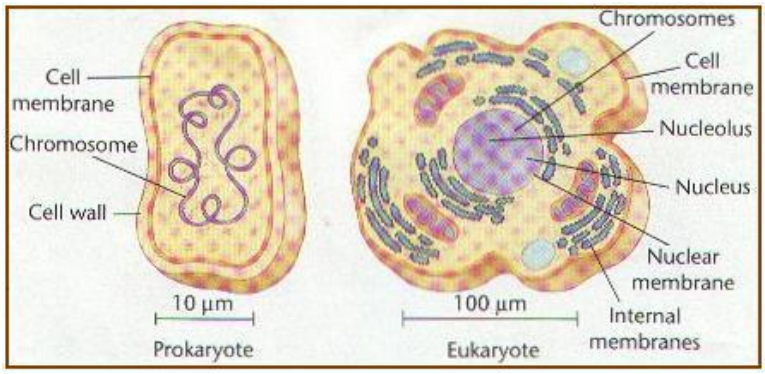
**Guided Notes: DNA and Mitosis**

## The Structure of DNA

- DNA is _____
- Stands for:
- Made up of repeating _____
- "Unit of Heredity"

*-Where is it found?*

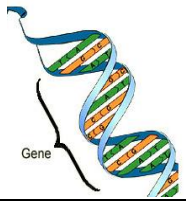
- DNA is in the _____ of prokaryotes and the _____ of eukaryotes
- The nucleus of a human cell contains 30,000 or more _____ in the form of DNA, called a _____.




*-Function of DNA*

- Purpose: _____
- This is essential to life! DNA → RNA → Proteins

*-Structure of DNA*

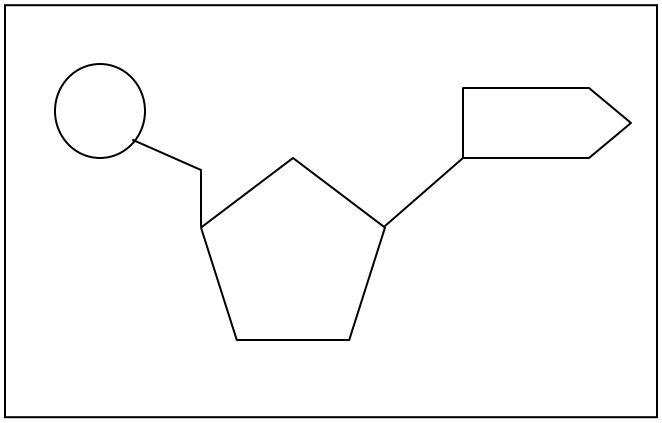
| | | |
|---|---|---|
| *DNA* is packaged tightly into pieces called _____ that are visible during cell division   | Each *chromosome* includes several thousand _____   | Each *gene* contains the directions to make one or more _____ -*Proteins* are made up of _____ |

- These proteins play a key role in how we look and grow-"It's in your genes!"
- ***Specialization***:
  - In embryo, all genes on the DNA are "_____". These _____ cells (_____) can develop into any type of cell
  - *Specialization* occurs when certain genes are turned "_____" and other genes remain "_____"-making that a particular type of cell.
    - Example: _____

**Structure of DNA**

- DNA is comprised of two strands that twist around each other, called a _____ _____
  - Discovered by _____
  - "Twisted Ladder Structure"

