Meiosis Study Guide Name Answer Key Date _____ Per ___

1. What is the purpose of meiosis? The purpose of meiosis is to produce gametes with a haploid number of chromosomes that all differ from one another.
2. Name 2 types of cells that are haploid sperm and egg.

3. Fill in the blanks with the best word or phrase using the word bank to the right. (all words may not be used)

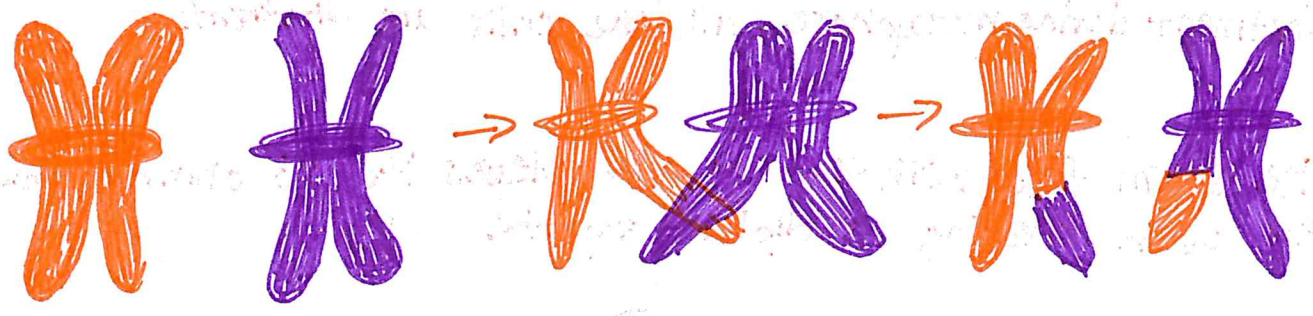
During Interphase before Meiosis, the DNA is replicated. During Prophase I, homologous chromosomes pair up as tetrads and undergo the process called synapsis (and crossing over). During this process, segments of chromosomes from mom are exchanged with similar segments of chromosomes from dad. This process of synapsis and crossing over leads to genetic recombination in the offspring. During Metaphase I, the homologous pairs orient themselves along the metaphase plate (middle of the cell) next to each other. This random orientation of homologues is another major reason for genetic variation in offspring. With 23 pairs of chromosomes, the human cells have 2 to the power of 23 or 8388608 ways to orient themselves along the metaphase plate.

During Anaphase I, the homologous chromosomes separate and each one is pulled by spindle fibers to the opposite poles of the cell. During Telophase I, the nuclear membrane forms around the separated chromosomes and the cell will have 2 nuclei at opposite poles, each containing 1 homologous set of chromosomes. Cytokinesis will pinch the cytoplasm in the middle, leading to 2 daughter cells with a haploid number or 23 chromosomes each.

