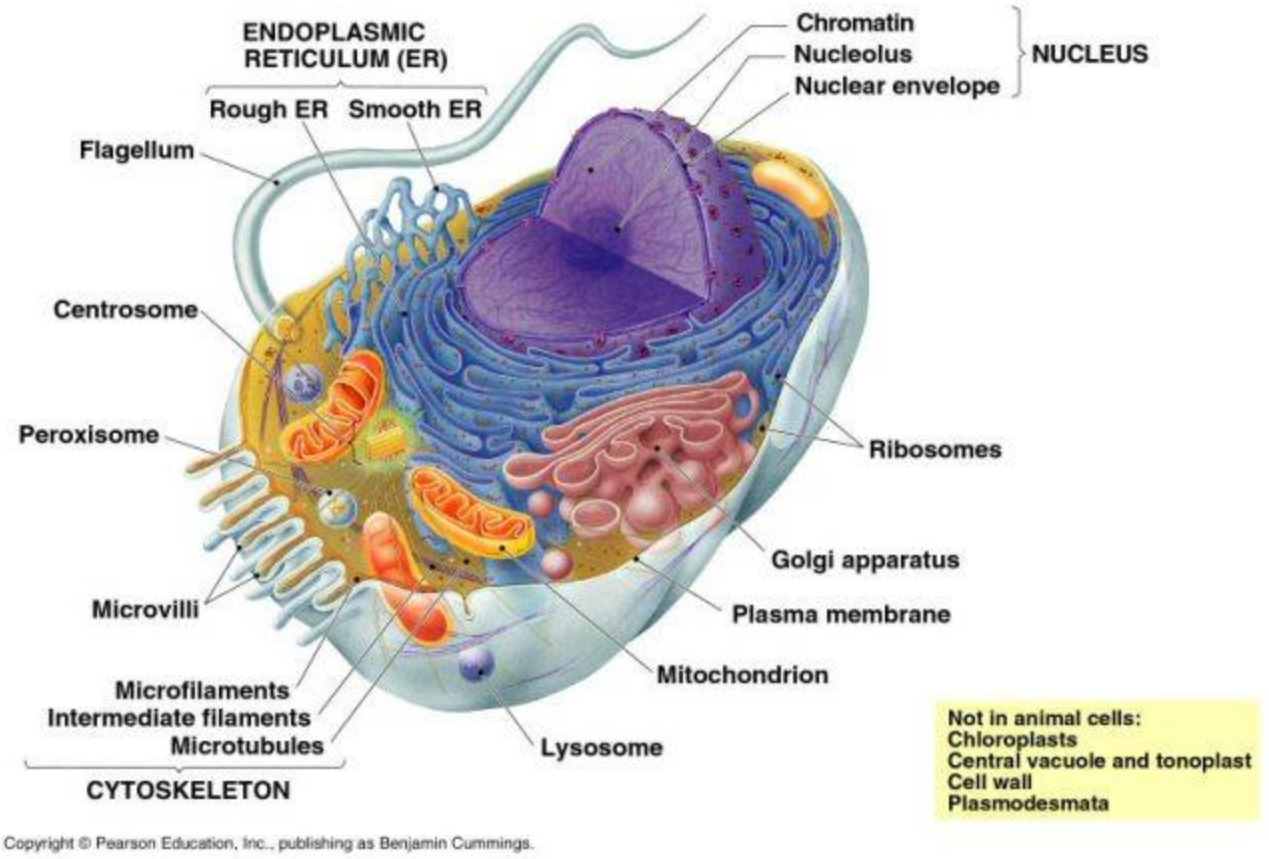
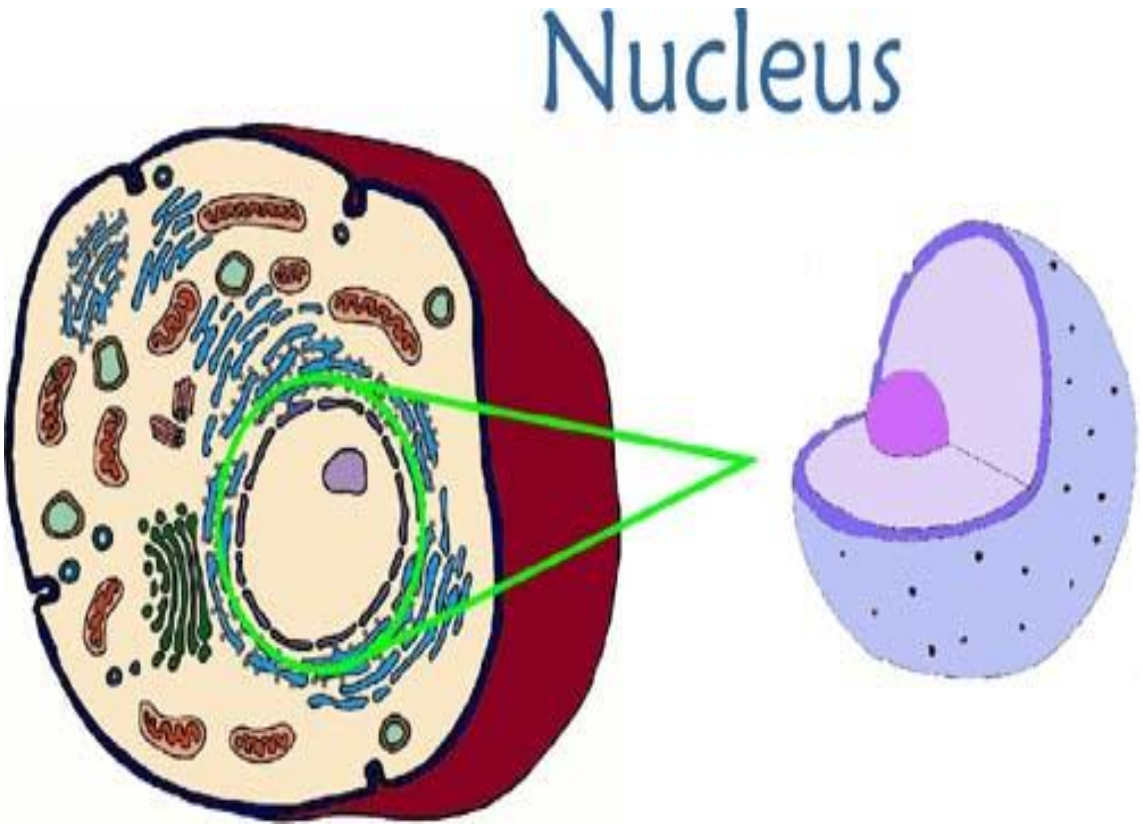
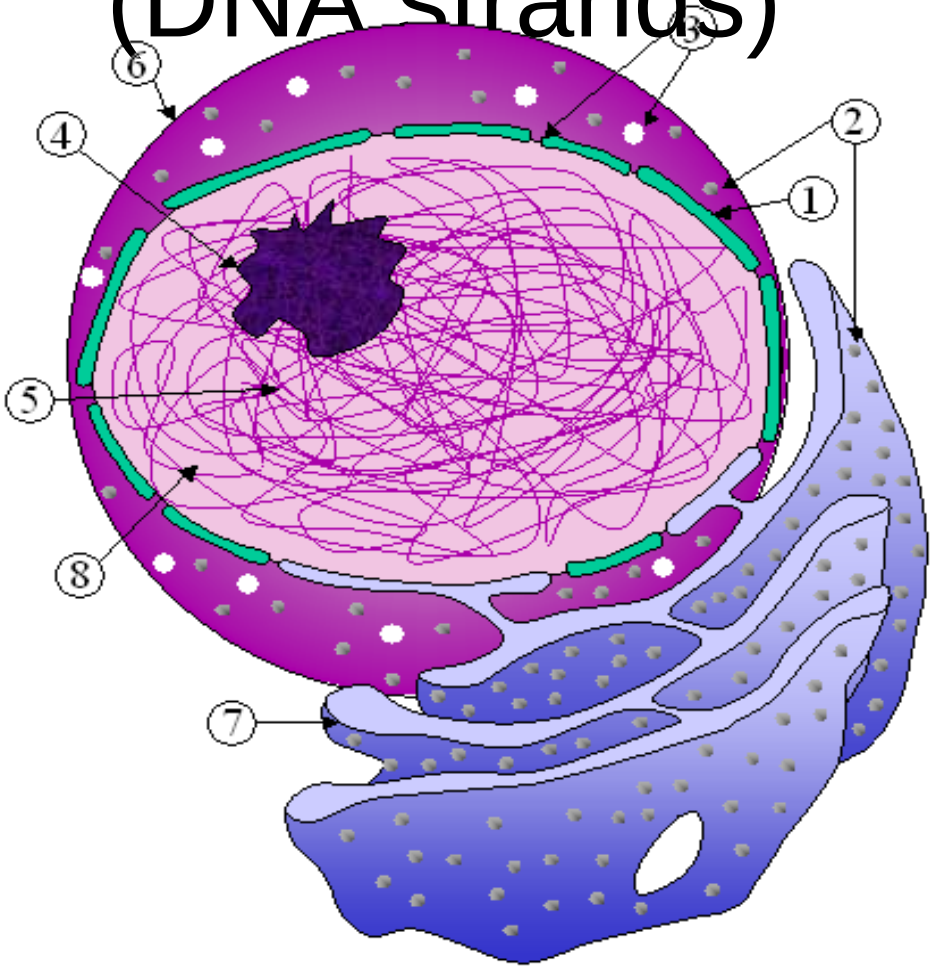
To live and grow, we must make new cells identical to the ones we have



