Chapter 10 - Cell Growth & Division Information Sheet

Limits to Cell Growth

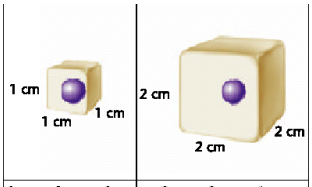
What is the relationship between the size of an organism and the size of its cells?

- So how do cells affect the size of an organism?

---

1. DNA Overload –
   - What is Transcription?

   - What is the problem large cells cause for DNA?



1 cm x 1 cm x 6 = 6 cm^2	2 cm x 2 cm x 6 = 24 cm^2
1 cm x 1 cm x 1 cm = 1 cm^3	2 cm x 2 cm x 2 cm = 8 cm^3
6 / 1 = 6 : 1	24 / 8 = 3 : 1

2. Exchanging Materials-
   - Surface Area to volume ratio dictates maximum size.

Division of the cell - To avoid all of these problems, cells need to make a second copy of its DNA and divide into two small daughter cells

Why do cells divide?

1) Growth-

2) Repair-

3) Maintenance-

4) Defense-

5) Reproduction-

Cell Life expectancy (how long before they need to divide)

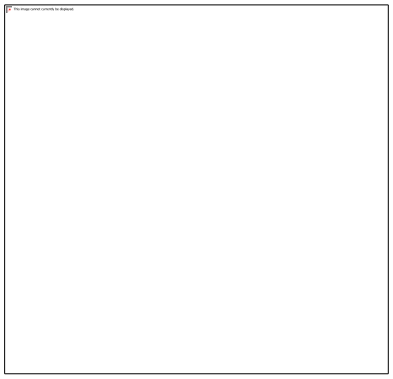
male sperm-
intestinal epithelium (lining)-
Skin-
RBC-
WBC-
Skeletal muscle-
Neuron-

Chapter 10 - Cell Growth & Division Information Sheet

Cell Division

❖ What are Chromosomes?

How is that different from chromatin



A highly coiled and compact bundle of DNA.

- Only exists when cell is _____
- Is made of two identical sister _____ joined by a _____.

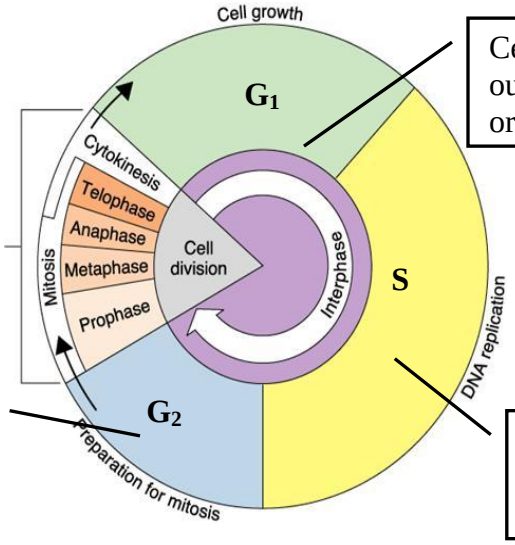
❖ What is the Cell cycle?

- It is the life cycle every cell goes through: 3 parts _____, _____, and _____.

- What is the longest stage of the cell cycle?

- Interphase

G1 – S – G2

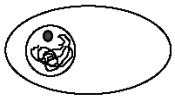
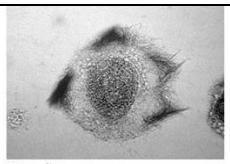
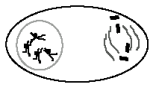
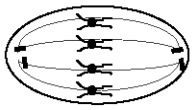
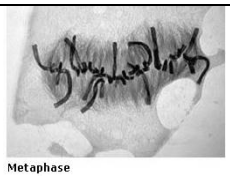
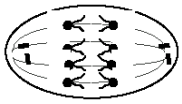
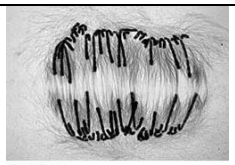
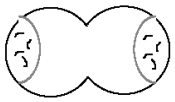
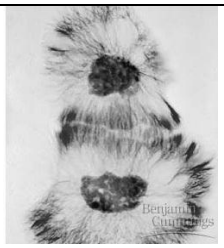
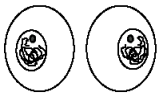


Cells are growing and carrying out their daily functions in the organism.

Organelles (centrioles) and molecules (enzymes) needed for division are produced.

DNA is replicated. A second copy for what will be a new cell after cell division is finished.

Chapter 10 - Cell Growth & Division Information Sheet

The Steps	# of Chromosomes	What does it look like?	What is happening and why?
1st: INTERPHASE 	2N (23 pairs) in beginning 4N = 46 pairs by the end	 Interphase	
2nd: PROPHASE 	4N (46 pairs)		
3rd: METAPHASE 	4N (46 pairs) connected in the middle	 Metaphase	
4th: ANAPHASE 	4N (46 pairs)	 Anaphase	
5th: TELOPHASE 	2N (23 pairs) on one end 2N (23 pairs) on other end		
6th: CYTOKINESIS 	2 cells with 2N (23 pairs) in each cell		

