Name _____ Date _____

Homework 6.1: Chromosomes and Meiosis

KEY CONCEPT Gametes have half the number of chromosomes that body cells have.

Your body is made of two basic cell types. One basic type are **somatic cells,** also called body cells, which make up almost all of your tissues and organs. The second basic type are germ cells, which are located in your reproductive organs. They are the cells that will undergo meiosis and form gametes. **Gametes** are sex cells. They include eggs and sperm cells.

Each species has a characteristic number of chromosomes per cell. Body cells are **diploid,** which means that each cell has two copies of each chromosome, one from each parent. Gametes are **haploid,** which means that each cell has one copy of each chromosome. Gametes join together during **fertilization,** which is the actual fusion of egg and sperm, and restores the diploid number.

The diploid chromosome number in humans is 46. Your cells need both copies of each chromosome to function properly. Each pair of chromosomes is called homologous.

Homologous chromosomes are a pair of chromosomes that have the same overall appearance and carry the same genes. One comes from the mother, and one comes from the father. Thus, one chromosome from a pair of homologous chromosomes might carry a gene that codes for green eye color, while the other carries a gene that codes for brown eye color.

For reference, each pair of homologous chromosomes has been numbered, from largest to smallest. Chromosome pairs 1 through 22 are autosomes. **Autosomes** are chromosomes that contain genes for characteristics not directly related to sex. The two other chromosomes are **sex chromosomes,** chromosomes that directly control the development of sexual characteristics. In humans, a woman has two X chromosomes, and a man has an X and a Y chromosome. The Y chromosome is very small and carries few genes.

Meiosis is a form of nuclear division that reduces chromosome number from diploid to haploid. Each haploid cell produced by meiosis has 22 autosomes and 1 sex chromosome.

1. How do gametes differ from somatic cells?

   _____

2. The prefix *homo-* means "the same." Explain how this meaning relates to the definition of homologous chromosomes.

   _____

3. How does meiosis relate to haploid cells? How does fertilization relate to diploid cells?

   _____

SECTION QUIZ 6.1: Chromosomes and Meiosis

Choose the letter of the best answer.

_____ 1. A kidney cell is an example of which type of cell?
   a. sex cell
   b. germ cell
   c. somatic cell
   d. haploid cell

_____ 2. How many chromosomes are in a human gamete?
   a. 46
   b. 23
   c. 22
   d. 44

_____ 3. Which of the following best describes the genetic material a person receives from his or her father?
   a. 22 pairs of homologous chromosomes and an X and Y chromosome
   b. 22 haploid cells and an X or Y chromosome
   c. 23 diploid cells and an X and Y chromosome
   d. 22 autosomes and an X or Y chromosome

_____ 4. Which phrase best describes the process of meiosis?
   a. occurs in body cells
   b. results in genetically identical cells
   c. happens only in haploid cells
   d. produces haploid gametes

_____ 5. At fertilization, what happens to the sex cells?
   a. They retain half of their chromosomes.
   b. Half of the cells copy their DNA twice.
   c. Their nuclei fuse to form one nucleus.
   d. One becomes an egg, and one becomes a sperm cell