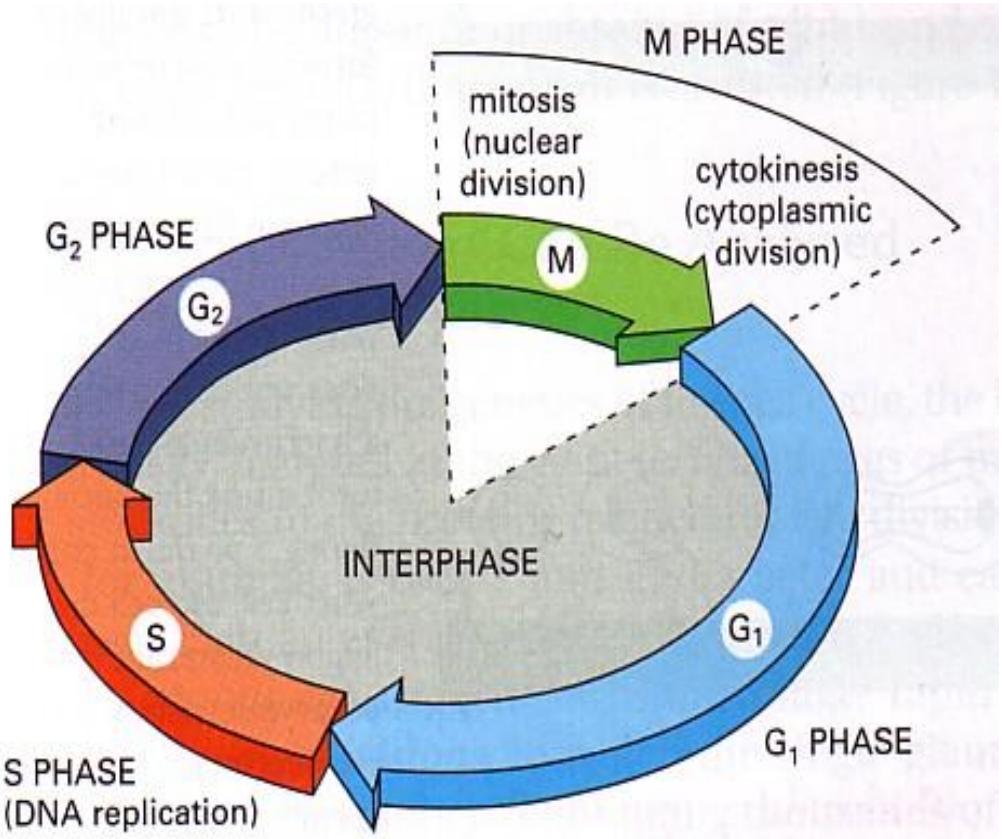
The nucleus (control center) tells cell when to reproduce



