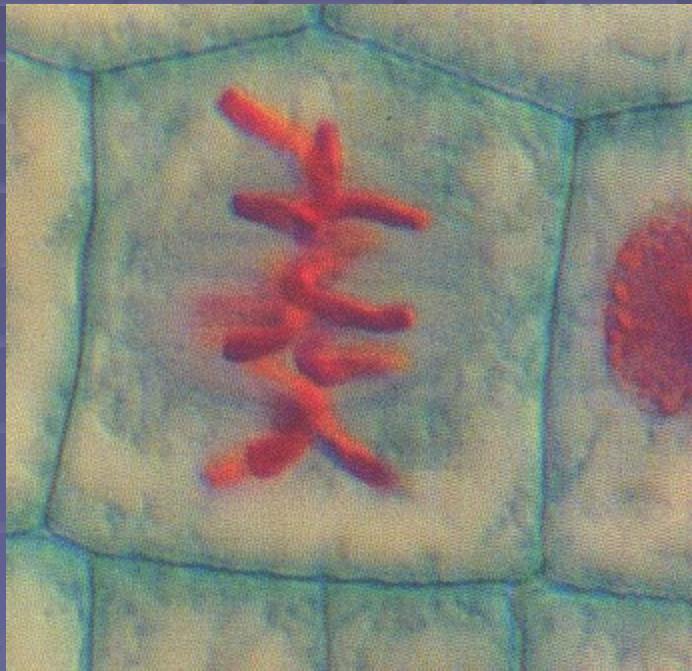
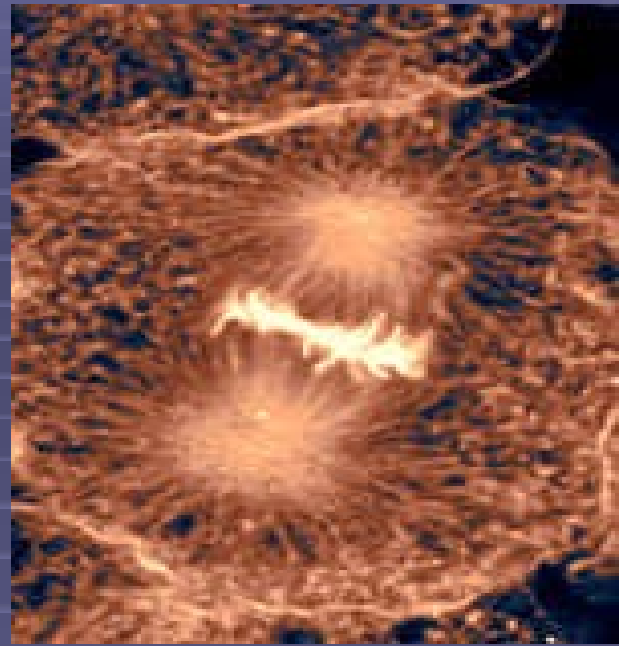
Prophase



