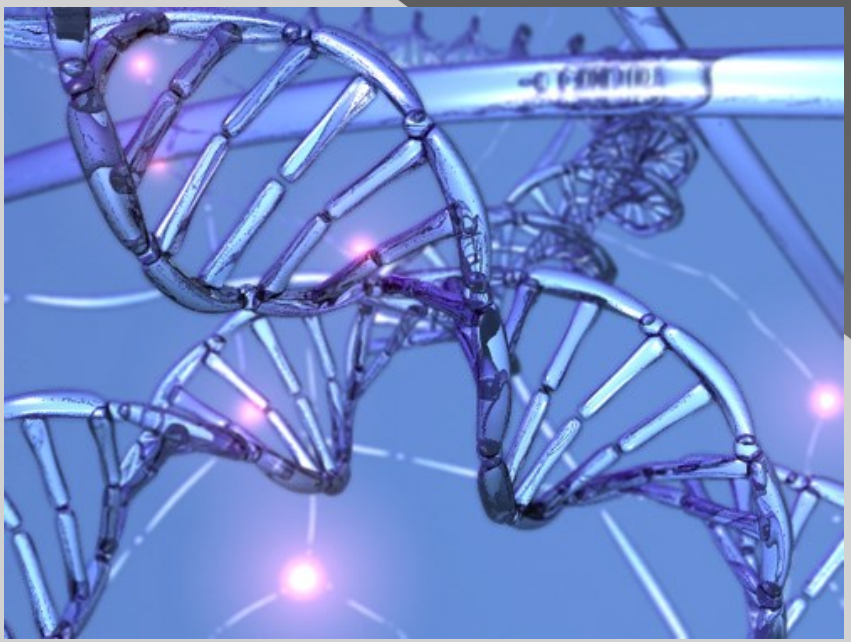
Unit 2 – Cell Cycles
Standard B-2

H.B.2D.1 Construct models to explain how the processes of cell division and cell differentiation produce and maintain complex multicellular organisms.

Introduction to Cell Division

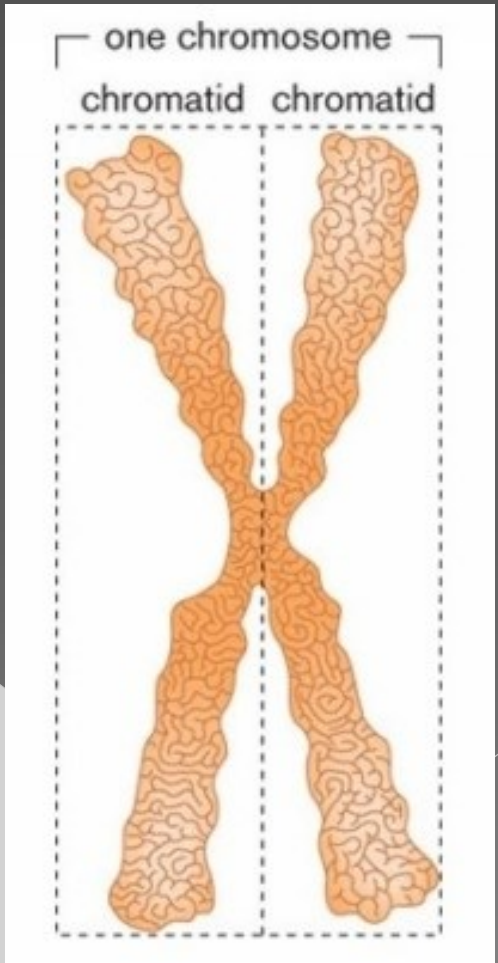
Important Vocabulary

- **DNA:** genetic material that contains all of the instructions for life
  - All cells in an organism have the same DNA!