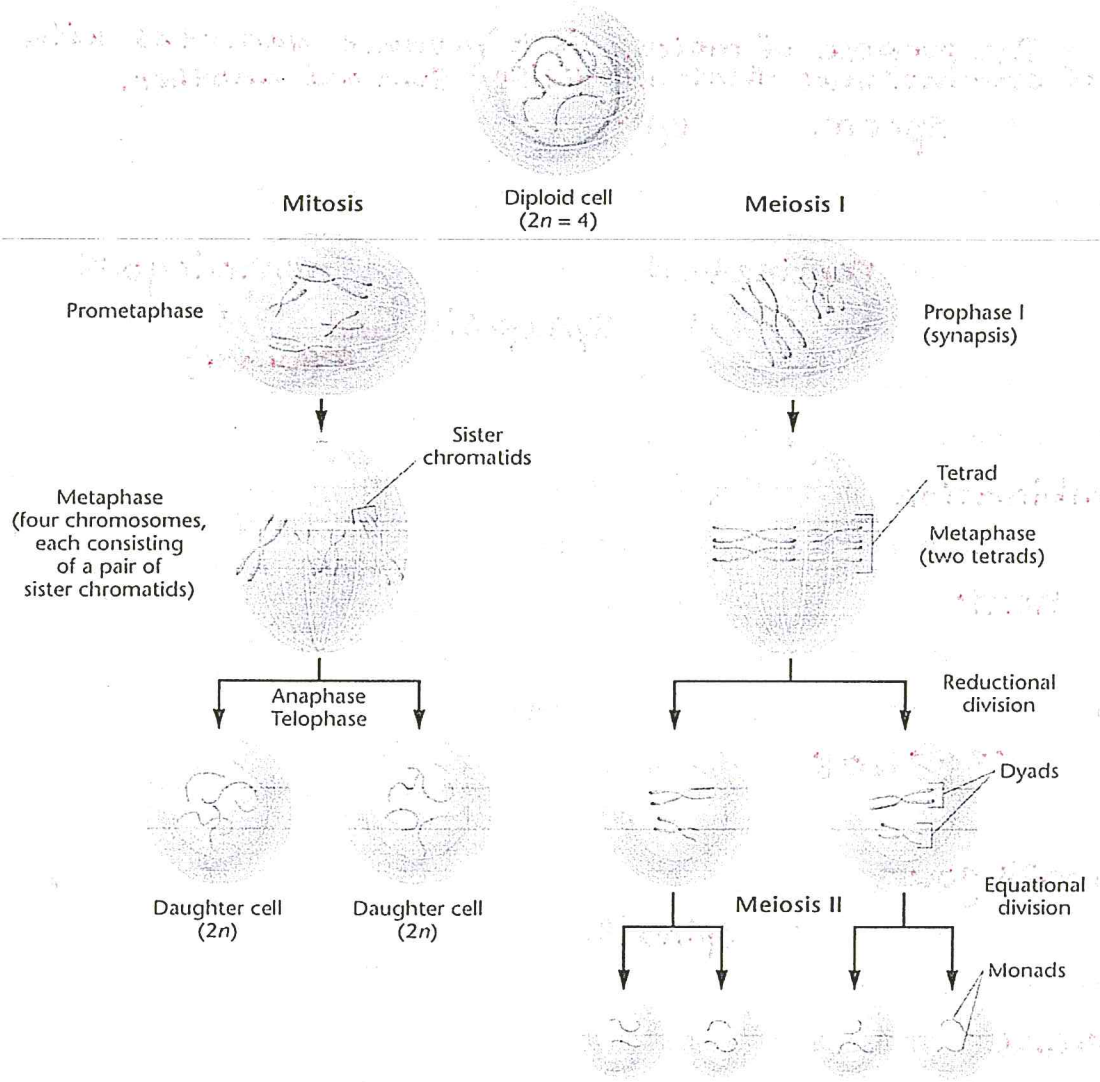
During Meiosis II, the spindle fibers will attach to the centromere of each chromosomes to line them up in the middle of the cell. During Anaphase II, the spindle fibers will shorten and pull apart the sister chromatid of each duplicated chromosome to opposite poles of the cell. By the end of Meiosis II, there will be 4 daughter cells which are genetically different from each other.

Word Bank
Synapsis
Crossing over
Recombination
Homologous chromosomes
Spindle
Spindle fibers
Sister chromatid
Different
Replicated
Homologous
Next
8388608
Nuclear membrane
2
Haploid
Diploid

Diagram a pair of homologous chromosomes undergoing synapsis and then crossing over. Explain what is occurring with the chromosomes.



Study the diagram below and complete the following sentences.






Mitosis begins with a single diploid (2n) cell and results in 2 identical cells.

Meiosis I begins wih a single diploid (2n) cell and results in 4 different cells. Meiosis 11 is technically a mitotic or division during which the sister chromatids in the two haploid cells separate. Meiosis results in a total of 4 haploid cells.

mitosis-style → equational

Are all the gametes (egg or sperm cells ) produced by one individual the same? Explain, giving 2 reasons based on Meiosis.

No, because of crossing over during prophase I and independent assortment during metaphase, all the cells are different.

What occurs during fertilization?

The sperm fuses with the egg and releases its 23 chromosomes into the ovum creating a diploid zygote.

Is the resulting zygote/embryo haploid or diploid. Explain.

**For each of the following statements about Meiosis (and the Cell Cycle for Meiosis) determine the specific phase in which the events described in each statement occur.**

1. Sister chromatids move to opposite poles of the cell. anaphase II
2. Homologous chromosomes align in the center of the cell. metaphase I
3. DNA replication occurs. interphase
4. Tetrads are formed. prophase I
5. Homologous chromosomes move to opposite poles of the cell. anaphase I
6. Four daughter cells are formed. Cytokinesis (after meiosis II)
7. Crossing over occurs. prophase I
8. Two daughter cells are formed. cytokinesis (after meiosis I)

Use the following chart to describe the differences between mitosis and meiosis.

| **Characteristics** | **Mitosis** | **Meiosis** |
|---|---|---|
| Goal or function | make two identical cells | make 4 different haploid cells |
| Creates what sort of cells? Somatic or sex cells? | Somatic | Sex |
| Creates genetically- (different/identical cells) | identical | different |
| Number of divisions | 1 | 2 |
| No. of daugter cells; diploid 2n or haploid n ? | 2 diploid | 4 haploid |
| Pairing of homologous chromosomes (Yes/No) | No | yes |
| Crossing over (Yes/No) | No | yes |