

# Biology 30 IB

## Cells, Chromosomes, & DNA

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# Unfinished!

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# 1 Terms

- **Somatic cells** are all cells in the body **except sex cells**—sperm and egg cells.
- **Cell division** is done by Eukaryotic cells—have a nucleus.
- **Binary fission** is done by Prokaryotic cells—have no nucleus, such as **bacteria**.

## 2 Cell Division

### 2.1 Purpose

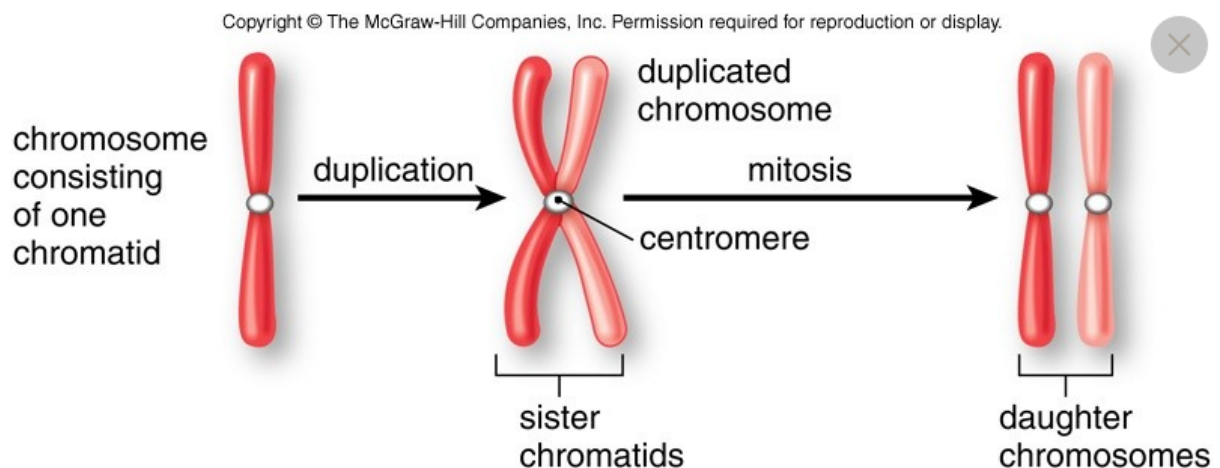
- Unicellular organisms (i.e. **zygote**) → Multicellular organisms
- Growth and maintenance of body cells—**replacement** of worn out cells

### 2.2 Chromosomes

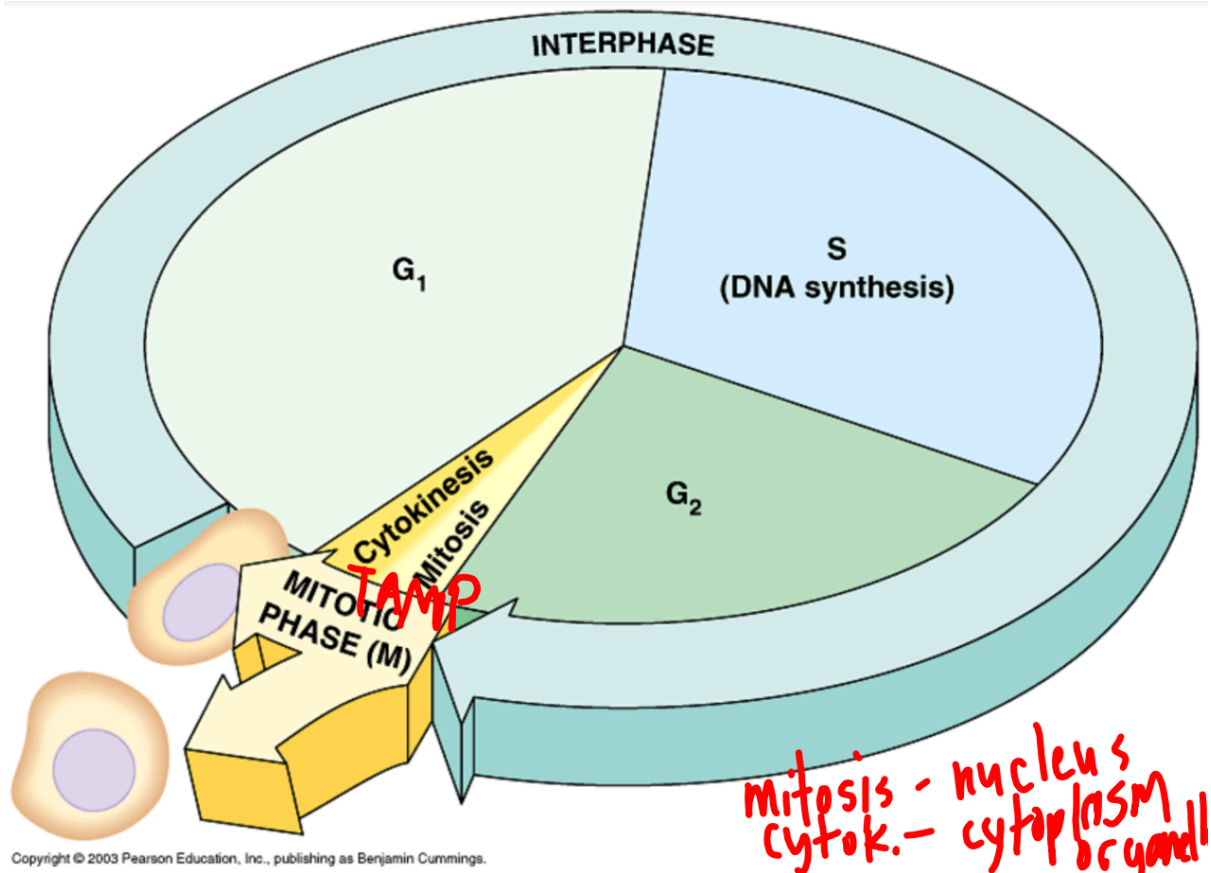
- Comprised of...
  - nucleic acids (DNA)
  - proteins
- Either...
  - **Uncondensed** aka. **Chromatin** = long, thin strands. invisible to microscope
  - **Condensed** = thick & shortened. visible to microscope