Important Vocabulary

- **Chromosome**: DNA in a condensed form
- **Chromatid:** one arm of a chromosome
  - **Sister chromatid:** identical arm
  - **Centromere:** holds them together
  - video

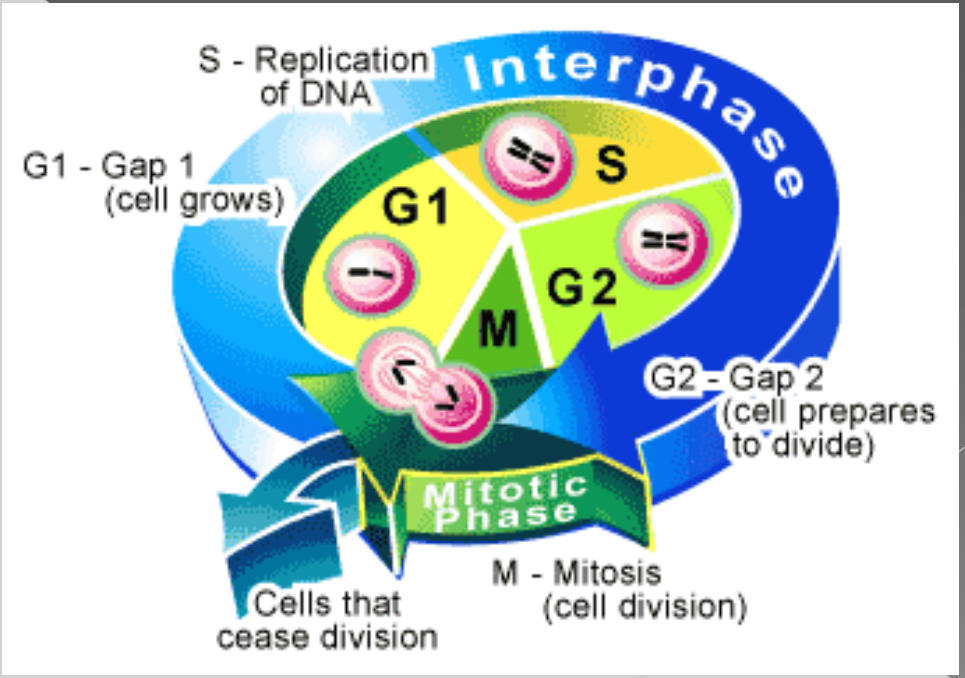


Cell Cycle

How do cells divide?

