BIG IDEA: Cells divide during mitosis and cytokinesis.
GOAL: Mitosis and cytokinesis produce two genetically identical daughter cells.

- Interphase (G1, S, G2) prepares the cell to divide.
- During S-PHASE OF interphase, the DNA is duplicated.
5.2 Mitosis and Cytokinesis

- Chromosomes condense at the start of mitosis.

  - DNA wraps around proteins (histones) that condense it.

![Diagram of DNA double helix, DNA and histones, chromatin, and supercoiled DNA.](image-url)
5.2 Mitosis and Cytokinesis

DIFFERENT TERMS FOR GENETIC MATERIAL BASED ON ITS STRUCTURE:

- DNA plus histones is called chromatin.
- One half of a duplicated chromosome is a sister chromatid.
- Sister chromatids are held together at the centromere.
- Telomeres at the end of a chromosome protect DNA and do not include genes.

Condensed, duplicated chromosome
5.2 Mitosis and Cytokinesis

- Mitosis divides the cell’s nucleus in **four** phases.

**PHASE 1**: During **prophase**, chromosomes condense and spindle fibers form.
PHASE 2: During metaphase, chromosomes line up in the middle of the cell.
5.2 Mitosis and Cytokinesis

• PHASE 3:
  – During **anaphase**, sister chromatids separate to opposite sides of the cell.
PHASE 4: During telophase, the new nuclei form and chromosomes begin to uncoil.
5.2 Mitosis and Cytokinesis

- **Cytokinesis** differs in animal and plant cells.
  - In animal cells, the membrane pinches together forming a cleavage furrow.
  - In plant cells, a cell plate forms.