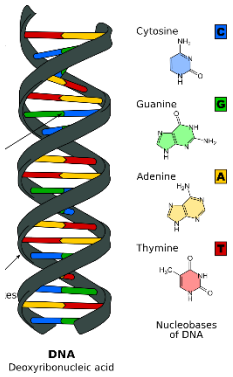
Unit 3 Notes

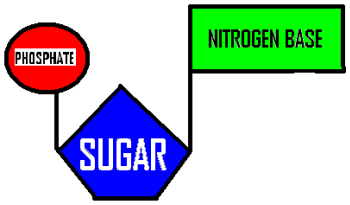


I. DNA History

1. Rosalind _____- (Early 1950's) Used _____ to get an image of a DNA molecule
2. Francis Crick and James Watson- (1953) Shown Franklin's X-ray pattern and used it to_____ - "_____"

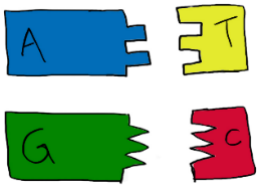
II. DNA Structure

1. Nucleic Acid is the _____
2. _____ is the _____ of DNA and is made of 3 parts:
   a) 5 carbon sugar- _____
   b) _____ molecule
   c) Nitrogenous _____
      I. _____- A
      II. _____- T
      III. _____- C
      IV. _____- G
   d) Elements of DNA: _____



Nucleotide

3. Base Paring Rule
   a) Adenine – Thymine (A-T)
   A_____ grow on **T**_____
   b) Cytosine – Guanine (C-G)
   C_____ go in **G**_____



   c) *Nitrogen bases directly code for an organism's _____
4. Shape of DNA is a _____ "looks like a _____"
   a) _____ and _____ molecules make up the outside of the ladder
   b) _____ make up the inside of the ladder
   c) Paired bases are held together by _____ _____ _____

DNA Function

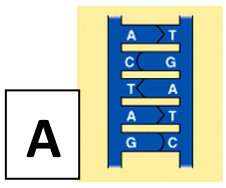
1. Stores _____
2. Genetic information is _____ to each _____

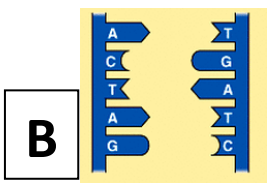
III. DNA Replication

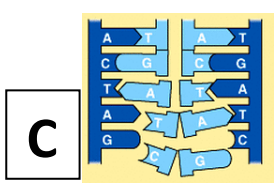
1. DNA must replicate before the cell divides. WHY?
   a) If it didn't the resulting cells would _____

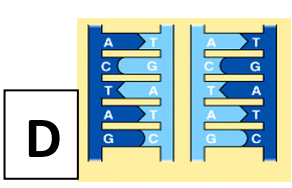
DNA Replication Steps:

a) DNA _____
b) DNA _____ with the help of an enzyme (protein) called) _____ _____
*DNA Helicase breaks the weak hydrogen bonds between paired bases
c) An enzyme called _____ _____ joins many _____ back together
d) End result is ____ complementary strands (one side is the _____ strand, the other side is the _____ strand) This is known as semi-conservative.





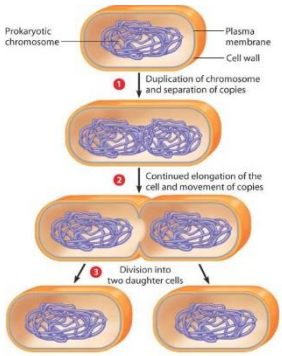




IV. Cell Limits in Prokaryotes & Eukaryotes

1. Problems with cell growth:
   a) Most cells have to _____… WHY?
      i. _____(Too much demand on the DNA)
      ii. _____(Difficult to get rid of waste products)
      iii. _____(Nutrients have to travel farther across the cell)

V. Unicellular Life - Prokaryotes



1. A _____ makes up the entire organism
   a) ALL _____ (Archaebacteria & Eubacteria)
   b) High rates of _____
   c) Most break down _____ (via infections)

Binary Fission – Prokaryotes (Asexual Reproduction)

1. Bacteria make identical cell through a process called _____ _____
2. Circular DNA is exchanged through _____
3. Cell divides in _____
4. Results are ____ identical bacterial cells (daughter cells) with the _____ _____

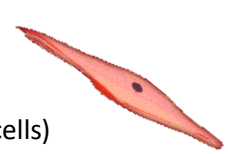
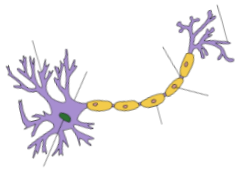
Advantages

a) Only requires a _____ organism
b) Reproduce _____ and increases population numbers
c) Less _____ usage