Directions for new cells are contained in the chromatin (DNA strands)



Like people, cells have a life cycle



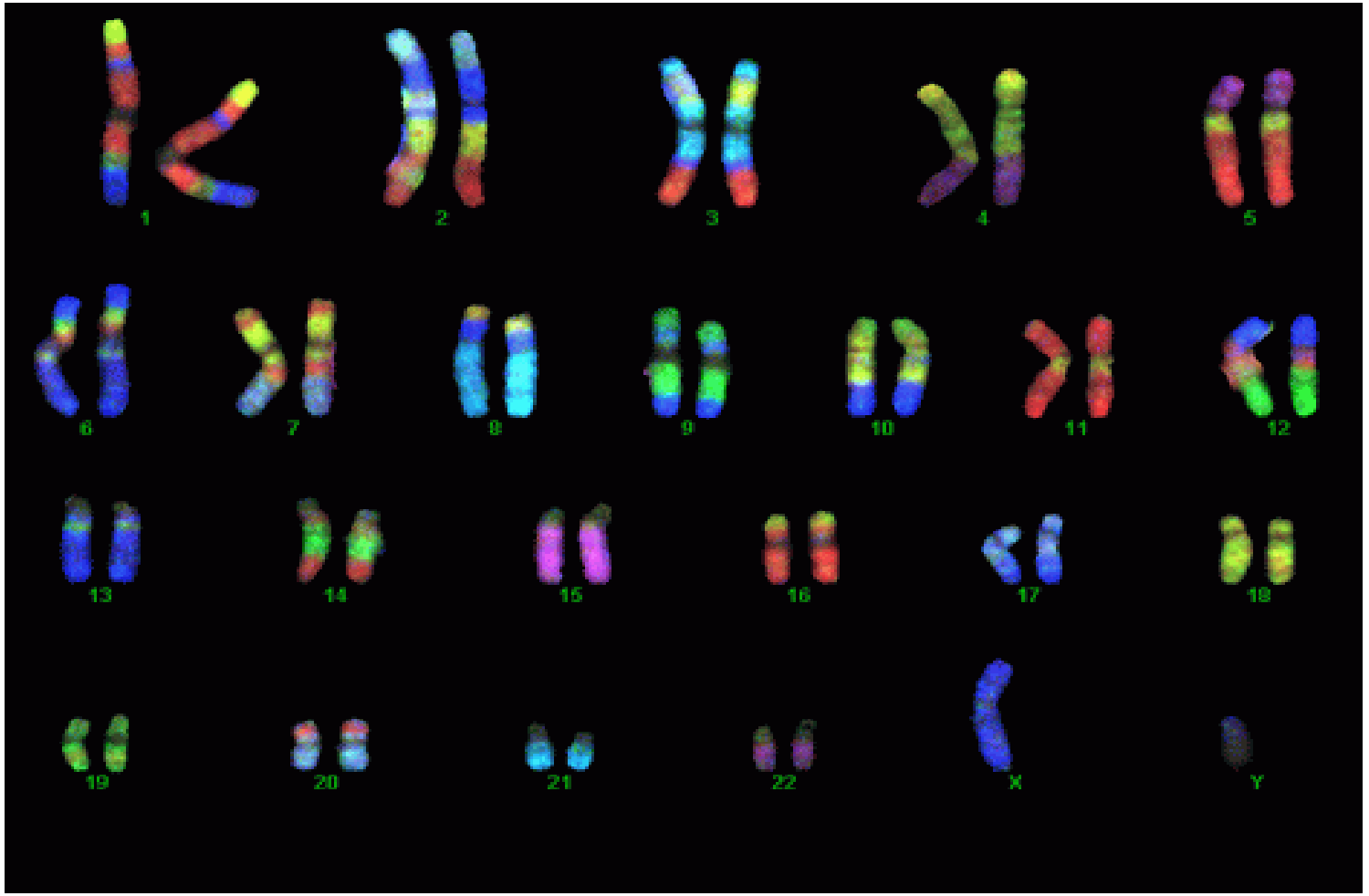
- Cells begin life and start to grow
- This is the G phase
- Remains in this phase until it gets instructions to reproduce
- Enters S phase where DNA replicates
- G2 phase is where cell completes preparations to divide
- M phase is where cell actually divides
- This is composed of several steps

- Before the cell can divide, the chromosomes must make exact copies of themselves so that the daughter cells will be just like the mother.
- They do this while they are still long, thin, and threadlike.

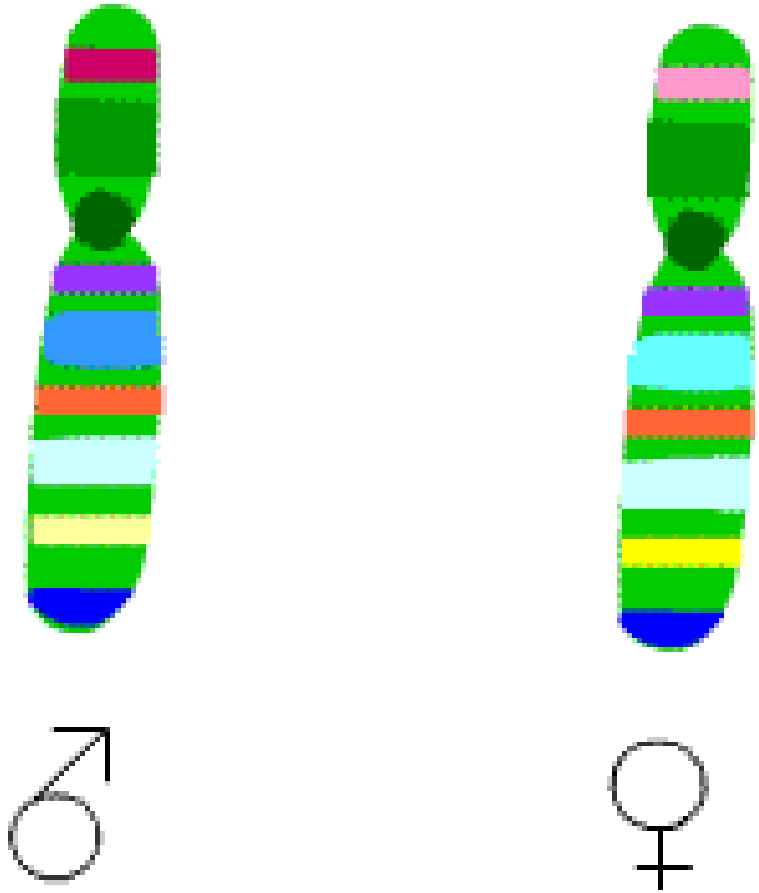
Ribbon

- Cromatin strands exist in nucleus
- Each one copies itself exactly
- They are tied together in the center
- During prophase, they coil up into compact structures called chromosomes
- These can be seen under a microscope