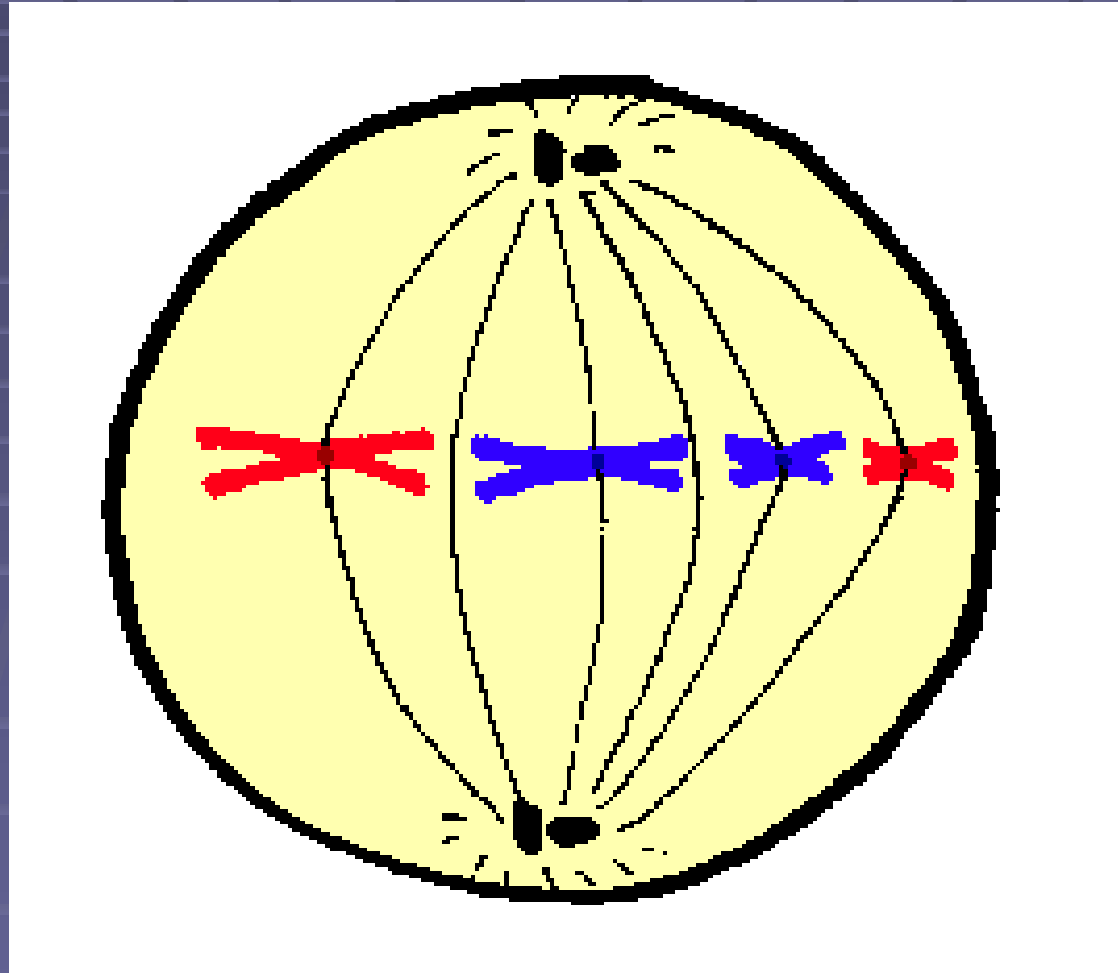
Metaphase

- The chromosomes line up at the equator of the cell (metaphase plate), with the centrioles at opposite ends and the spindle fibers attached to the centromeres.



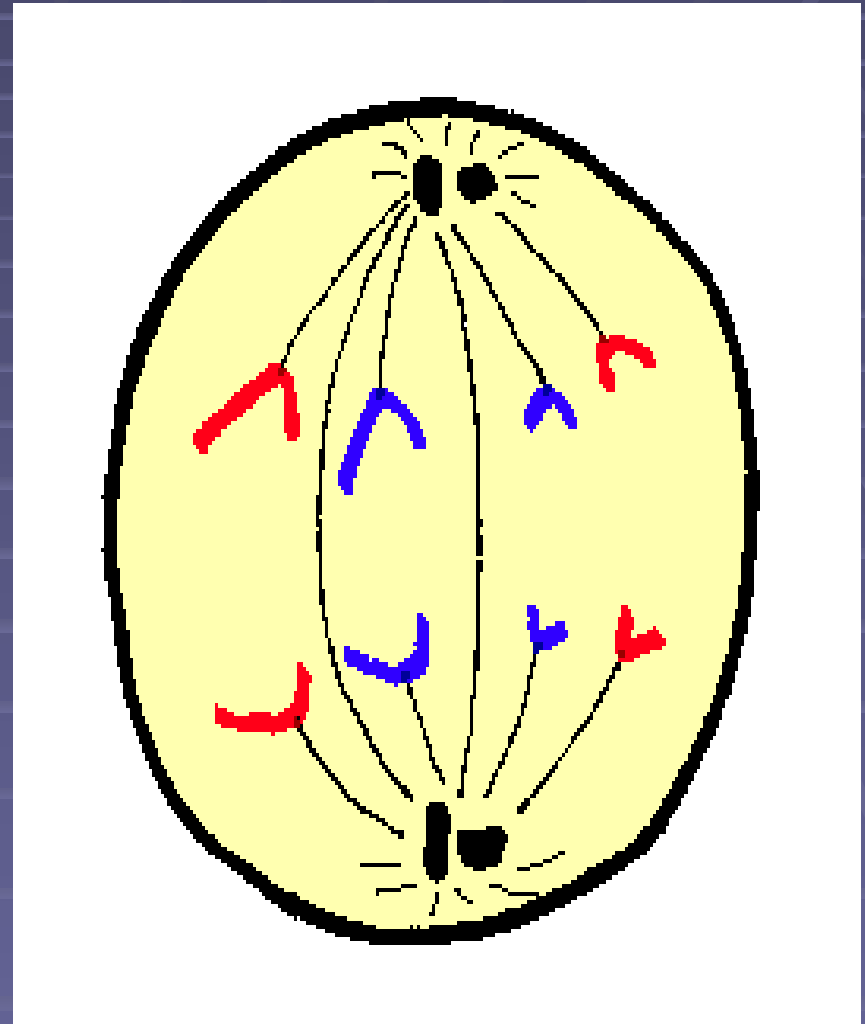


Draw Metaphase



Anaphase

- In anaphase, the centromeres divide.
- At this point, each chromosome goes from having 2 sister chromatids to being 2 separate chromosomes