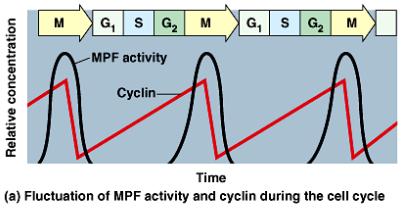
10-3 Regulating the cell cycle (pg. 250 – 253)

Chapter 10 - Cell Growth & Division Information Sheet

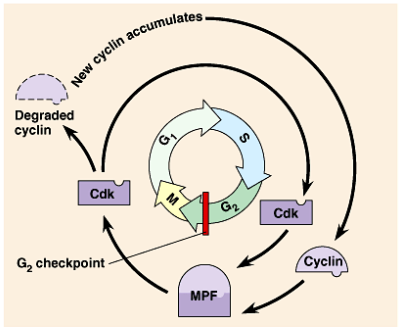
- Controls on Division

- Cell Cycle Regulation

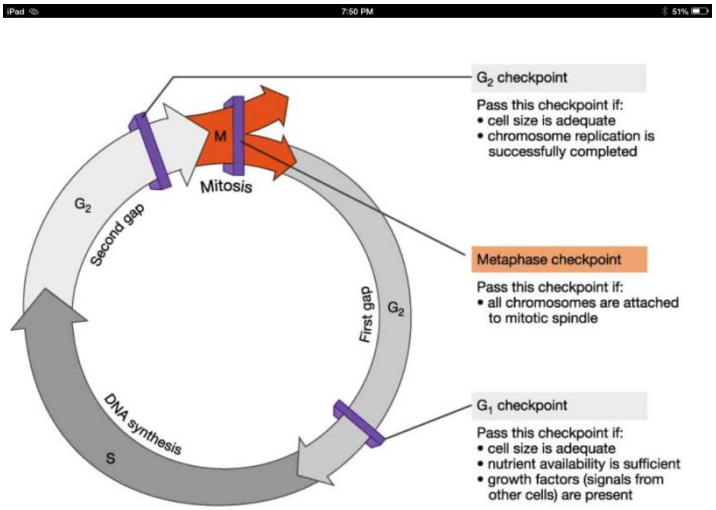
  - Internal Regulators –



(a) Fluctuation of MPF activity and cyclin during the cell cycle

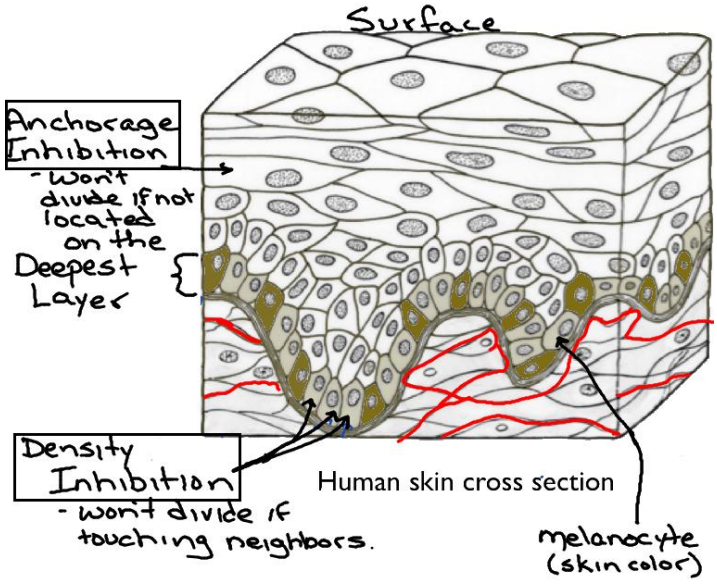


(b) Molecular mechanisms



"checkpoints"

  - External Regulators

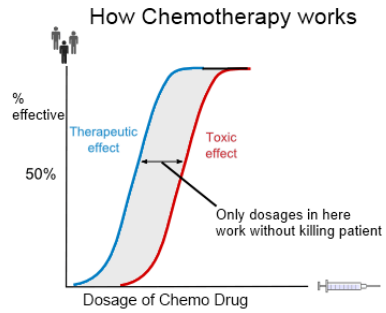


Chapter 10 - Cell Growth & Division Information Sheet

- Uncontrolled Cell Growth
  - Cancer
    - What is it?
    - What is the direct cause of it?
    - What are "cancer genes" supposed to do when they work correctly?
      - What do "cancer genes" do when someone gets cancer?

- What happens if the process does not work right?
  - Why does cancer cause the problems it does?
  -

- How is cancer treated?
  - Chemotherapy
  - Radiation
  - Surgery



  - Why is it so hard to kill?

Meiosis

Chromosome Number

Haploid (N)

Chapter 10 - Cell Growth & Division Information Sheet

Diploid (2N)

Phases of Meiosis

Meiosis I

- Exactly the same as Mitosis with all of the same steps
  - DNA Doubles, coils into chromosomes, lines up, divides, splits.
- Starts with a parent cell that is Diploid (2N)
- Ends with 2 cells that are Diploid (2N) just like mitosis

Meiosis II

- Exactly the same as Mitosis with ONE MAJOR DIFFERENCE.
  - DNA DOES NOT DOUBLE, coils into chromosomes, lines up, divides, splits.
- Starts with 2 parent cells that is Diploid (2N)
- Number of Cells Depends on Gender.
  - Male ends with 4 tiny sperm cells that are Haploid (N).
  - Female ends with one huge egg that is Haploid (N) and 3 tiny Polar Bodies that do not live.