

Topic 4
Pre-Class Reading Assign

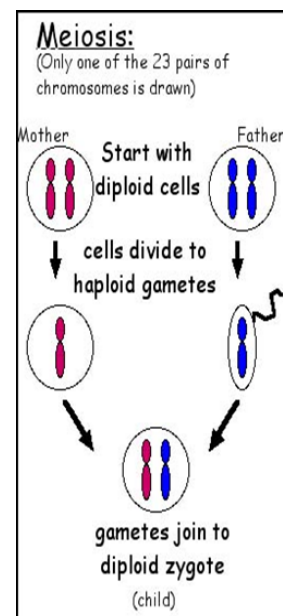
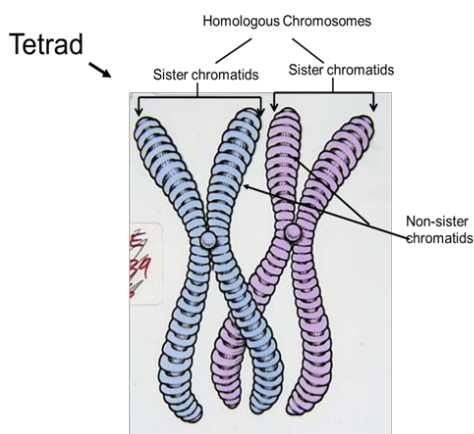
1. Read pgs 572-577
2. Define the following terms
 - a. Meiosis
 - b. Haploid
 - c. Diploid
 - d. Homologous chromosomes
 - e. Tetrad
 - f. Synapsis
 - g. Crossing over

Topic 4 – Meiosis and Gametogenesis

<http://www.sumanasinc.com/webcontent/animals/content/meiosis.html>

<http://www.learnalberta.ca/content/seb30/html/interacveLauncher.html?interacve=StagesMeiosis.swf>

- **Meiosis** – the process by which sex cells are formed
- Sometimes referred to as reduction division b/c it is a form of cell division that creates a cell with a reduced number of chromosomes
- In humans, diploid (germ) cells of the gonads undergo meiosis to produce haploid gametes (sperm and egg)
- Germ cells are cells of the body that produce gametes
- **Sister chromatids** – a pair of identical chromosomes joined at the centromere
- **Homologous chromosomes** – chromosomes which are similar but not identical



Phases of Meiosis

- Before Meiosis begins, cells go through interphase in the same ways that occurs in Mitosis
- Meiosis is broken down into two phases
 - Meiosis I - 1 diploid cell creates 2 haploid cells
 - Made up of prophase I, Metaphase I, Anaphase I and Telophase I
 - Meiosis II - 2 haploid cells create 4 haploid cells
 - Made up of prophase II, Metaphase II, Anaphase II and Telophase II

Meiosis I – separate the homologues

Prophase I –

- homologous chromosomes align side by side
- This pairing up is called **synapsis**
- Synapsis results in a **tetrad**