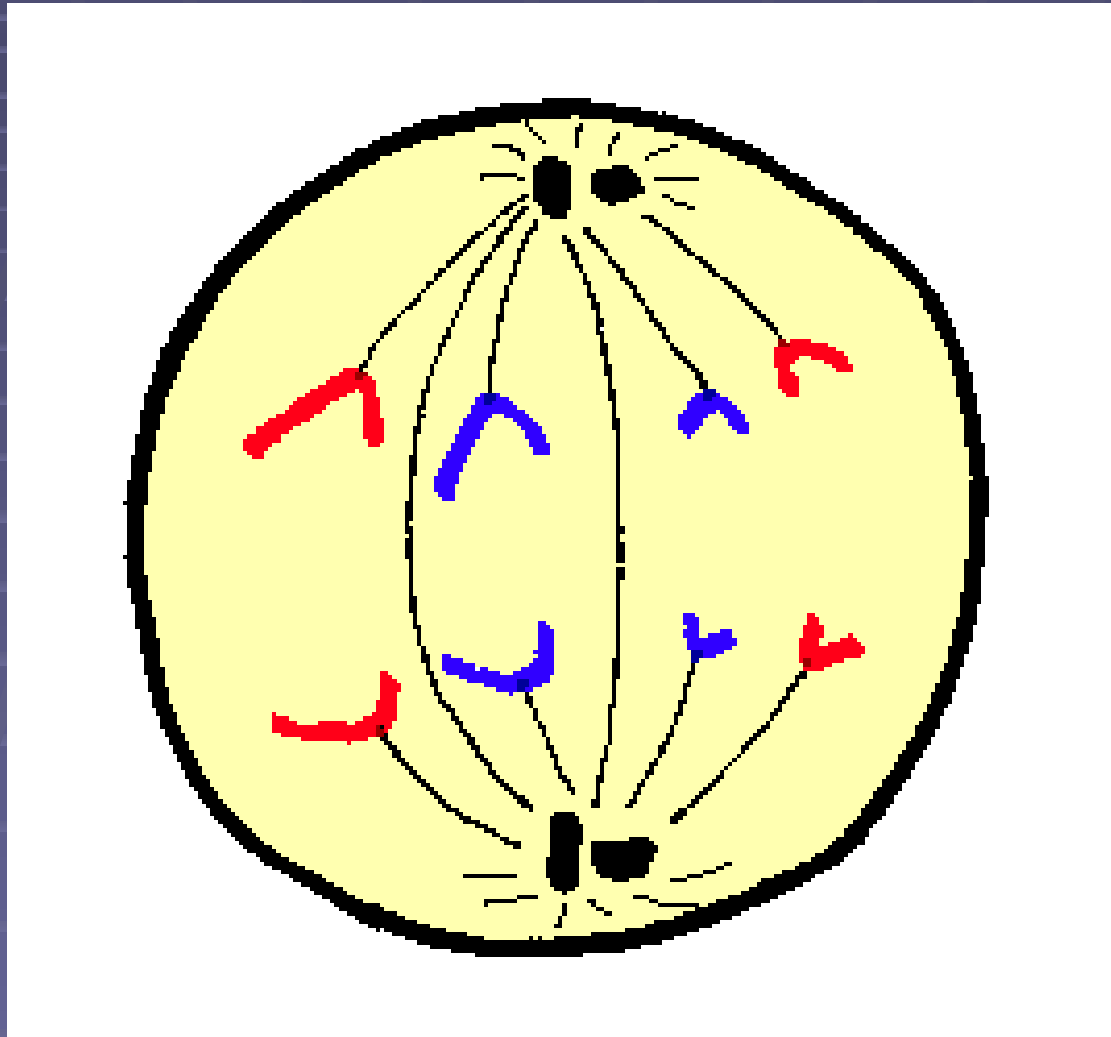


Anaphase

- The spindle fibers contract and the chromosomes are pulled to opposite poles.