46 Chromosomes…23 Pairs



Pair =Two similar chromosomes…one from Mom, one from Dad



- Once the chromosomes have divided and everything is ready, Mitosis (cell division or the birth of two new cells) can begin.
- Mitosis…
- Asexual reproduction
- The two daughter cells produced are identical to the mother cell
- For growth and repair in somatic cells
- Produces cells with diploid number of chromosomes (2 sets, same as Mom cell)

Six stages of Mitosis

- Interphase
- Prophase
- Metaphase
- Anaphase
- Telophase
- Cytokinesis

Interphase

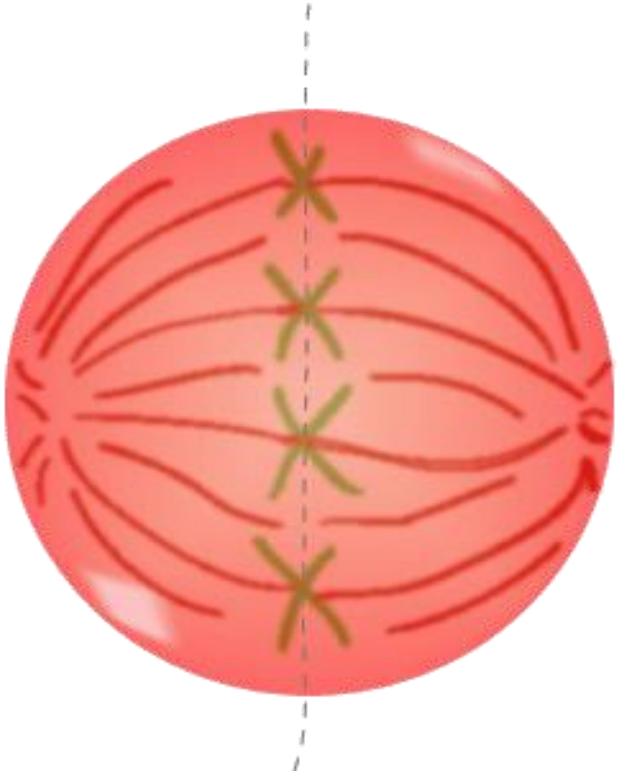
- This is 90% of the cell cycle
- Cell is doing normal cell functions
- G1 = growing
- S = Synthesis = Chromosome (DNA) replicate. Centrioles, mitochondria, chloroplasts, etc. replicate as well
- G2 = Organelles grow and prepare to divide

Prophase

Prophase

- Cromatin coils up to form chromosomes
- Nuclear membrane disentegrates
- Nucleolus disappears
- Centriole pairs separate and move to poles
- Spindle and asters form

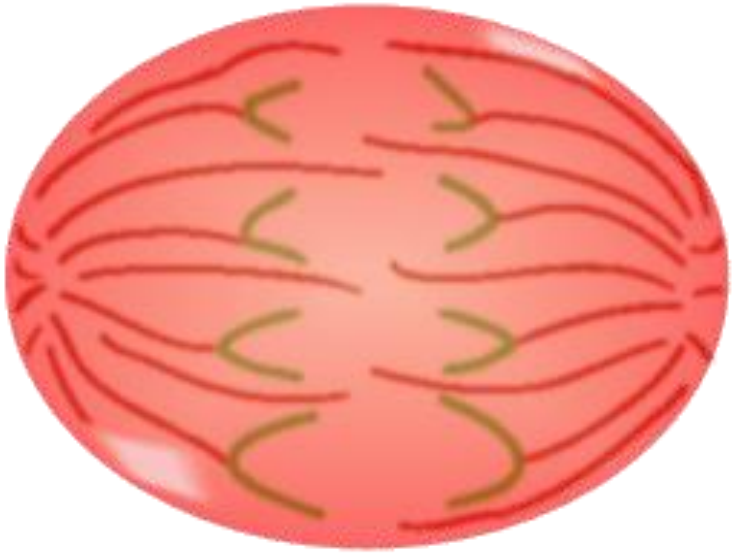
Metaphase



Metaphase

- Chromosomes are lined up by the spindles at the equator (center of the cell).
- Centromere = attachment at center of chromosomes

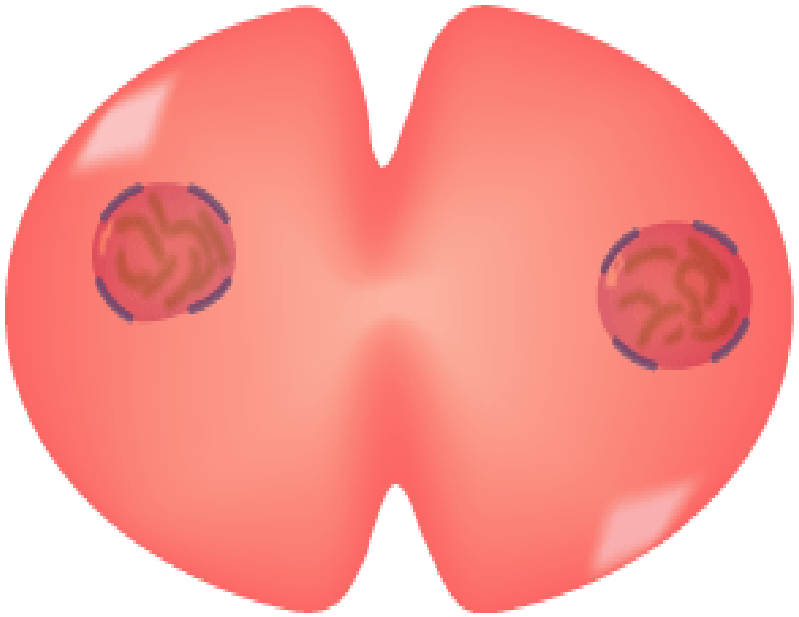
Anaphase



Anaphase

- Chromosomes pull apart at the centromere.
- Spindles pull chromosomes toward either end of the cell.