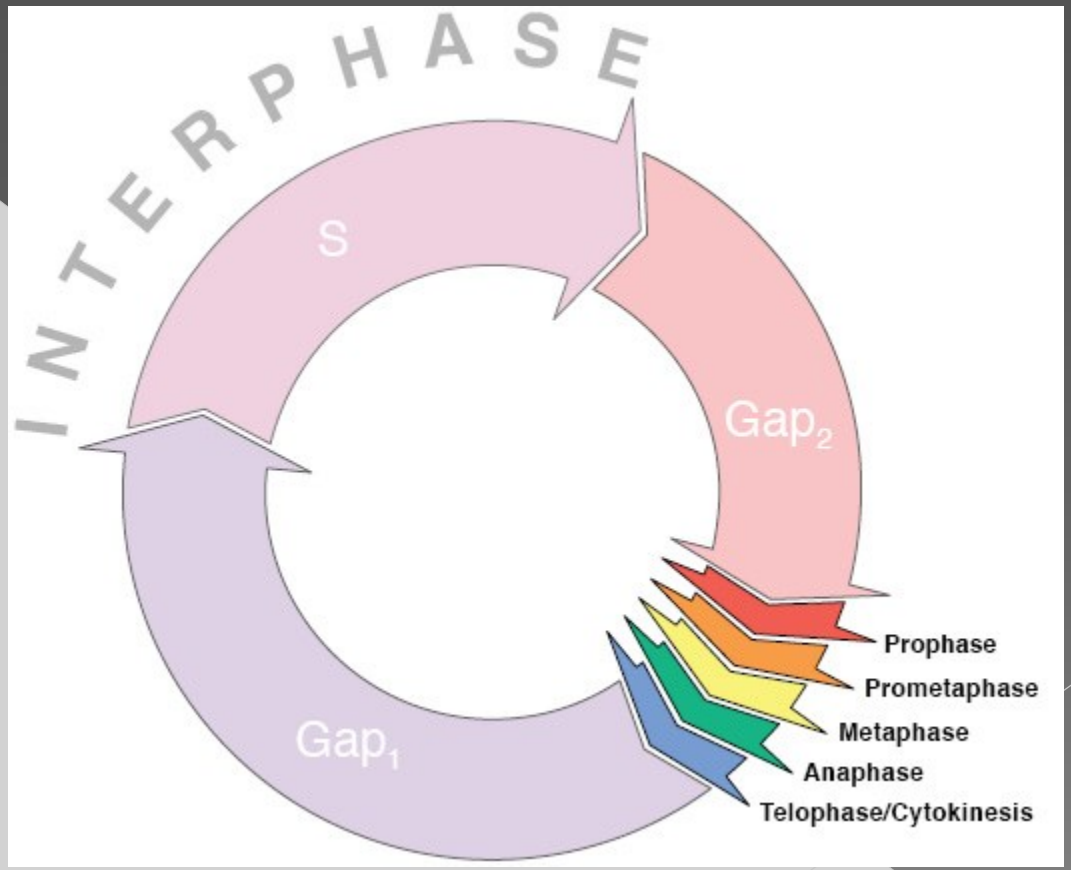
Cell Cycle

- The **cell cycle** is a repeated pattern of growth and division in eukaryotic cells
- It has 3 phases
  - Interphase
  - Mitosis
  - Cytokinesis



Interphase

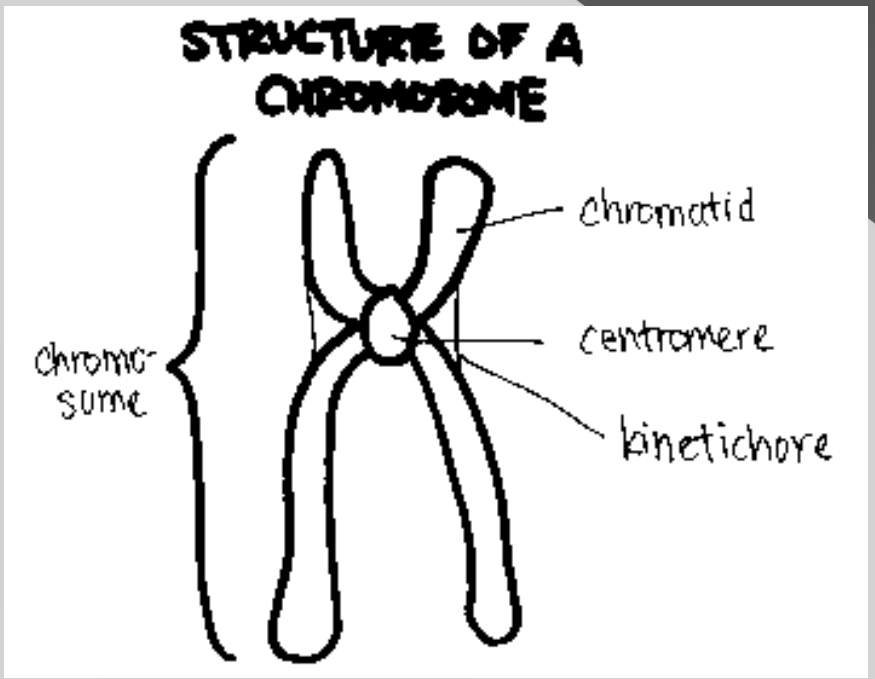
- This is where cells spend most of the time
- Purpose is *cell growth*; divided into 3 parts