Disdvantages

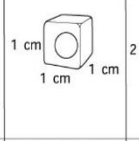
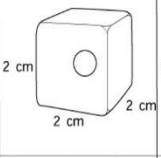
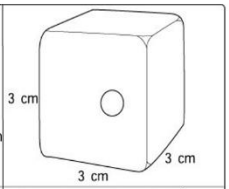
a) All new cells are identical, so the only source of genetic variation are _____

Cell Cycle & Cancer

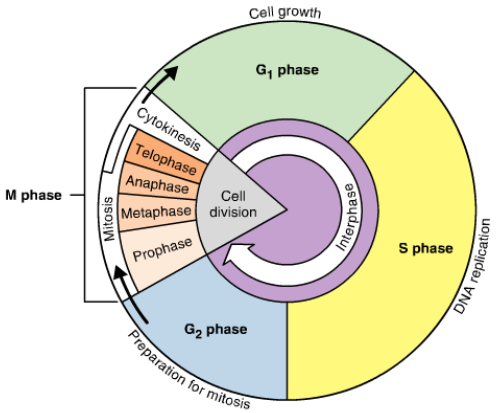
I. Multicellular Life – Eukaryotes

1. Organisms composed of _____ cells (up to trillions of cells)
2. Cell Specilization:
   a) Cells become efficient at performing tasks and are _____ on other cells
   b) Only found in _____ organisms
      -All multicellular organisms have a COMPLETE SET of _____ in them!
3. Limits to cell growth: Volume _____ more rapdily than surface area as the cell grows
4. Solution:
   a) When cells become too large they must _____ forming two "_____" cells
   b) DNA must _____ first in order for each daughter cell to have a _____ copy of DNA

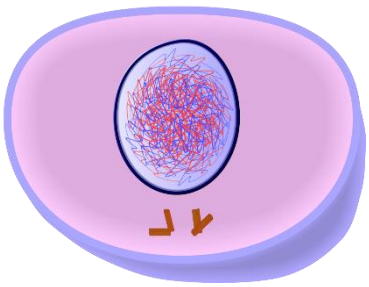
Cell Size			
Surface Area (length x width x 6)	1 cm x 1 cm x 6 = 6 cm^2	2 cm x 2 cm x 6 = 24 cm^2	3 cm x 3 cm x 6 = 54 cm^2
Volume (length x width x height)	1 cm x 1 cm x 1 cm = 1 cm^3	2 cm x 2 cm x 2 cm = 8 cm^3	3 cm x 3 cm x 3 cm = 27 cm^3
Ratio of Surface Area to Volume	6 / 1 = 6 : 1	24 / 8 = 3 : 1	54 / 27 = 2 : 1

Cell Cycle – Eukaryotes (Asexual Reproduction)

1. There are three main phases of the cell cycle
   a) _____
   b) _____
   c) _____



Interphase

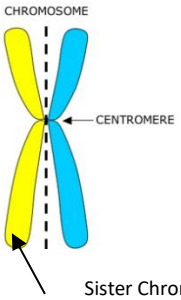


_____ phase in the cell cycle

Cell spend the _____ of their time in this phase

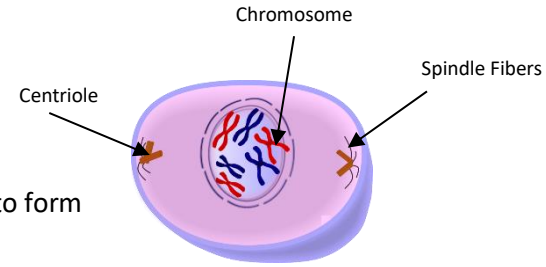
DNA is called _____ (think…chroma*thin*)

1. G_1 – 1st Growth: Cell increases in _____
2. S – DNA Replication: _____ is copied. Eukaryotes have _____ DNA.
3. G_2 – 2nd Growth: Prepares to divide and _____



