Biology 10

Chapter 10-1, 10-2

"Cell Growth", "Cell Division"

pp 274-285

Objectives

- Explain two reasons why most cells are small.
- Describe the steps of the cell cycle.
- Be able to identify which phase of the cell cycle a given cell is in.

Why Are Most Cells Small?

- DNA "overload": as a cell gets bigger, it _____
  - eventually, the DNA cannot meet the demands of the cell
- **surface area/volume ratio**
  - a cell exchanges nutrients/materials through its plasma membrane
  - the amount of exchange that can take place is limited by how much membrane there is, therefore
  - the amount of exchange that needs to take place, is a function of its _____
  - As a cell gets bigger, its _____ (amount of membrane) doesn't increase as fast as its volume
  - So, eventually a cell cannot exchange materials fast enough to supply it's organelles as it gets bigger!

Surface Area Volume Ratio Chart

	Side =1	Side =2	Side =3
Surface Area (l X w X 6)			
Volume (l X w X h)			
S.A./Volume ratio			

Cell Division

- To get around these limitations, cells _____

Chromosomes

- From cell theory: "All cells come from pre-existing cells
- To do this, cells must _____
- To divide, cells must _____
- DNA is found in the form of _____ during division

Draw and label a chromosome here

Chromosome Structure

- Each chromosome made up of two **chromatids**
- Chromatids connected at the **centromere**

Chromosome numbers

- Number of chromosomes varies from species to species
  - number of chromosomes does not indicate complexity!
  - ex: fruit flies = 8 chromosomes
  - ex: humans = 46 chromosomes
  - ex: goldfish = 96 chromosomes

Homologous Chromosomes

- In all sexually reproducing species, chromosomes appear in pairs
  - the two members of each pair are _____
  - a cell that has both members of each pair is called _____ or **2N**
  - a cell that has only one member of each pair is called _____, or **N**
  - ex) in humans, there are 23 pairs of chromosomes
    - in humans, 2N = _____
    - in humans, N = _____

The Cell Cycle

- Three phases
  - **interphase**- the _____ and functioning
    - cells spend most of their time in this phase
  - **mitosis**- the period during which the _____
  - **cytokinesis**- the period during which _____ (organelles, cytoplasm, etc)

Interphase

- Three phases of interphase
  - **G_1 phase**: cell _____, organelles double
  - **S phase**: _____ (in chromatin form)
  - **G_2 phase:** cell produces necessary _____ for mitosis

The Cell Cycle

Mitosis

- Dividing of cell nucleus
- 4 phases
- **prophase**-
  - _____
  - _____ disappear
  - **centrioles** appear- not found in plants!!

- **spindle fibers** appear
- **asters appear**- not found in plants!!

- **metaphase**- "middle phase"
  - chromosomes _____ of the cell
  - spindle fibers maneuver chromosomes into position

- **anaphase**-
  - centromeres divide
  - chromatids separate
  - _____ through spindle fiber maneuvering

- **telophase**-
  - centrioles and spindle fibers disappear
    - centrioles not in plants!
  - chromosomes stretch back out into chromatin
  - _____

Cytokinesis-

- division of _____
- usually occurs directly after mitosis
- animal cells- _____ and separates the two new nuclei
  - actually begins during anaphase of mitosis
- plant cells- vesicles from Golgi body _____- a membrane dividing the two new cells
  - cell wall then forms on both sides of cell plate