Interphase: 3 Phases

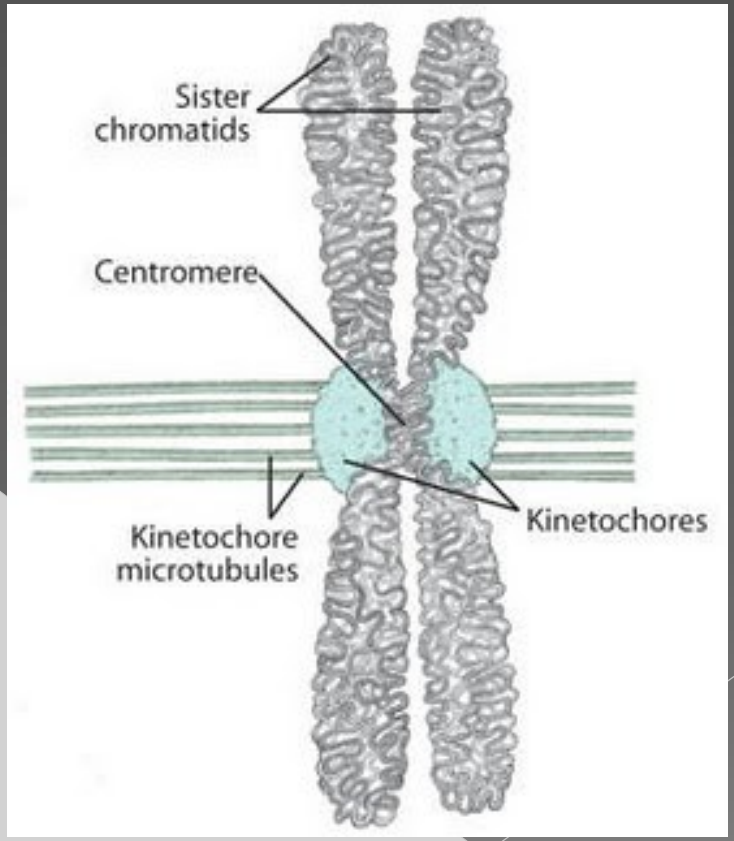
- G1: cell grows and makes proteins
- S: chromosomes doubled so there is enough for two cells
  - Forms **sister chromatids** held by a **centromere**
- G2: cell continues to grow and make proteins

Chromosome


STRUCTURE OF A CHROMOSOME
chromatid
centromere
kinetichore
chromo-some

Mitosis

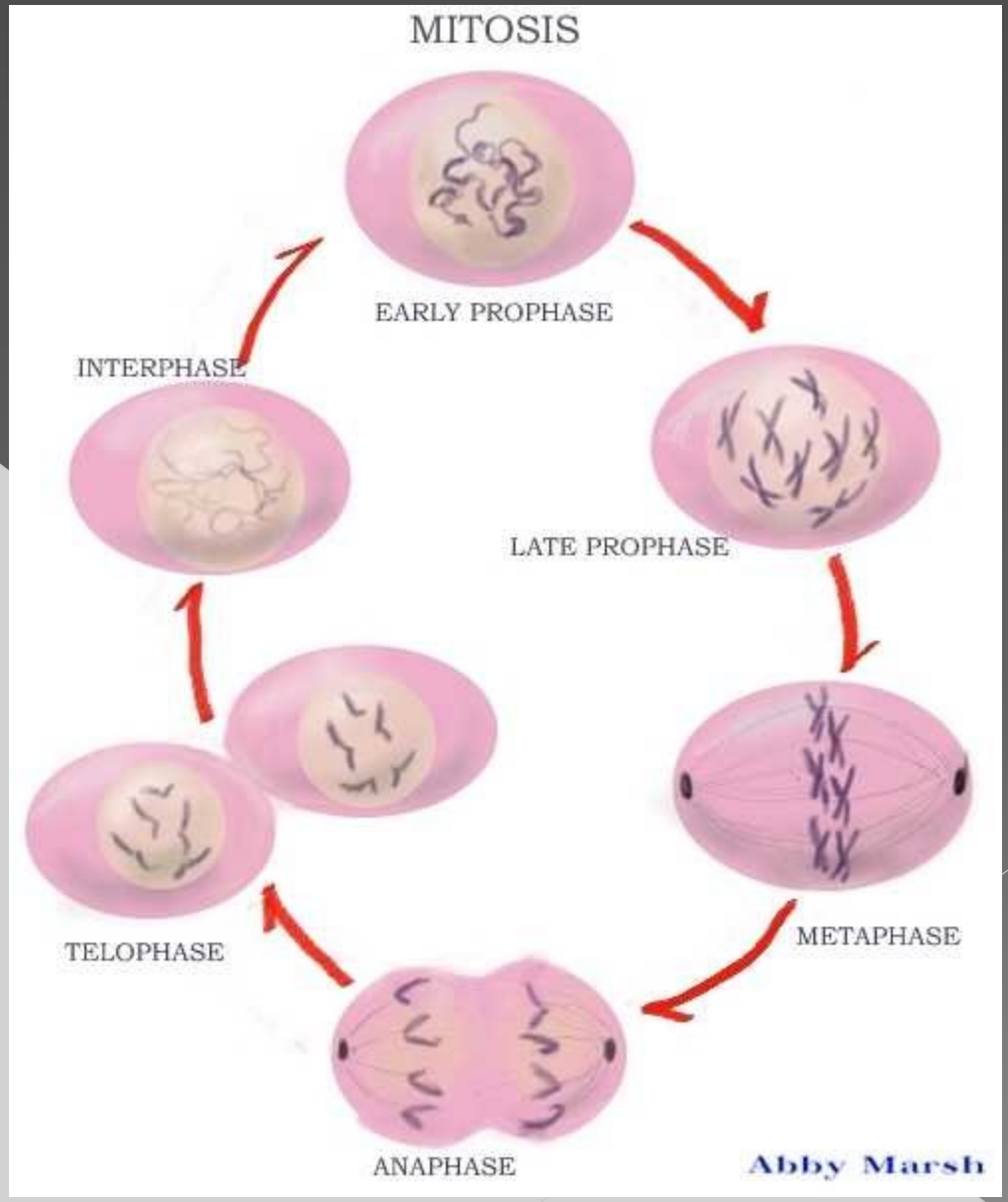
- Purpose is cell division (make 2 cells from one)
  - Each cell must have its own DNA, cytoplasm, and organelles
  - This stuff is ***created in interphase***
  - In mitosis, the ***sister chromatids have to separate*** at the centromere so each cell has one set of DNA