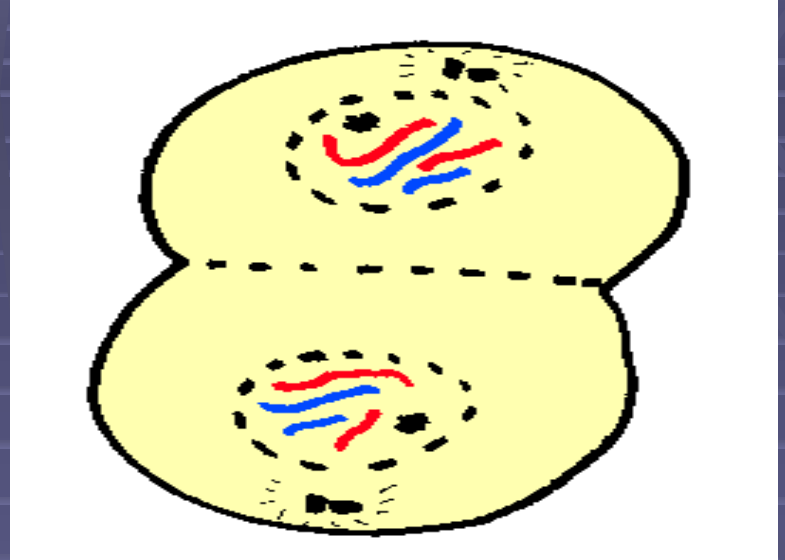


Draw Anaphase

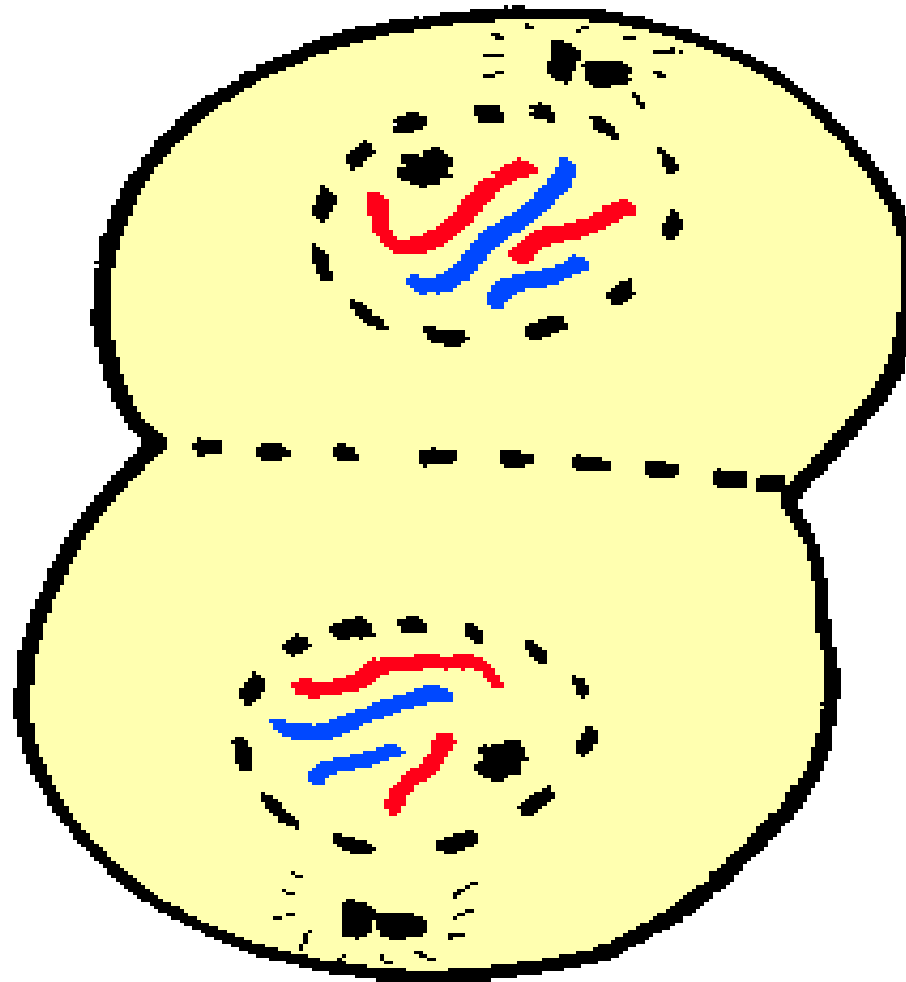


Telophase

- In telophase the nucleus actually divides.
- The chromosomes are at the poles of the cell.
- The nuclear envelope re-forms around the two sets of chromosomes.



Draw Telophase



Cytokines is

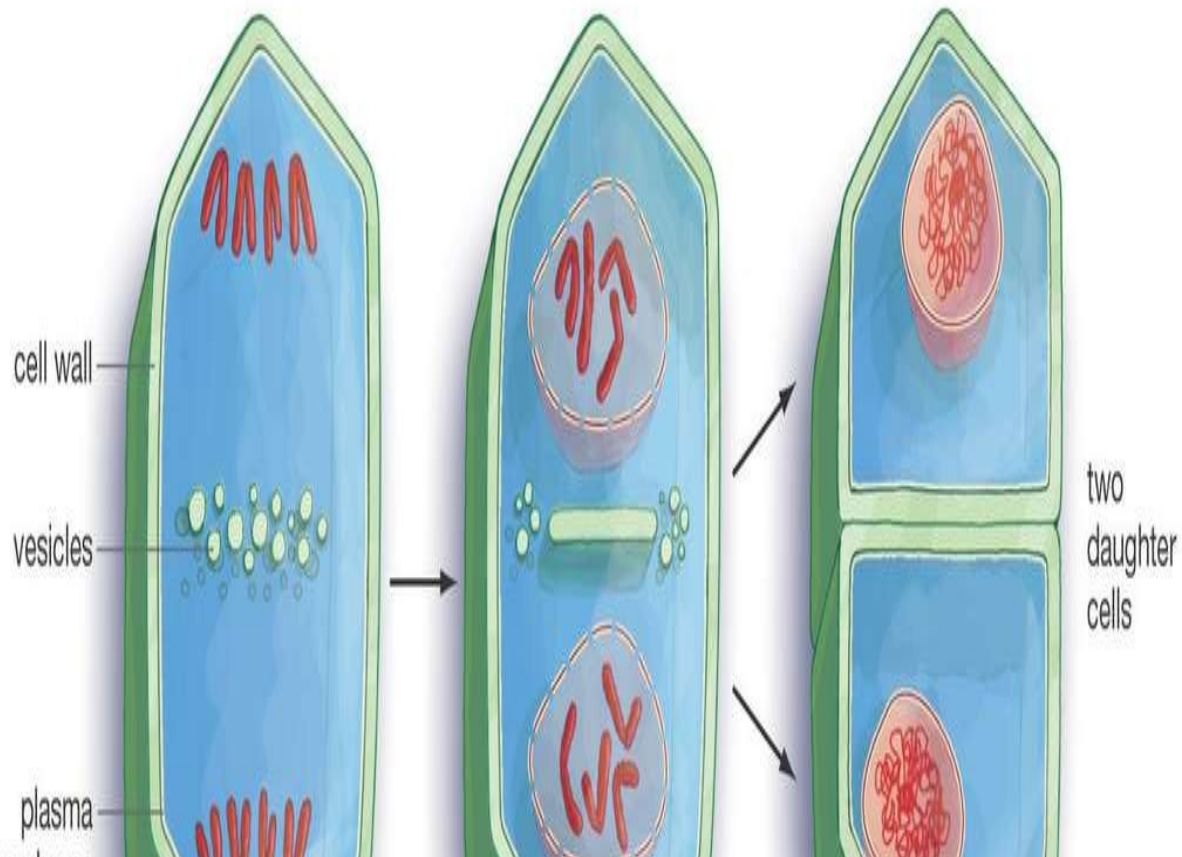
- The division of the cytoplasm.
- In animal cells, a Cleavage Furrow forms and separates Daughter Cells