_____ are held together by a _____

Mitosis

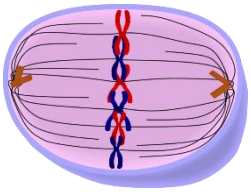


Prophase – PREPARE

-Chromatin condenses into _____

-_____ separate & _____ to form

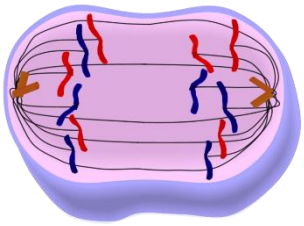
-Nuclear envelope breaks down



Metaphase - MIDDLE

-Chromosomes line up in the _____

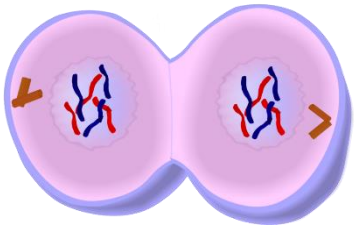
-Chromosomes connect to _____ at centromere



Anaphase - AWAY

-Spindle fibers pull the sister chromatids _____

-Sister chromatids are pulled to _____ sides of the cell

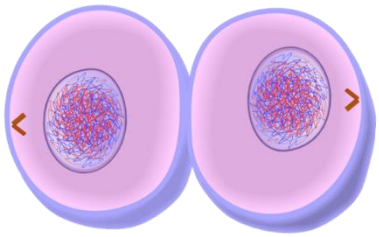


Telophase – TWO

-Chromosomes gather at opposite ends

-Two new _____ form

Cytokinesis



-Cytoplasm pinches in _____

-Each newly formed daughter cell has _____ numbers of chromosomes

-Cell membrane pinches in the _____

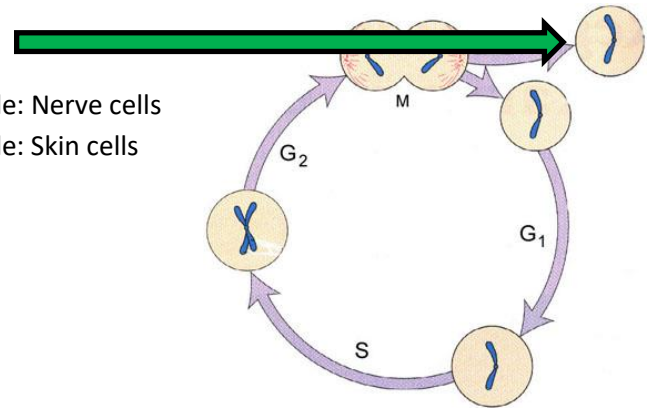
-*In plant cells, a _____ forms to separate the two cells

G_0 Phase: Resting Phase

_____ cell division takes place here

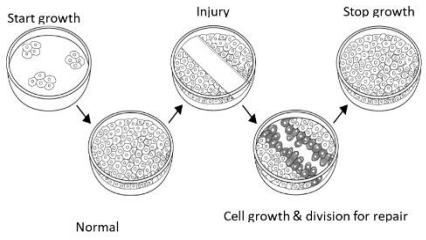
Some cells never _____ this phase Example: Nerve cells

Some cells never _____ this phase Example: Skin cells



II. Regulating the Cell Cycle (To ensure proper steps have been taken, the cell cycle is 'checked' or regulated).

1. Cyclins: Proteins that regulate the _____ of the cell cycle & jumpstart _____ _____
   - Internal Cyclins (cell won't divide unless DNA has been copied)
   -External Cyclins (cells stop growing when they touch one another
2. p53 Gene (normally stops cell cycle until after DNA has been replicated correctly)
3. Growth Factors (proteins) Ex: bone marrow is stimulated to produce blood cells



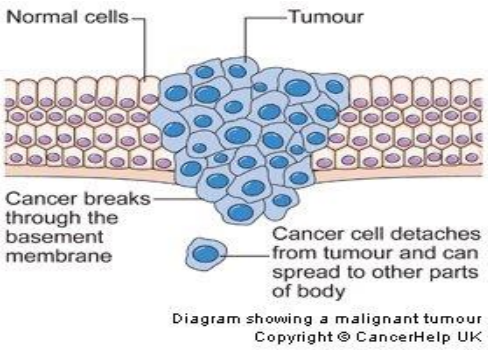
III. Cancer

Uncontrolled cell growth is called _____

1. Cells _____ to control their cell growth
2. Cells _____ to signals that control growth
3. Cancer cells may have a defect in the _____ gene

Types of Cancer

1. Malignant - _____ and destroys surrounding healthy tissue
   -Metastasis – Cell detaches from tumor and _____ to other body parts
2. Benign – does _____ spread



IV. Treatment of Cancer

1. Radiation – gamma rays _____ in quickly reproducing cells
2. Chemotherapy - _____ that target rapidly dividing cells
3. Surgery – Removal of tumor (_____ of cells)