Mitosis

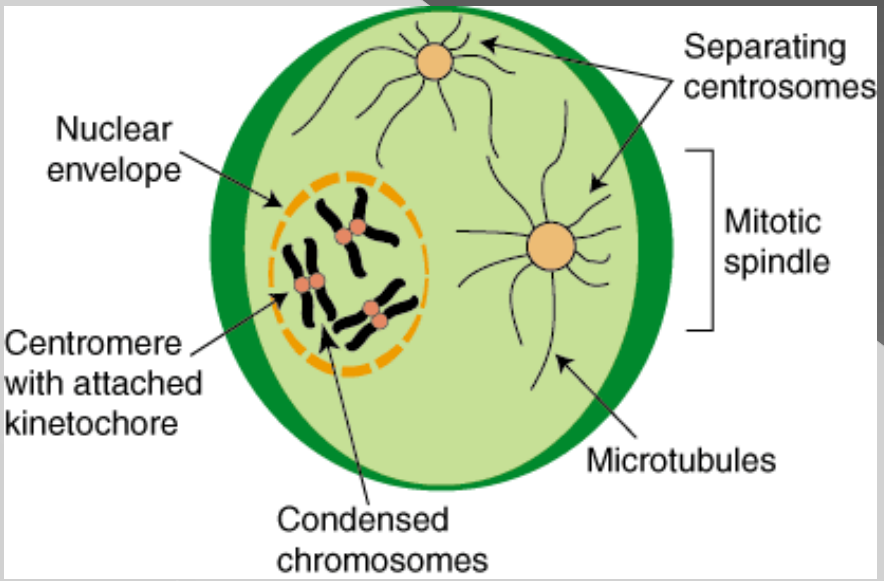
- There are 4 parts of mitosis
  - Prophase
  - Metaphase
  - Anaphase
  - Telophase