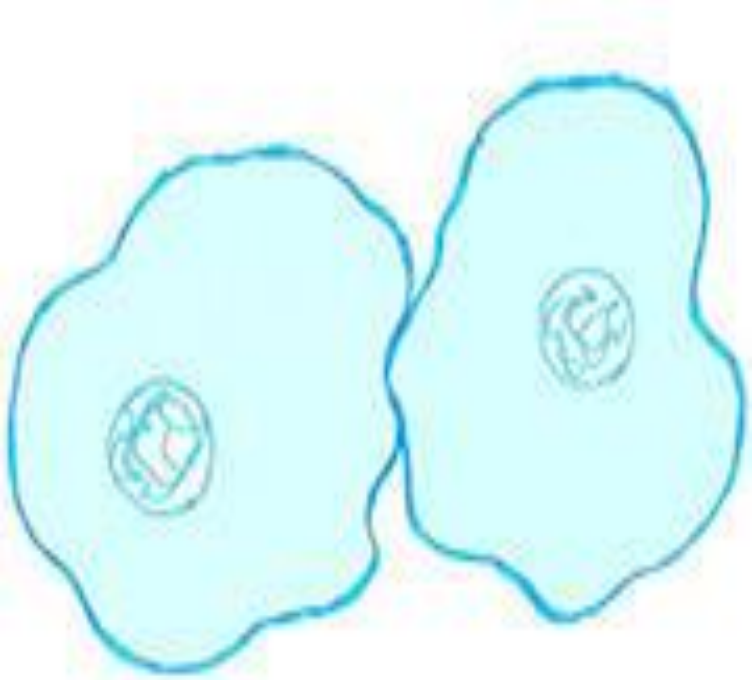
Telophase



Telophase

- Chromosomes uncoil and become chromatin again.
- Nuclear envelope reforms around 2 diploid somatic nuclei
- Cytokinesis begins

Cytokinesis



Cytokinesis

- The cytoplasm divides to complete the process.
- True cell division.
- Two completely new daughter cells formed.
- Cleavage furrow – animal cell
- Cell plate – plant cell

Mitosis Main Idea

- Mitosis is nuclear division that results in two identical diploid daughter somatic cells.

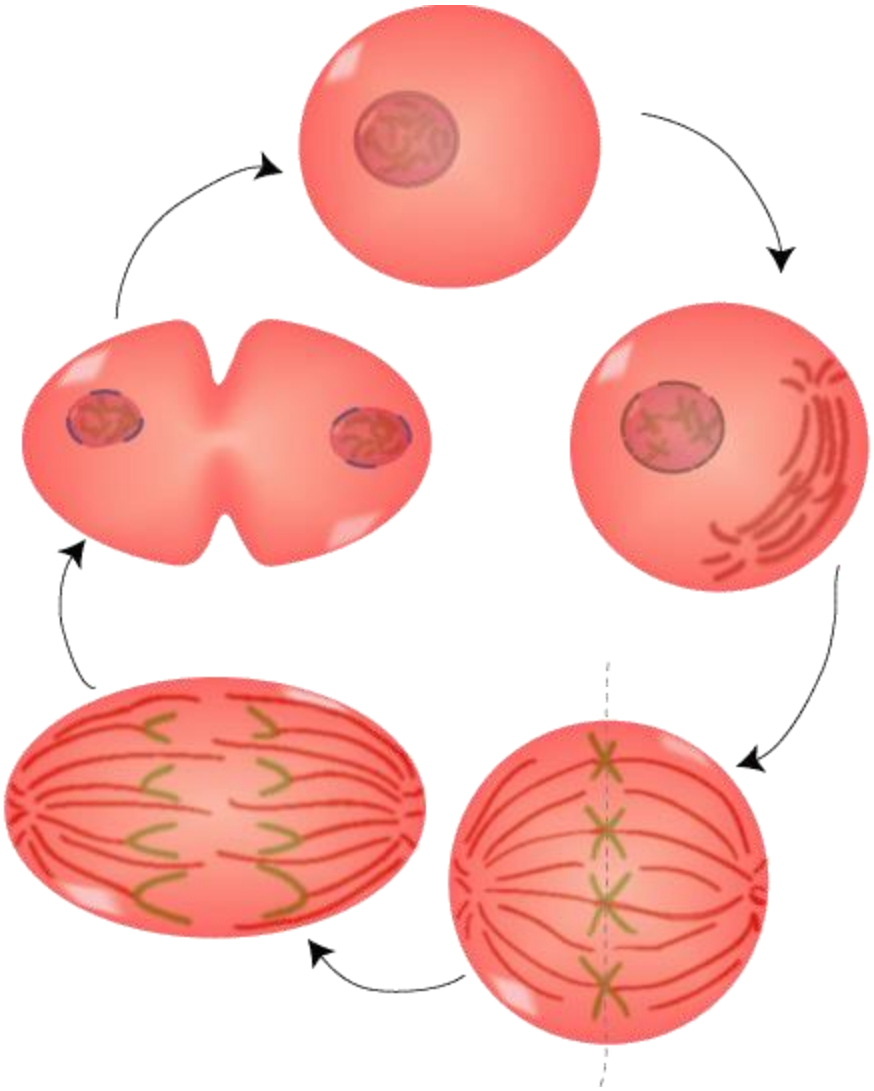
Vocabulary

- Chromatin = thin threadlike hereditary material in non-dividing cell
- Chromosome = thick rod-like hereditary material in dividing cell
- Centromeres = central portion of the chromosome which attaches sister chromatids (The spindle fibers attach here during cell division).