Metaphase I

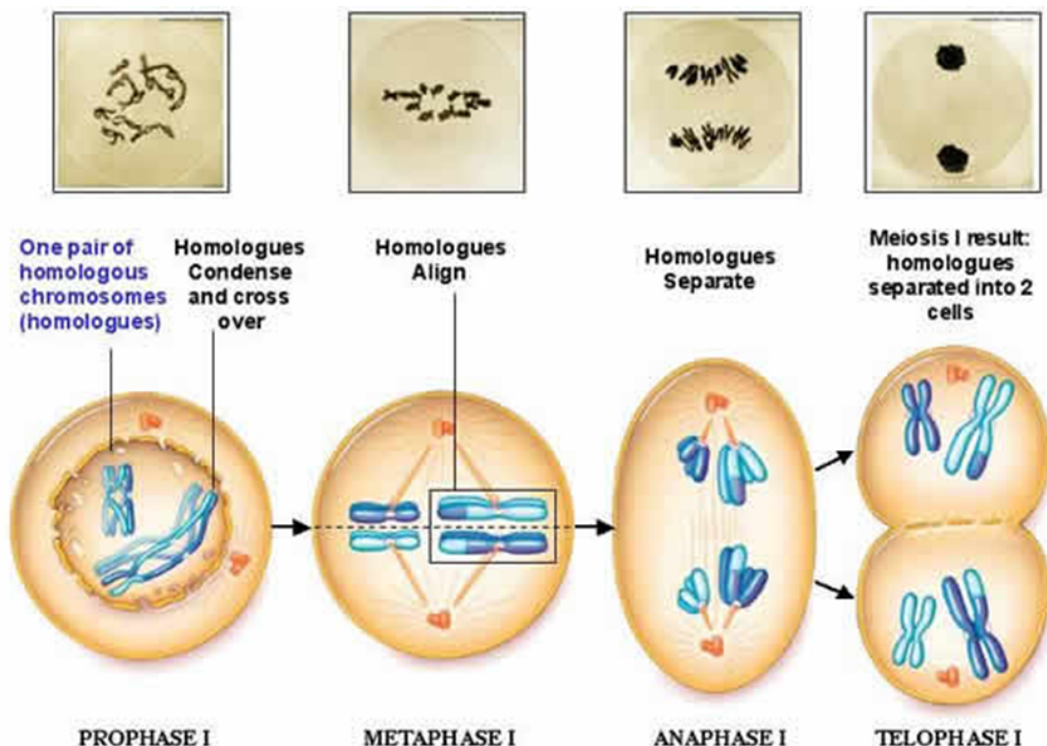
- Spindle fiber attaches to the centromere of each chromosome
 - A spindle fiber from one pole attaches to one pair of sister chromatids
 - A spindle fiber from the other pole attaches to the other pair of sister chromatids
- Chromosomes line up on the equatorial plate
- One pair of chromatids is lined up on one side of the plate, the other on the other side.

Anaphase I

- Spindle fibers shorten causing homologous chromosomes to separate
- Homologues move to opposite poles of the cell

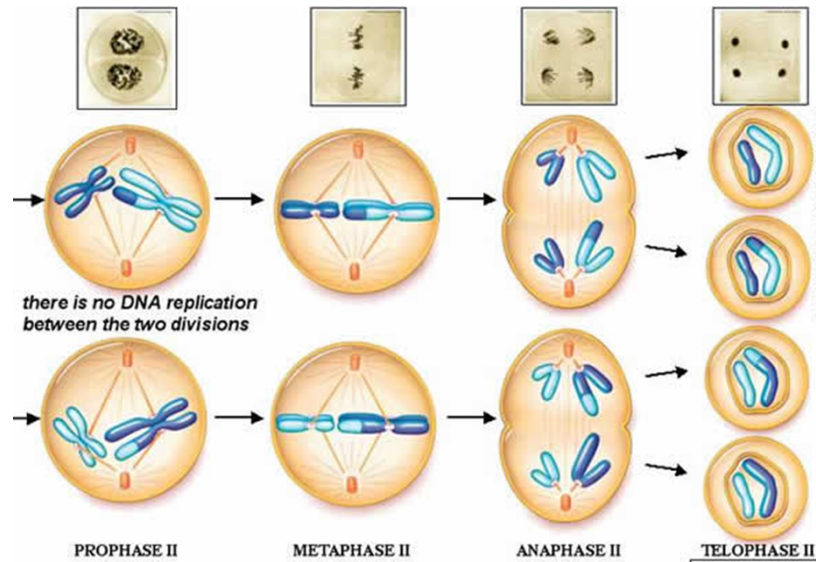
Telophase I

- Chromosomes uncoil and spindle fibers disappear
- Cytoplasm is divided
- Nuclear membrane reforms
- Two haploid cells are formed



