Name _____ Date _____

Homework 6.2: Process of Meiosis

KEY CONCEPT During meiosis, diploid cells undergo two cell divisions that result in haploid cells.

Meiosis occurs after a cell has already duplicated its DNA. Cells go through two rounds of cell division during meiosis. During the first round, meiosis I, homologous chromosomes separate from each other. During the second round, meiosis II, sister chromatids separate from each other. Meiosis produces genetically unique haploid cells that will go through more steps to form mature gametes.

Meiosis is a continuous process, but scientists have divided it into phases.

- Prophase I: The nuclear membrane breaks down, and the spindle fibers assemble. The duplicated chromosomes condense, and homologous chromosomes pair up. The sex chromosomes also pair together.
- Metaphase I: The homologous chromosome pairs randomly line up along the middle of the cell. Because this is random, there are a mixture of chromosomes from both parents on each side of the cell equator.
- Anaphase I: The paired homologous chromosomes separate from each other and move to opposite sides of the cell.
- Telophase I: The nuclear membrane forms in some species, the spindle fibers break apart, and the cell undergoes cytokinesis. Each cell has 23 duplicated chromosomes.
- Prophase II: The nuclear membrane breaks down if necessary and the spindle fibers assemble again.
- Metaphase II: The chromosomes line up along the middle of the cell.
- Anaphase II: The sister chromatids are pulled apart from each other and move to opposite sides of the cell.
- Telophase II: The nuclear membranes form again, the spindle fibers break apart, and the cell undergoes cytokinesis.

The haploid cells produced by meiosis are not capable of fertilization. They must undergo additional steps to form mature gametes. During **gametogenesis, sperm** cells—the male gametes—and **eggs**—the female gametes—become specialized to carry out their functions. Sperm cells lose much of their cytoplasm and develop a tail. Eggs receive almost all of the cytoplasm during the divisions in meiosis. This is necessary for an embryo to have all the materials needed to begin life after fertilization. The smaller cells produced by meiosis in the female are called **polar bodies,** and they are eventually broken down.

1. During which phase do homologous chromosomes separate?

   _____

2. During which phase do sister chromatids separate?

   _____

SECTION QUIZ 6.2: Process of Meiosis

Choose the letter of the best answer.

_____ 1. Which of the following statements is true of homologous chromosomes?
   a. They are exact copies.
   b. They contain the same genes.
   c. They divide during meiosis II.
   d. They connect to each other.

_____ 2. Which phrase best describes meiosis I?
   a. duplication of paired chromosomes
   b. fusion of sister chromatids
   c. division of homologous chromosomes
   d. creation of two diploid cells

_____ 3. What happens to sister chromatids in meiosis II?
   a. They duplicate.
   b. They are divided.
   c. They remain together.
   d. They do not take part.

_____ 4. Gametogenesis is the term for
   a. the production of gametes.
   b. the fertilization of eggs.
   c. the development of polar bodies.
   d. the movement of sperm.

_____ 5. What does an egg contribute to the embryo that a sperm does not contribute?
   a. polar bodies
   b. organelles
   c. DNA
   d. germ cells