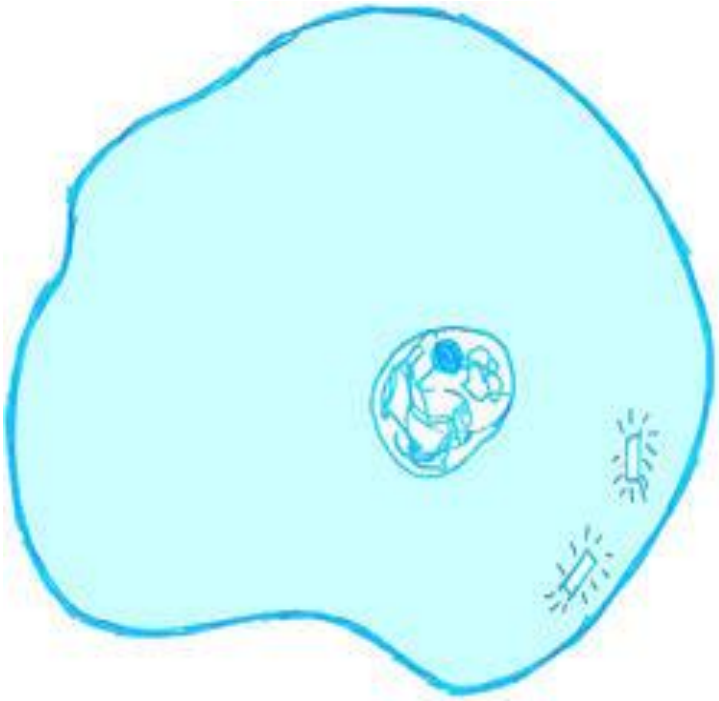
Vocabulary

- Diploid = A cell that contains two sets of chromosomes (one set donated from each parent).
- Haploid = A cell containing one set of chromosomes (from one parent only).
- Somatic cell = Any cell in the body other than an egg or sperm cell.
- Gamete = reproductive cells (egg or sperm)