Cleavage furrow in a dividing frog cell.

Cytokines is

- In plant cells, a Cell Plate forms and separates Daughter Cells



Cell Plate forming

ANIMAL VS. PLANT MITOSIS

■ ANIMAL CELL

- Centriole and aster present
- Daughter cells separated by cleavage furrow

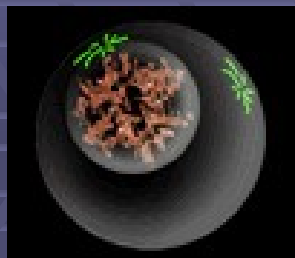


■ PLANT CELL

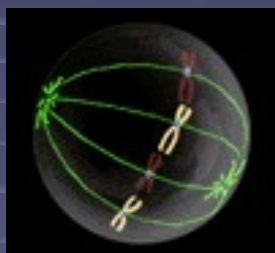
- No visible centriole or aster
- Daughter cells separated by cell plate



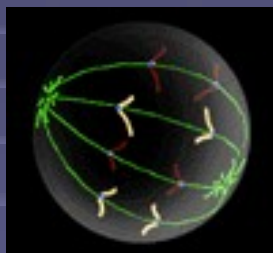
MITOSIS: CAN YOU NAME THE STAGES?



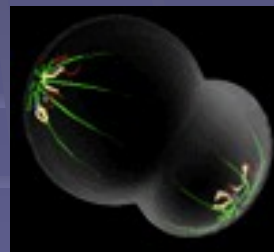
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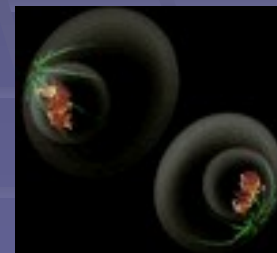
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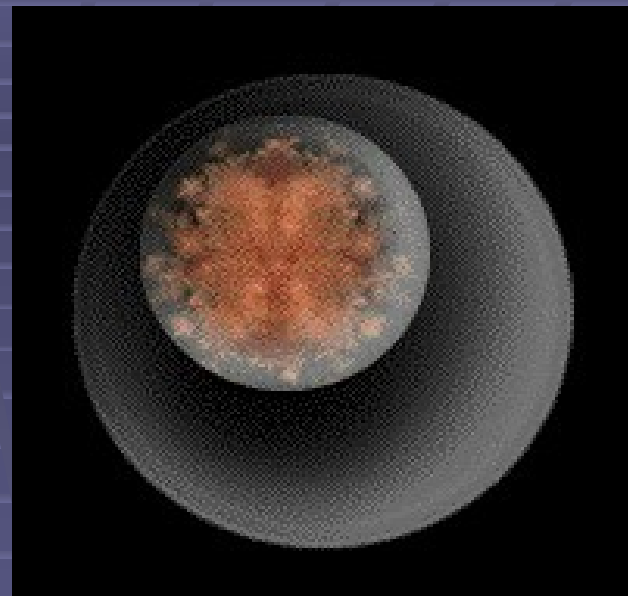
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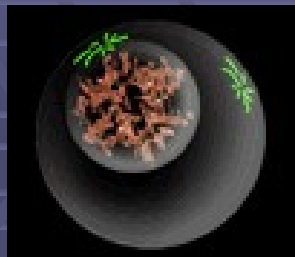
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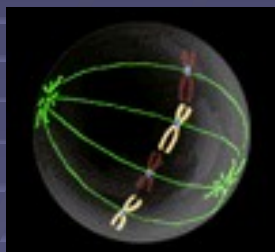
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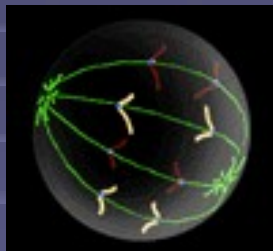
MITOSIS: CAN YOU NAME THE STAGES?