  - *Remember P-MAT*



Prophase

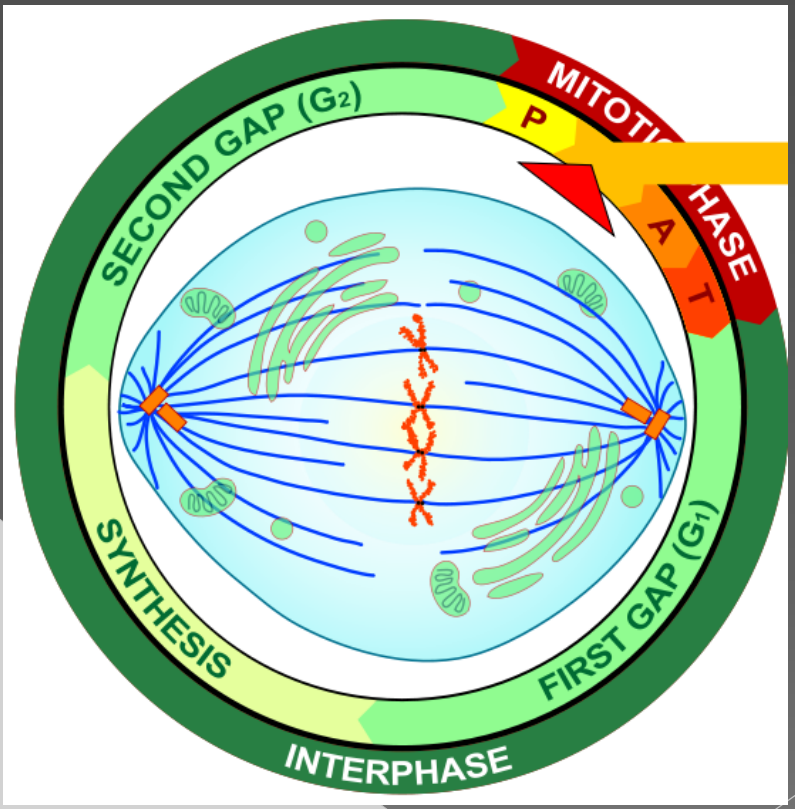
- Chromosomes condense
- Nuclear envelope begins to break down
- Spindle continues to form: 2 centrosomes migrate to opposite sides of the cell, while long spindle fibers extend out of them



  - Remember P for PREPARATION

Metaphase

- 2 important events
  - Chromosomes line up at the middle of the cell
  - Spindle fibers connect to the centromere of each sister chromatid
  - Remember M for METAPHASE and MIDDLE



Anaphase

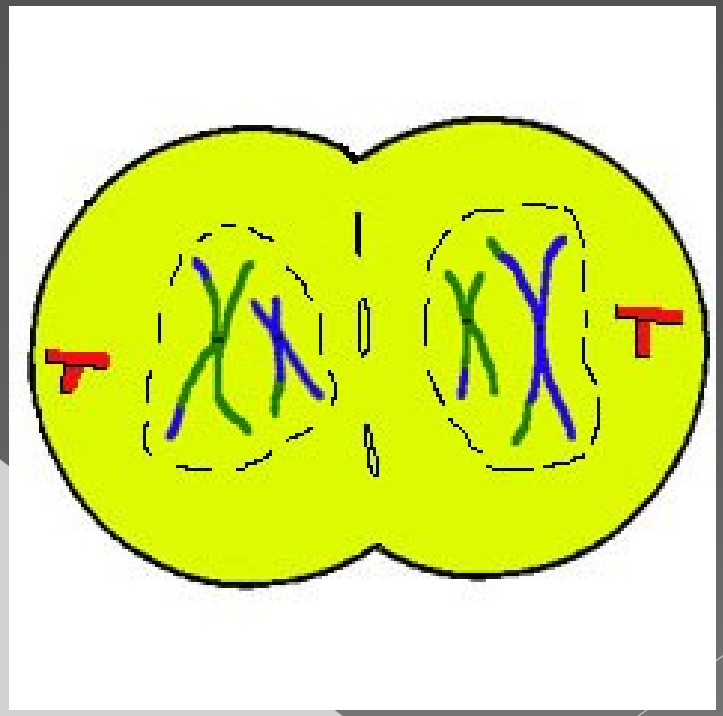
- 2 important events
  - Centromeres split
  - Sister chromatids separate to become individual chromosomes

  - Remember A for ANAPHASE and APART

Telophase

- 4 important events
  - Chromosomes uncoil
  - Nuclear envelope reforms
  - Spindle fibers break down
  - Cytokinesis begins