### 2.3 Chromatid

- The strand that makes up a normal chromosome.
- In mitosis...
  - A chromosome duplicates into two **identical** chromatids, joined together by a **centromere**, to form a **duplicated chromosome**.
  - These chromatids are referred as **sister chromatids** in this state.
  - Each chromatid of a duplicated chromosome goes to each of the two new cells.



### 3 Cell Cycle



A continuous cycle that involves all steps of a cell's life, especially cell division.

#### 3.1 Interphase

- 90% of cell cycle.
- All cell activity when not dividing.

##### 3.1.1 Gap 1 ( $G_1$ )

- Cell growth and general function.
- After cell division, cells may be smaller than their parent. Cell growth is needed.

##### 3.1.2 S Phase ( $S$ )

- DNA is doubled.
- Single(-chromatid) chromosome  $\xrightarrow{\text{duplication}}$  double(-chromatid) chromosome.

##### 3.1.3 Gap 2 ( $G_2$ )

- Organelles are doubled. (*building proteins, new cell membranes*)

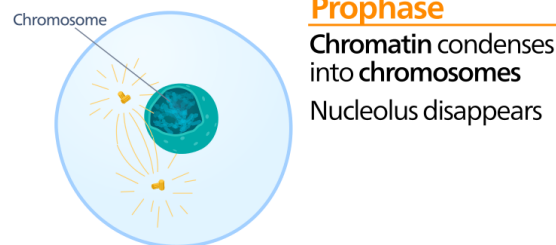
## 3.2 Mitosis

Occurs in somatic cells.

Distribution of **nucleus and its contents**.

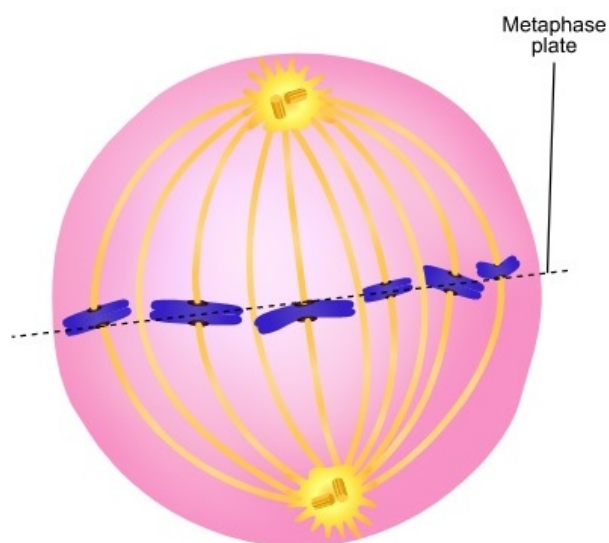
### 3.2.1 Prophase

- Chromatin condense—shorten & thicken—into chromosomes, becoming visible.
- Nuclear membrane fades.
- Animal cells only...
  - **Centrioles** move to opposite poles of cell. (N/S, E/W)
  - Centrioles deploy **spindle fibers**.



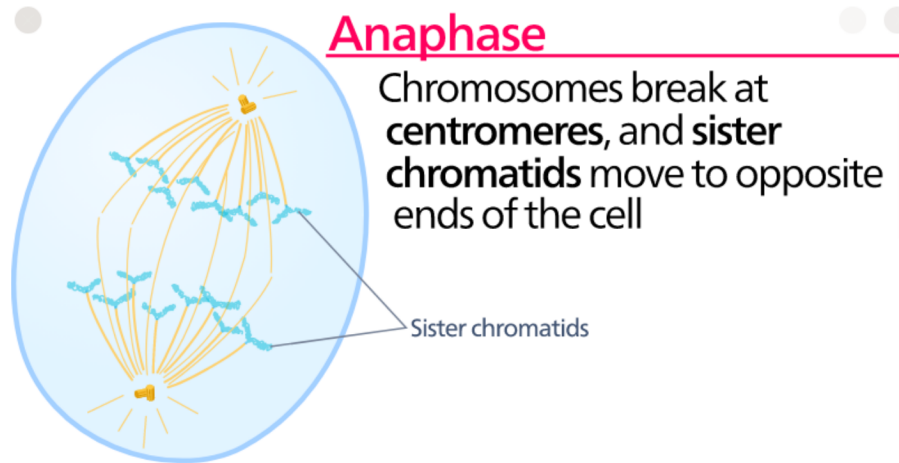
### 3.2.2 Metaphase

- **Equatorial plate** = center of cell.
- Sister chromatids move towards equatorial plate.
- Chromosomes attach to spindle fibers.



### 3.2.3 Anaphase

- Centromeres divide.
- (Now) chromatids move towards spindle fibers—i.e. opposite poles of cell.



### 3.2.4 Telophase

- Spindle fibers dissolve.
- Nuclear membrane forms around each mass of chromatin.
- **Cytokinesis** occurs.
  - **Division of cytoplasm** and **distribution of organelles** to "daughter" cells.
  - Involves **cleavage**, pinching off in the center as the cytoplasm moves to opposite poles.
  - In plant cells only, a **cell plate** is distributed, which develops into a new cell wall.