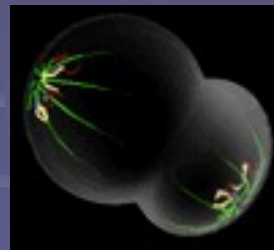
Prophase



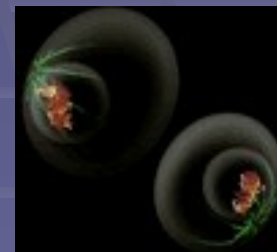
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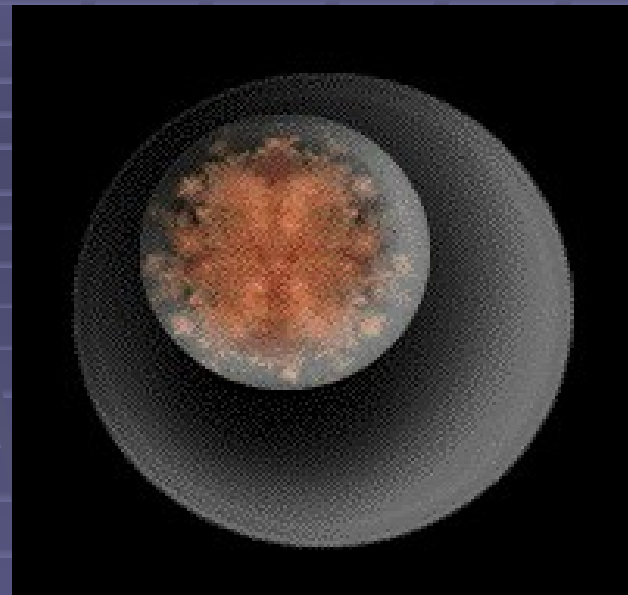
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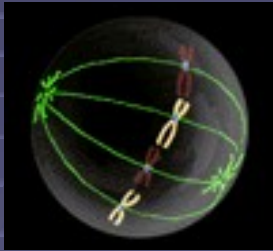
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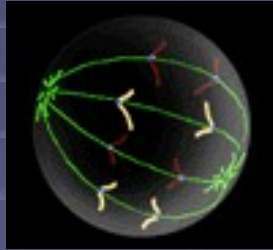
MITOSIS: CAN YOU NAME THE STAGES?



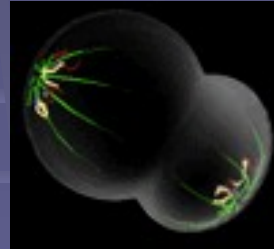
Prophase



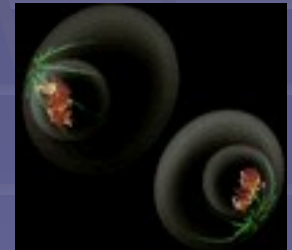
Metaphase



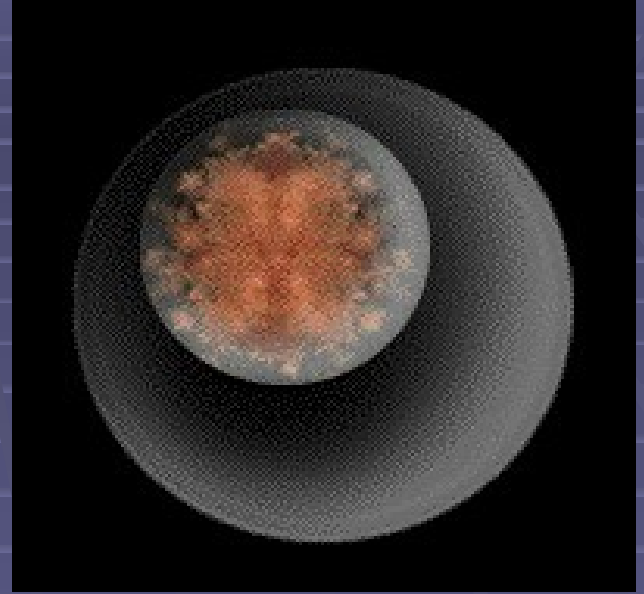
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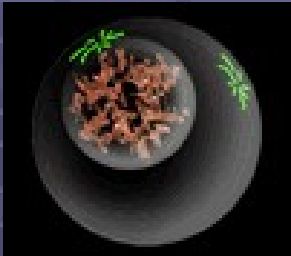
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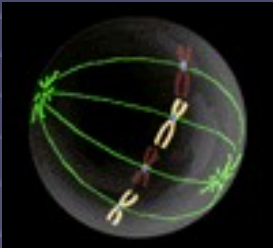
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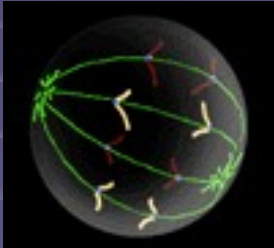
MITOSIS: CAN YOU NAME THE STAGES?



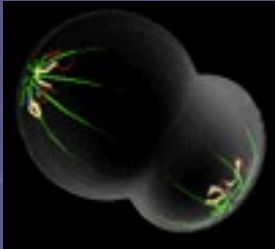
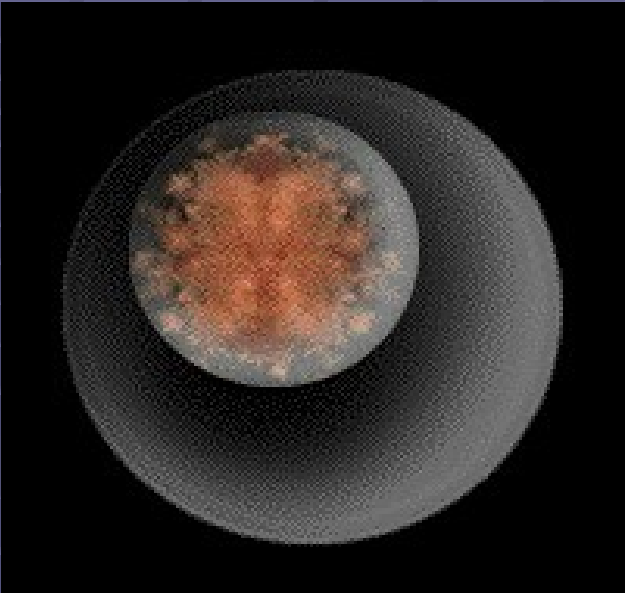
Prophase I