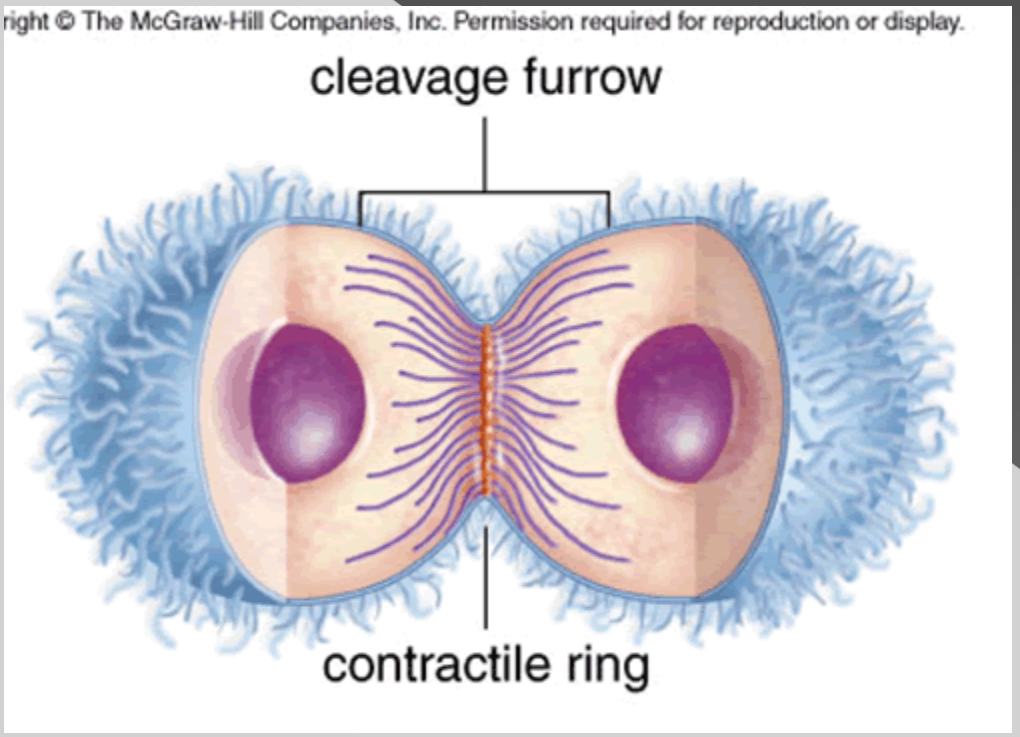
  - Remember T for TO THE START

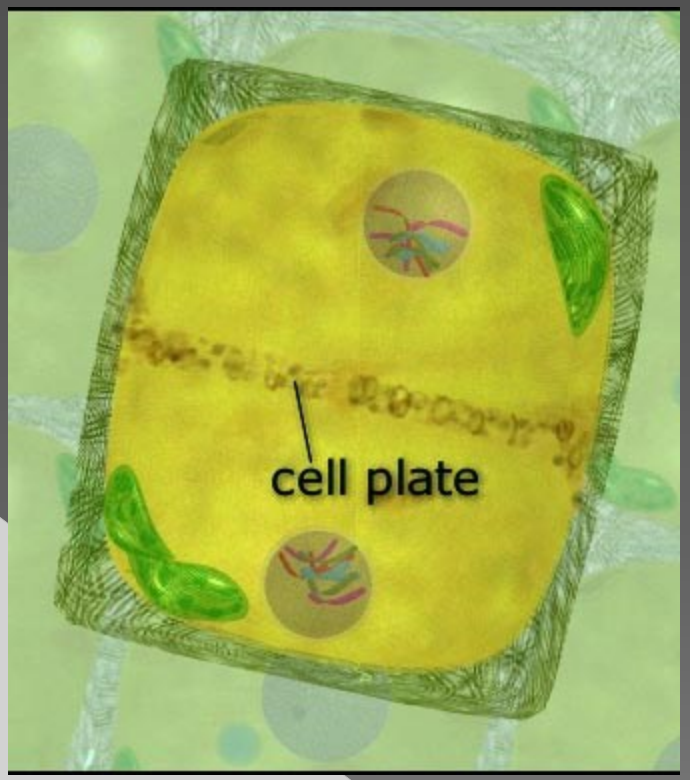


Cytokinesis

- The third part of the cell cycle is **cytokinesis,** or division of the cytoplasm
  - In *animal cells*: membrane forms a cleavage furrow and pinches the cell into two
  - In *plant cells*: **cell plate** forms midway between the nuclei

Cytokinesis





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