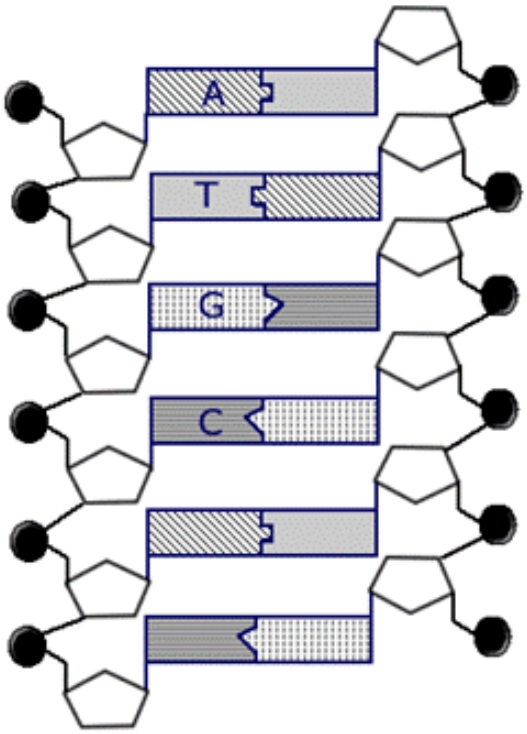
- DNA is made of building blocks called _____
- A nucleotide is made up of:
  - One _____
  - One _____ (called _____)
  - One _____ (adenine, thymine, cytosine, guanine)



- Nucleotides put together make up the DNA strand!
- "Backbone of DNA" is composed of _____
- "Rungs of the ladder" make up _____
  - The four bases are: A (_____), T (_____), G (_____), and C (_____)
  - A pairs with T (____ H Bonds)
  - G pairs with C (____ H Bonds)

In the diagram of DNA on the right, do the following:

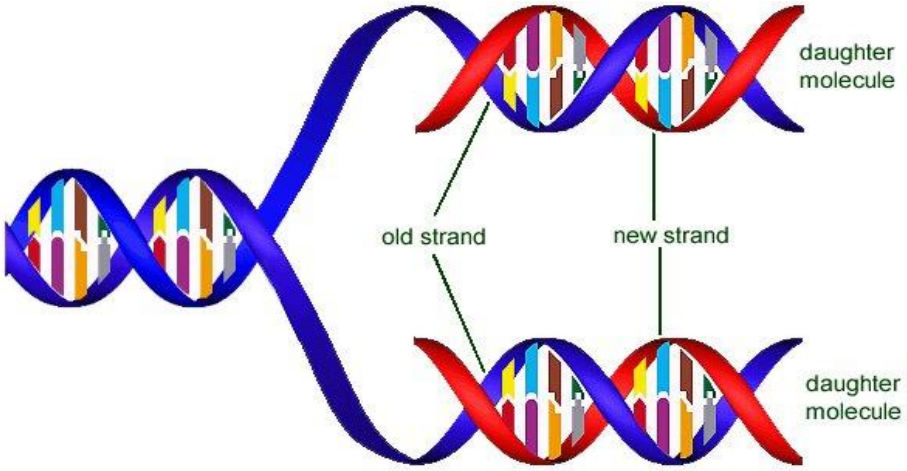
1. Label a phosphate of the backbone
2. Label a sugar (deoxyribose) of the backbone
3. Identify and pair the bases
4. Place a square around 1 nucleotide



**DNA Replication**

- DNA Replication is the process of producing 2 _____ replicas from one _____ DNA molecule
    1. To replicate means "_____"
- During replication, the DNA molecule separates into _____ strands, and builds two new _____ strands using the base pairing rule! (A::T; C:::G)
- The molecule is _____ and _____ with the help of _____, an enzyme!

*-Steps in DNA replication:*




1. DNA _____ and then _____, exposing the _____
2. New DNA N-Bases are added to each side of the molecule, making separate _____
    - If the unzipped side read ATCG, then _____ would be added to that side. Now it is an _____ strand!