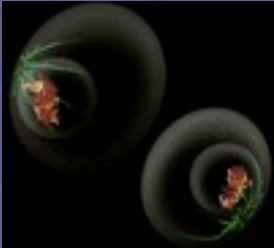
Metaphase I



Anaphase I

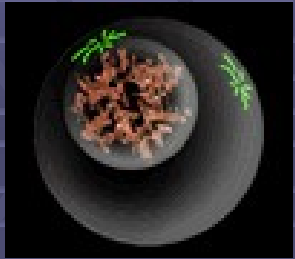


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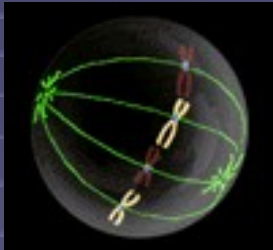


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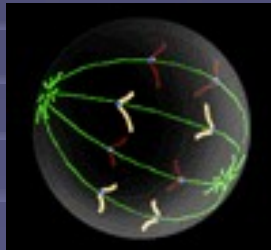
MITOSIS: CAN YOU NAME THE STAGES?



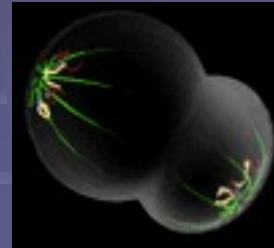
Prophase



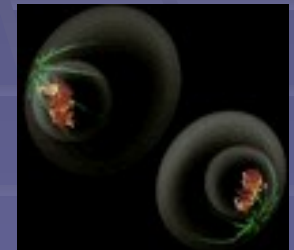
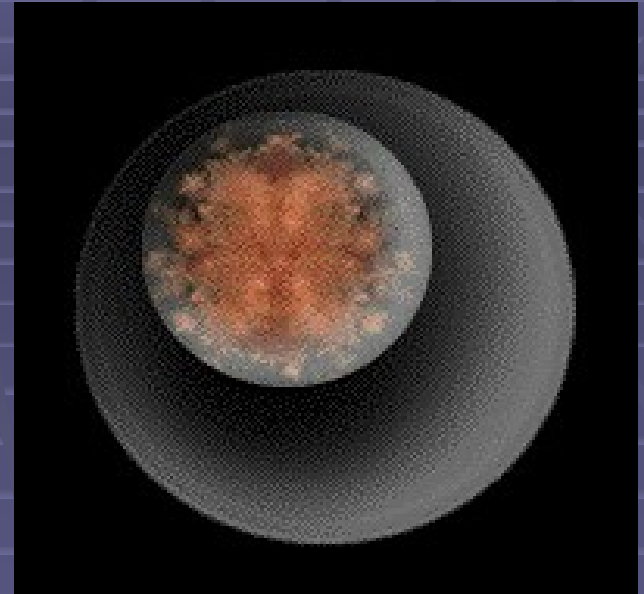
Metaphase



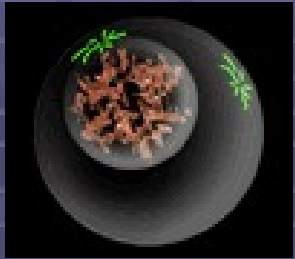
Anaphase



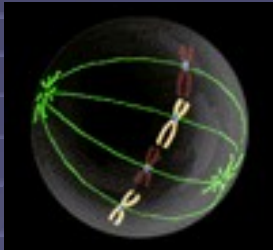
Telophase



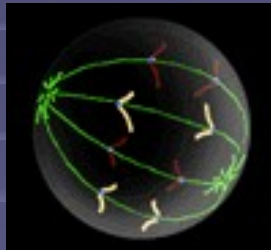
MITOSIS: CAN YOU NAME THE STAGES?



