

ACTIVE READING WORKSHEETS

PROCESS OF MEIOSIS**Meiosis**

Read the passage below, which covers topics from your textbook. Answer the questions that follow.

Meiosis is a process of nuclear division that reduces the number of chromosomes in new cells to half the number in the original cell. In animals, meiosis produces haploid reproductive cells called gametes. Human gametes are sperm cells and egg cells, each of which contains 23 ($1n$) chromosomes. The fusion of a sperm and egg results in a zygote that contains 46 ($2n$) chromosomes. Cells begin meiosis with a duplicate set of chromosomes, just as cells beginning mitosis do. Because cells undergoing meiosis divide twice, diploid ($2n$) cells that divide meiotically result in four haploid cells ($1n$) rather than two diploid ($2n$) cells.

The stages of the first cell division are called meiosis I, and the stages of the second cell division are called meiosis II. During the first stage of meiosis I, prophase I, DNA coils tightly into chromosomes and spindle fibers appear. Then the nuclear membrane and nucleolus disassemble, and every chromosome lines up next to its homologue. This pairing of homologous chromosomes is called **synapsis**. During synapsis, the chromatids within a homologous pair twist around one another. Portions of chromatids may break off and attach to adjacent chromatids on the homologous chromosome—a process called **crossing-over**. This process permits the exchange of genetic material between maternal and paternal chromosomes. Thus, crossing-over results in **genetic recombination** by producing a new mixture of genetic material.

In a cause-and-effect relationship, one event, or cause, triggers a second event, or effect, to occur. Listed below are exercises with cause-and-effect relationships. Complete each relationship with the missing event.

SKILL: Recognizing Cause-and-Effect Relationships

1. Cause: In humans, meiosis produces haploid reproductive cells called gametes.

Effect: _____

2. Cause: _____

Effect: A zygote contains 46 chromosomes.

3. Cause: During synapsis, chromatids within a homologous pair may twist around one another.

Effect: _____

4. Cause: _____

Effect: A new mixture of genetic material results in genetic recombination.

Read the question and write your answer in the space provided.

SKILL: Vocabulary Development

5. The term *synapsis* comes from a Greek word meaning “point of contact.” How is the term *synapsis* related to its Greek word of origin?

Circle the letter of the phrase that best completes the statement.

6. During prophase I,
- a. DNA coils into chromosomes.
 - b. spindle fibers appear.
 - c. gametes fuse.
 - d. Both (a) and (b)