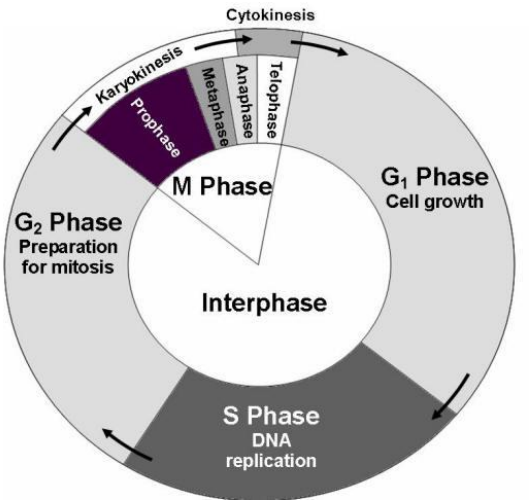
- Each new DNA strand (_____) is made up of 1 strand from the _____ DNA, and one _____ strand

*Think about it:* Use the strand below to fill in what the complementary DNA strand would be.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Old Strand: | A | G | G | T | C | A | C | T | A | C | C | T |
| New Strand: | | | | | | | | | | | | |

**The Cell Cycle**

- The _____ describes the life of a cell from birth to death
- There are three main parts of the cycle:
  - _____ : Normal cell activities; broken up into 3 parts
  - _____ : The process of cell division (1 cell becomes 2)
  - _____ : The division of the organelles and cytoplasm following mitosis




***Interphase***

- _____ : Period of cell growth
  - Cells can remain in the G1 phase indefinitely, called _____
- _____ : Period when DNA replication occurs
  - Once a cell copies its DNA, it _____ divide
- _____ : Cell growth and preparation for Mitosis

***Mitosis***

- *Mitosis* is a form of _____ reproduction
  - Means only _____ organism required
- Occurs in response to the body's need for growth and repair
- _____ stages of mitosis: Prophase, Metaphase, Anaphase, Telophase

***Cytokinesis***

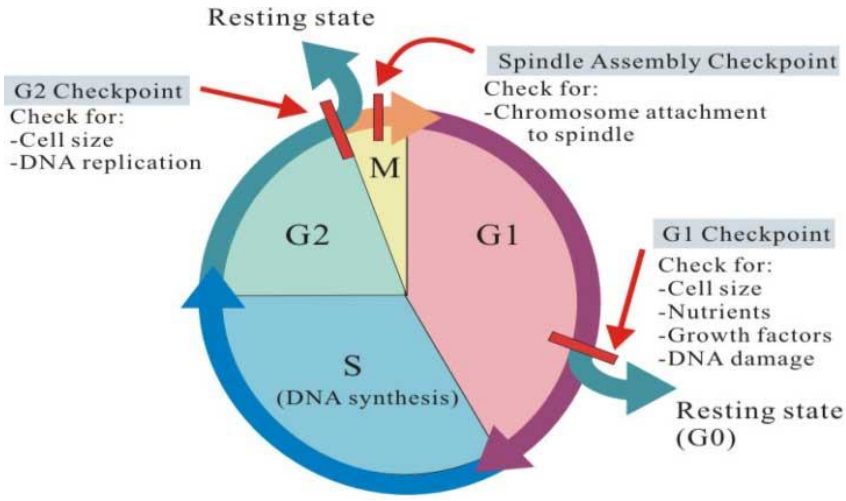
- The cell cycle ends with _____ : the division of the _____
  - Accompanies *mitosis*
- This means one cell has divided into two cells, and those two cells can continue with their own independent cell cycles!

*-Regulation of the Cell Cycle*

- _____ : Proteins that regulate the rate of the cycle
  - _____ regulation: cell cycle can't proceed until certain levels of these proteins are reached
    - ex. Poor nutrition→ cell stays in G1
  - _____ regulation: cycle can speed up or slow down