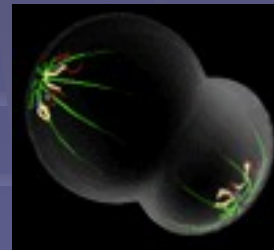
Prophase



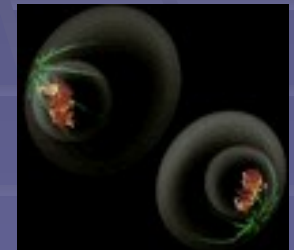
Metaphase



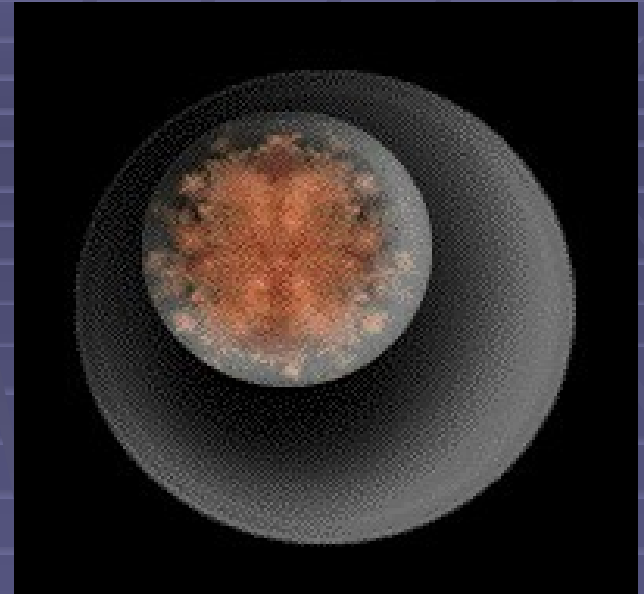
Anaphase



Telophase

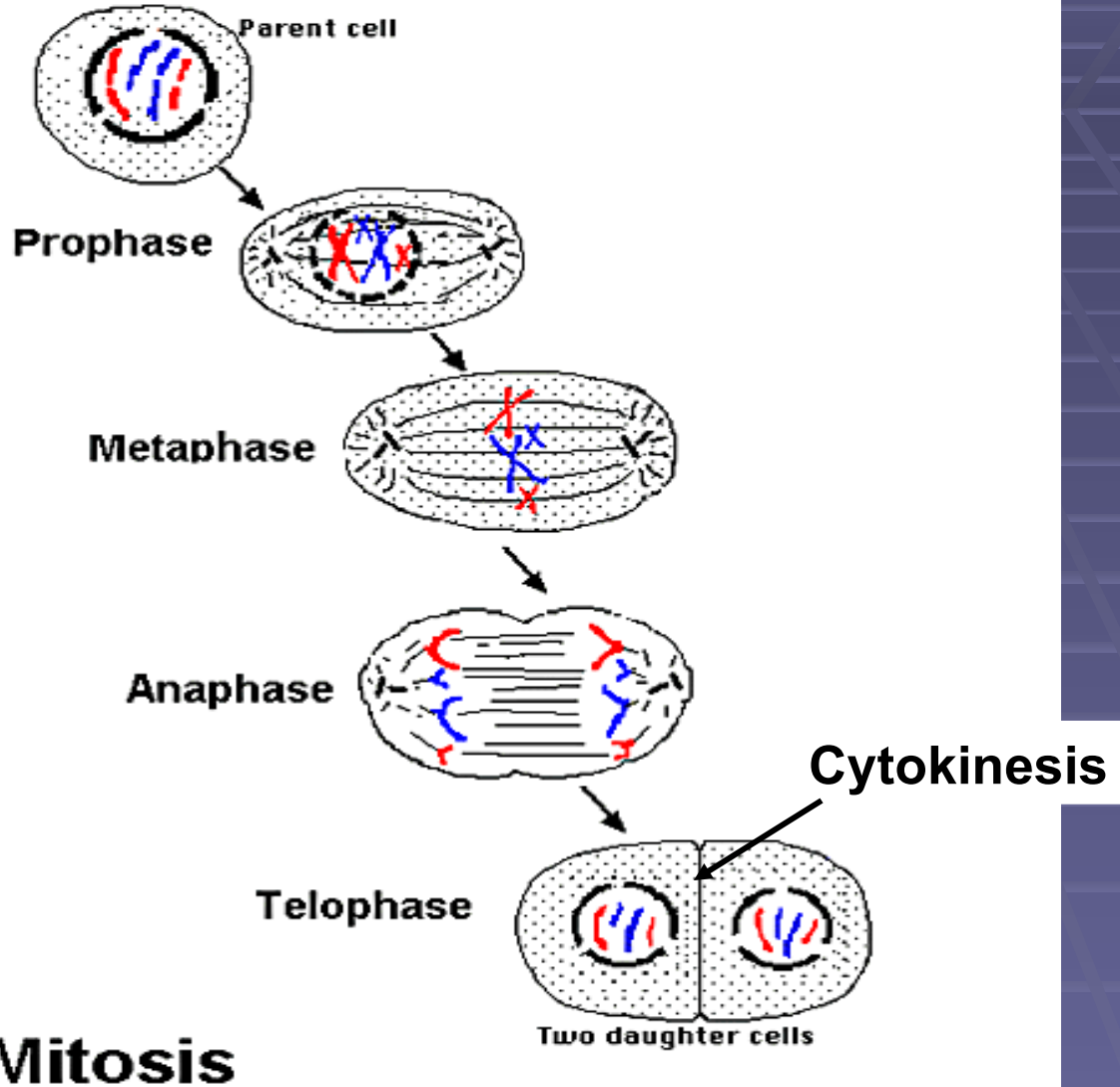


Cytokinesis



PHASES OF CELL CYCLE-IPMATC

Interphase



■ Phases of cell cycle - IPMATC

Important

Impatient

People

People

Must

May

Analyze

Attack

Tasks

Teachers

Correctly

Constantly