Meiosis II – separate the sister chromatids

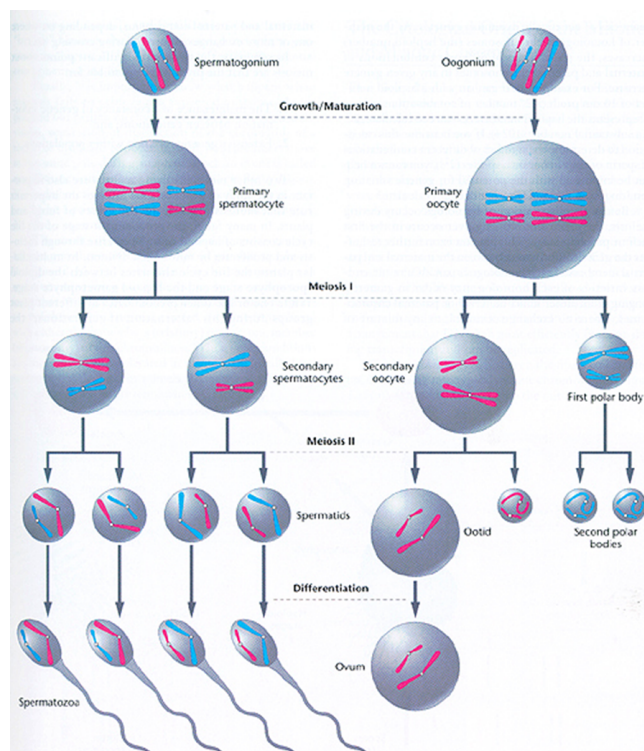
- Interphase does not occur before meiosis II
- Phase of Meiosis II are very similar to mitosis
- Each cell that enters Meiosis II are haploid but consist of sister chromatids
- At the end of meiosis II the cells are still haploid, but contain single, unreplicated chromosomes



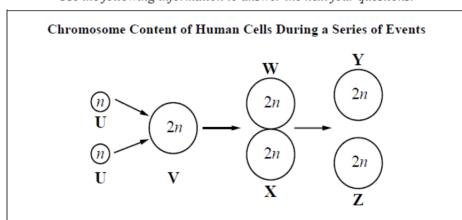
Spermatogenesis

http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation__spermatogenesis__quiz_1_.html

http://wps.aw.com/bc_martini_eap_4/40/10469/2680298.cw/content/index.html



Use the following information to answer the next four questions.



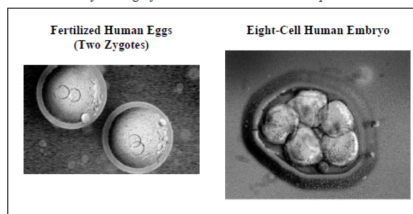
- In humans, what process must have occurred to obtain the cells at U?
 - Mitosis
 - Meiosis
 - Fertilization
 - Differentiation
- In humans, what process occurs between U and V?
 - Mitosis
 - Meiosis
 - Fertilization
 - Differentiation
- In humans, what process must occur before cell V forms cells W and X?
 - Mitosis
 - Meiosis
 - Recombination
 - Nondisjunction
- In humans, cells Y and Z represent individual cells that
 - are two eggs
 - will no longer divide
 - will become a 4n cell
 - could develop into identical twins
- One aspect of meiosis that is different from mitosis, is that normally by the end of meiosis
 - two diploid cells result
 - four diploid cells result
 - two haploid cells result
 - four haploid cells result

- Given that the diploid number for horses is 64, what is the number of chromosomes found in a horse's somatic cell and what is the number of chromosomes found in a horse's gamete cell?

Given that the diploid number for horses is 64, what is the number of chromosomes found in a horse's somatic cell and what is the number of chromosomes found in a horse's gamete cell?

Number of
Chromosomes: _____
Cell Type: somatic cell gamete cell

Use the following information to answer the next two questions.



- Which of the following statements **best** describes one of the diagrams above?
 - The two zygotes will form identical twins.
 - The two zygotes are about to undergo meiosis.
 - The cells of the eight-cell human embryo have differentiated.
 - The cells of the eight-cell human embryo contain identical DNA.
- The process that occurs to form an eight-cell embryo stage from a zygote is
 - mitosis of diploid cells
 - mitosis of haploid cells
 - meiosis of diploid cells
 - meiosis of haploid cells
- How does the first meiotic division differ from the second meiotic division?
 - meiosis of diploid cells
 - meiosis of haploid cells
 - meiosis of diploid cells
 - meiosis of haploid cells
- A muscle cell of a mouse contains 22 chromosomes. Based on this information, how many chromosomes are there in the following types of mouse cells?
 - daughter muscle cell formed from mitosis
 - egg cell
 - fertilized egg cell

- When meiosis occurs in females, the cytoplasm is not divided equally among the resulting four cells. Explain why.

- Use Figure 13 to answer the questions below.
 - Which process(es) identify mitosis? Explain your answer.

- Which process(es) identify meiosis? Explain your answer.

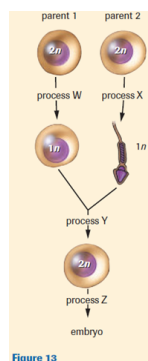


Figure 13