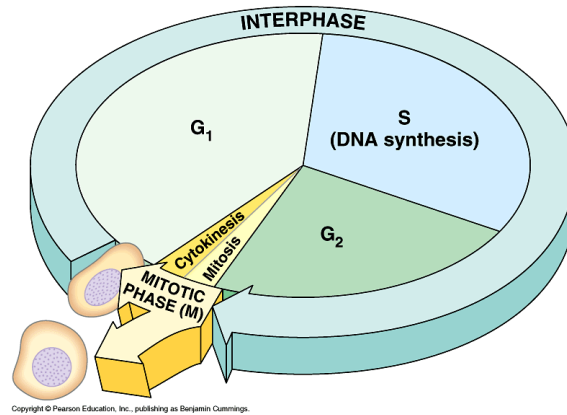


# THE CELL CYCLE

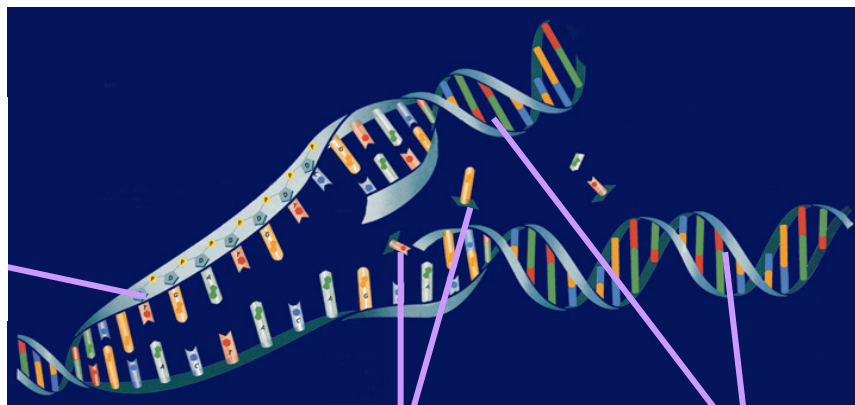
The **cell cycle** is a sequence of several phases through which a cell passes as it grows, prepares for division, and divides.



- **Interphase**- the stage where the cell spends most of its time, divided into...
  - **G1** (first growth) phase- cell undergoes growth, energy conversions, transport of molecules, and synthesis of new molecules (normal cellular functions)
  - **S** (synthesis) phase- a copy of each chromosome is made. One complete set of genetic information will be given to one nucleus that forms as a result of mitosis, and the other complete set will be given to the other nucleus.

(DNA is the instruction manual for the cell. Exact copies of DNA are passed on to the next generation of cells each time a cell divides. The overall process of DNA replication (*DNA copying itself to make new DNA for new cells*) is shown in the diagram below)

1. DNA molecule is unzipped  
(bonds between the nitrogen bases are broken by enzymes)



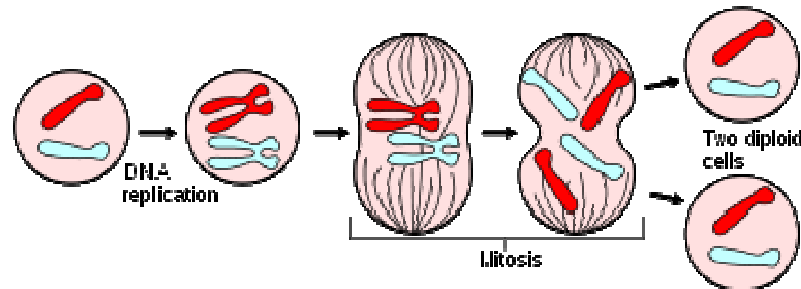
2. Free floating nucleotides are added to their complementary bases

3. Formation of two identical DNA molecules

- **G2** (second growth) phase- cell prepares for mitosis

*Once interphase is complete, the cell is ready to enter mitosis...*

- **Mitosis** (M phase)- the process in which a nucleus divides to form two nuclei
  - Chromosomes condense
  - Chromosomes line up along the middle of the cell
  - Each member of a chromosome pair moves to the opposite end of the cell
  - The nucleus divides. Each nucleus ends up with the same number of chromosomes as the original cell.
  - The cytoplasm divides (**cytokinesis**), resulting in two identical cells.



While the events of the cell cycle are usually carefully regulated, mutations may lead to loss of control of the cell cycle. Uncontrolled cell division is known as **cancer**.

#### PRACTICE

- The cell cycle includes mitosis. What happens during mitosis?
  - each chromosome makes a copy of itself
  - the cell cytoplasm divides to produce two cells
  - the cell prepares to divide
  - the nucleus divides so that each cell will receive a complete set of genetic information
- A yeast cell can complete a cell cycle every 90 minutes. Starting with just one cell, how many yeast cells should be present after 6 hours?
  - 2
  - 4
  - 8
  - 16
- During the very early stages of a person's life, the rate of cell division proceeds rapidly. During this time, cells show little growth. What can you conclude from this information about the cell cycle during these very early stages of development?
  - the cell cycle consists mainly of a long G1 phase
  - the cell cycle consists mainly of M and S phases
  - most cells exit the cell cycle
  - most cells will not undergo mitosis
- During the cell cycle, DNA is copied. Which type of biomolecule is DNA?
  - carbohydrate
  - lipid
  - protein
  - nucleic acid

5. The cell cycle requires energy. Which process supplies this energy so that the cell cycle can take place in all living things?

- a. respiration
- b. transport
- c. homeostasis
- d. fermentation

6. Part of the cell cycle involves growth. Growth involves assembling smaller molecules to make large ones. Which process is responsible for making these larger molecules from smaller ones?

- a. transport
- b. respiration
- c. synthesis
- d. homeostasis

7. The cell cycle involves the division of the nucleus. Which type of cell undergoes mitosis?

- a. prokaryotes
- b. eukaryotes
- c. bacterial cells
- d. only plant cells

8. Why must each chromosome make a copy of itself before the M phase begins?

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9. What happens during the M phase of the cell cycle?

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10. Why is the cell cycle important to the growth of an organism?

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