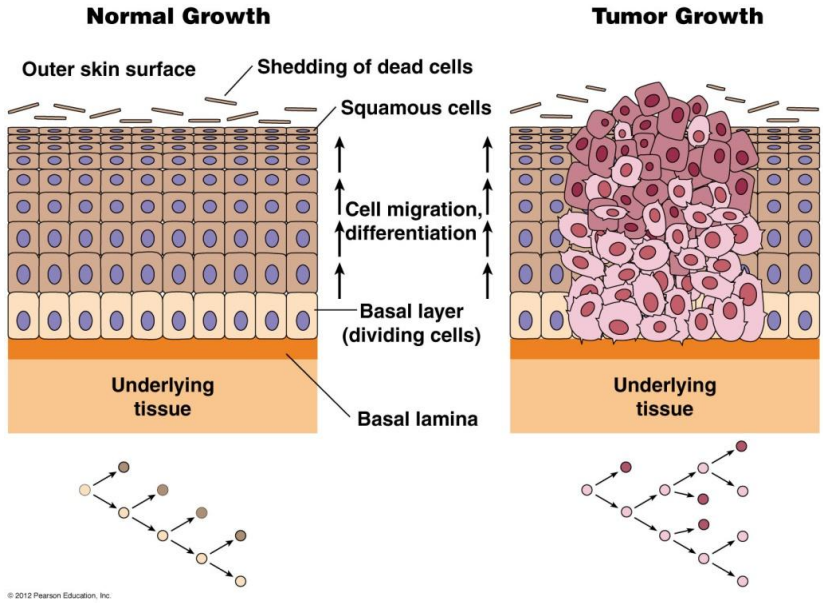
*Think about it:* Do you think a paper cut on your finger would cause the cell cycle to speed up or slow down?

**Cell Cycle Checkpoints**




## Cancer

- Sometimes errors in the cell cycle can lead to _____: uncontrolled cell growth
  - Errors can be _____ or due to an _____ toxin
- Internal regulation error followed by external; cells cannot "feel" their neighbors, and thus begin uncontrolled division
  - Lack _____ dependence (tumor) and _____ dependence (metastasized cancer cells)




## Mitosis

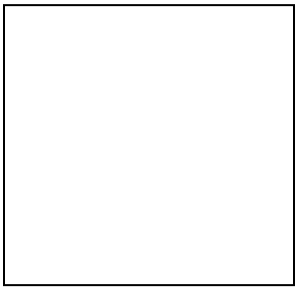
- _____ refers to the division of the cell
- Asexual reproduction for _____ _____
- Occurs in response for the body's need for _____ and _____

*-More about Mitosis*

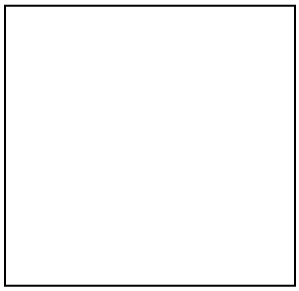
- Occurs in _____
- _____ cell divides to produce _____ daughter cells
- These cells are _____ to the original cell
    - Same number of _____

*-Stages of Mitosis*

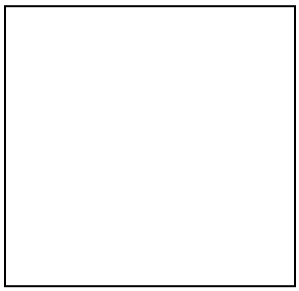
- Stage 1: _____
    - _____ _____ dissolves
    - _____ condenses into _____
        - _____: uncondensed DNA (looks like spaghetti)
        - _____: condensed DNA (looks like X's)
    - _____ move to opposite ends of the cell
    - _____ forms and fibers extend from one side to the other



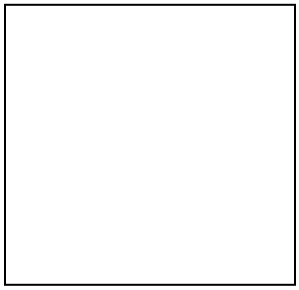
- Stage 2: _____
    - _____ (middle of chromosome) attach to spindle fibers
    - Chromosomes are _____ to the middle of the cell



- Stage 3: _____
    - Spindle fibers pull _____ apart
    - Each sister _____ moves toward _____ end of the cell



- Stage 4: _____
    - _____ _____ reforms
    - Spindle fibers disappear
    - Animal Cells:
        - Cell membrane _____
    - Plant Cells:
        - New _____ begins to form



**Cytokinesis**

- Division of _____ and _____
- _____ cell is now _____ identical cells