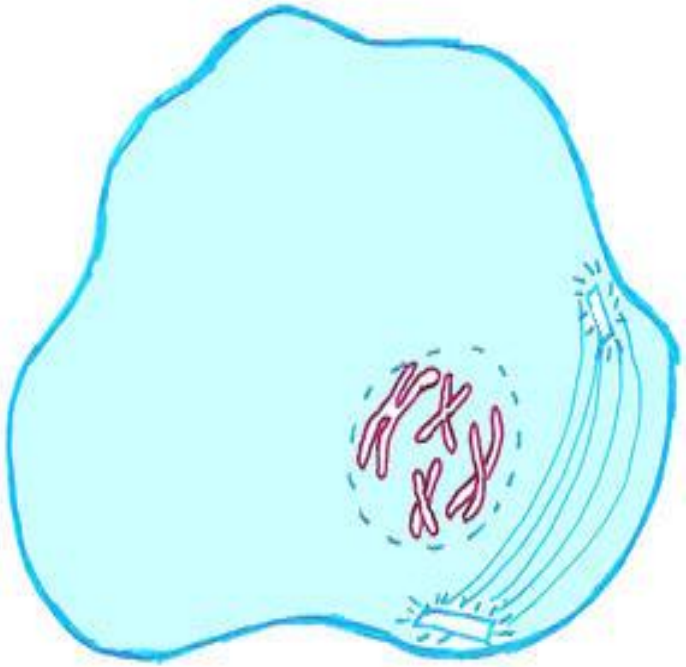
Recap



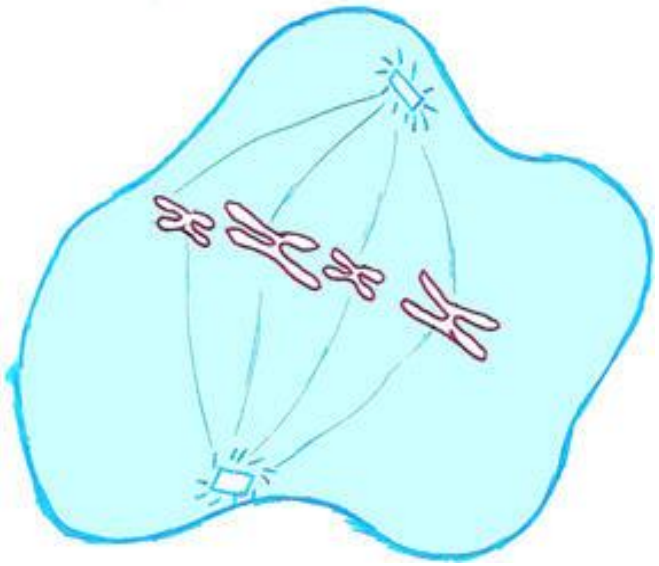
Interphase



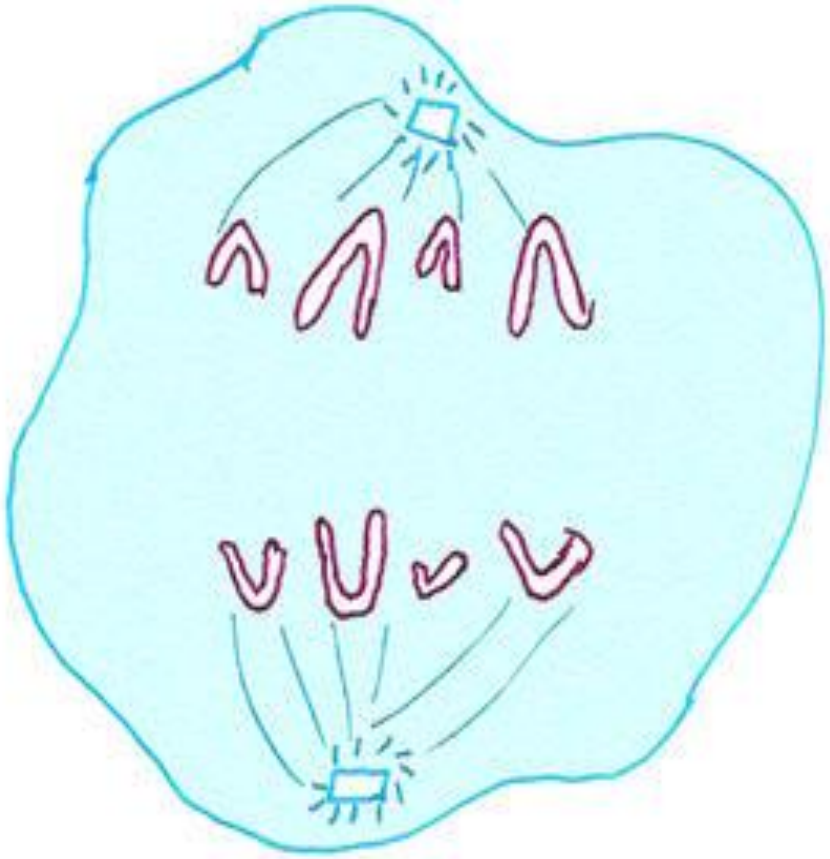
Prophase



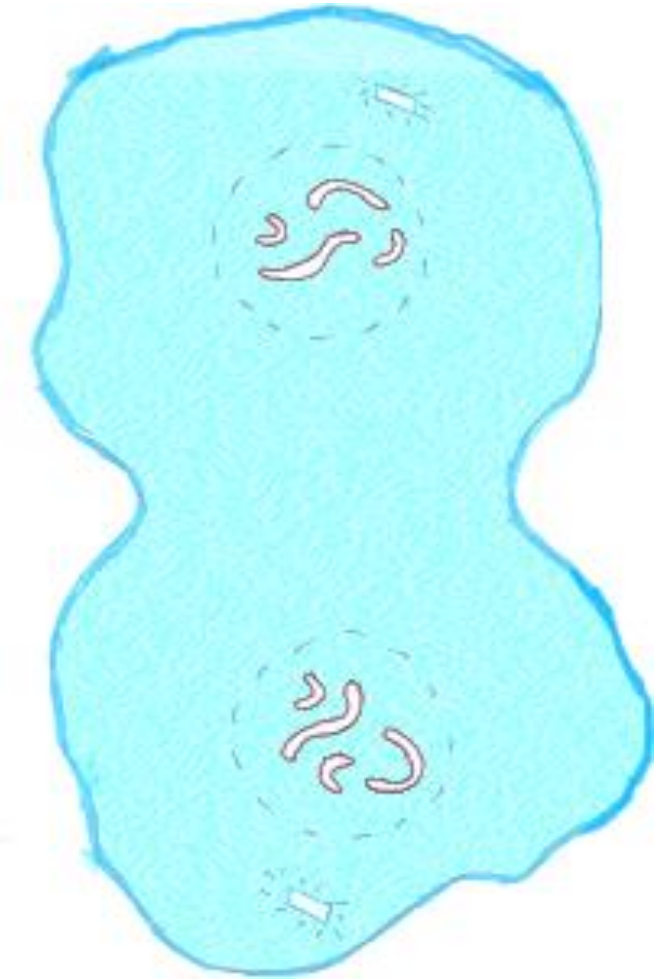
Metaphase



Anaphase



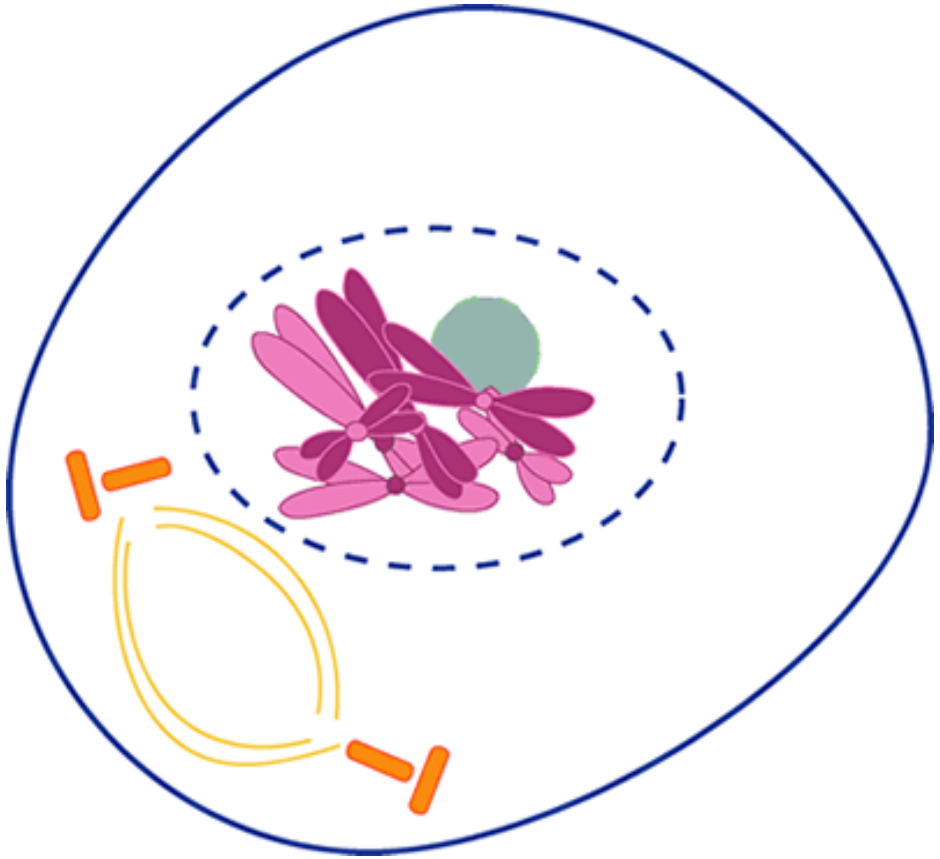
Telophase



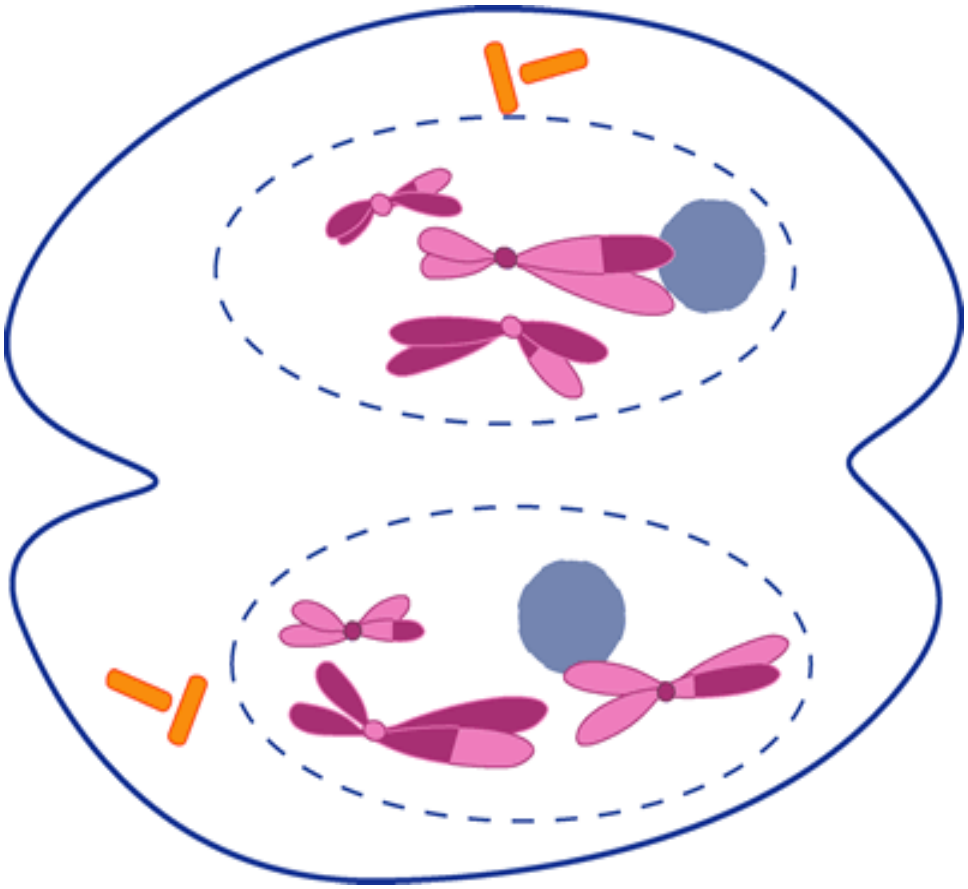
Cytokinesis

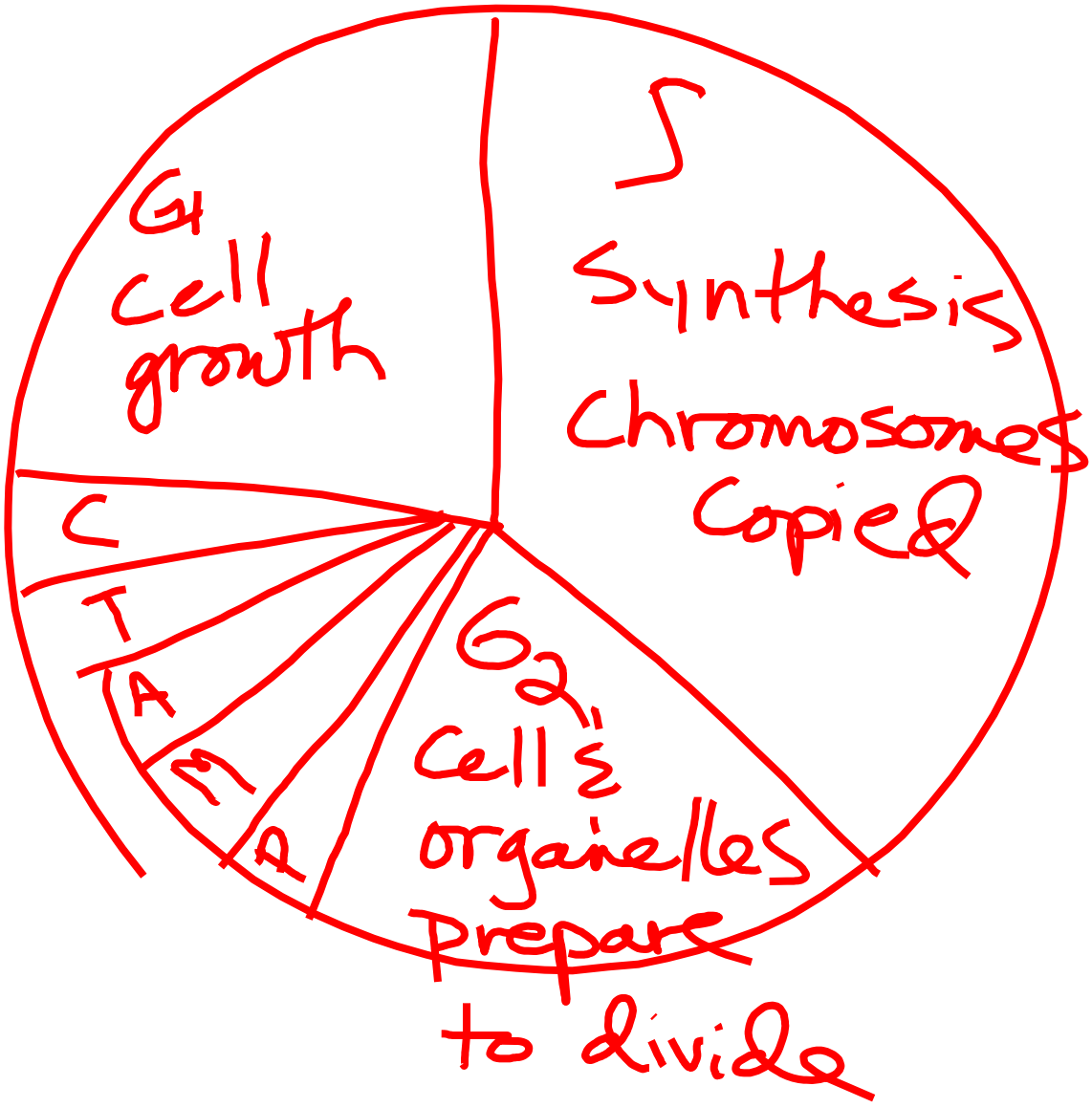
- The end

Prophase



Telophase




G1
cell
growth
S
Synthesis
Chromosomes
Copied
C
T
A
M
A
G2
Cell &
organelles
prepare
to divide

Bunsen Burner