

## CHAPTER 9.4—9.6: Meiosis and Sexual Reproduction

1. Define the following terms:

a. gametes \_\_\_\_\_

b. somatic cells \_\_\_\_\_

c. zygote \_\_\_\_\_

d. fertilization \_\_\_\_\_

e. diploid \_\_\_\_\_

f. haploid \_\_\_\_\_

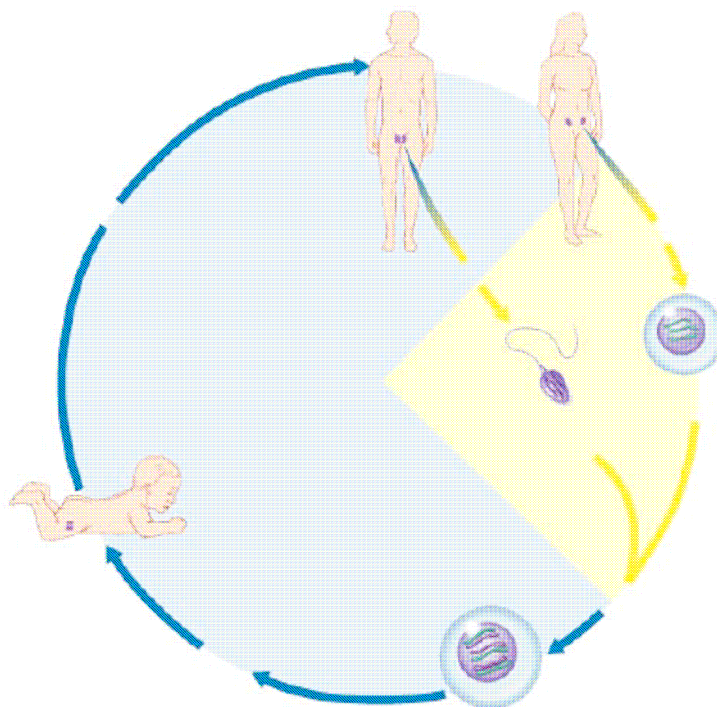
2. Why is meiosis called "reduction division"? Why is this process necessary for sexual reproduction?

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3. Label the diagram of the human lifecycle. Include the chromosome numbers at each stage.



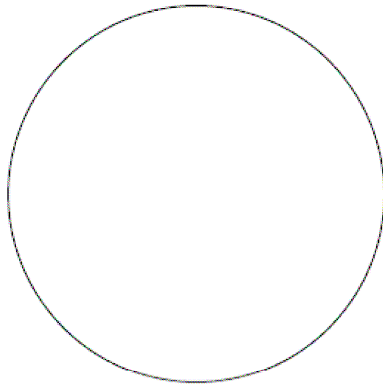
4. Explain synapsis.

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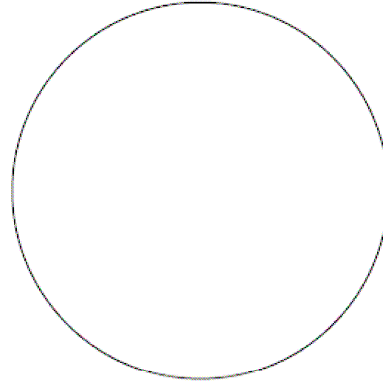
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5. Use the diagrams below to distinguish mitosis from meiosis. For an organism where  $2n=4$ , draw a cell at **metaphase of mitosis** and a cell at **metaphase 1 of meiosis**.



Metaphase of mitosis



Metaphase 1 of meiosis

6. Meiosis is said to be a double division. Explain.

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7. Draw a pair of homologous chromosomes in synapsis and then illustrate a crossing over event and the products of crossing over. Label the chiasmata.

Name: \_\_\_\_\_

8. At what stage of meiosis does crossing over occur? \_\_\_\_\_

9. Compare the products of mitosis with meiosis.

a. Mitosis \_\_\_\_\_

\_\_\_\_\_

b. Meiosis \_\_\_\_\_

\_\_\_\_\_

10. Summarize the significant differences between mitosis and meiosis.

<b>MITOSIS</b>	<b>MEIOSIS</b>

11. Meiosis is an important source of variation. Define and describe how each of the following contributes to variation within a species:

a. independent assortment \_\_\_\_\_

\_\_\_\_\_

b. crossing over \_\_\_\_\_

\_\_\_\_\_

c. random fertilization \_\_\_\_\_

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12. What is the significance of genetic variation to natural selection and evolution?

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13. What is the difference between necrosis and apoptosis?

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14. Read ahead on pg. 224—225. How is recombination frequency used to determine relative distances between genes on the same chromosomes?

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### END OF CHAPTER 9 MULTIPLE CHOICE

1. Which statement about eukaryotic chromosomes is not true?
  - A) They sometimes consist of two chromatids.
  - B) They sometimes consist only of a single chromatid.
  - C) They normally possess a single centromere.
  - D) They consist only of proteins.
  - E) They are clearly visible as defined bodies under the light microscope.
2. Nucleosomes
  - A) are made of chromosomes.
  - B) consist entirely of DNA.
  - C) consist of DNA wound around a histone core.
  - D) are present only during mitosis.
  - E) are present only during prophase.
3. Which statement about the cell cycle is not true?
  - A) It consists of mitosis and interphase.
  - B) The cell's DNA replicates during G1.
  - C) A cell can remain in G1 for weeks or much longer.
  - D) DNA is not replicated during G2.
  - E) Cells enter the cell cycle as a result of internal or external signals.
4. Which statement about mitosis is not true?
  - A) A single nucleus gives rise to two identical daughter nuclei.
  - B) The daughter nuclei are genetically identical to the parent nucleus.
  - C) The centromeres separate at the onset of anaphase.
  - D) Homologous chromosomes synapse in prophase.
  - E) The centrosomes organize the microtubules of the spindle fibers.

5. Which statement about cytokinesis is true?
- A) In animals, a cell plate forms.
  - B) In plants, it is initiated by furrowing of the membrane.
  - C) It follows mitosis.
  - D) In plant cells, actin and myosin play an important part.
  - E) It is the division of the nucleus.
6. Apoptosis
- A) occurs in all cells.
  - B) involves the formation of the plasma membrane.
  - C) does not occur in an embryo.
  - D) is a series of programmed events resulting in cell death.
  - E) is the same as necrosis.
7. In meiosis,
- A) meiosis II reduces the chromosome number from diploid to haploid.
  - B) DNA replicates between meiosis I and meiosis II.
  - C) the chromatids that make up a chromosome in meiosis II are identical.
  - D) each chromosome in prophase I consists of four chromatids.
  - E) homologous chromosomes separate from one another in anaphase I.
8. In meiosis,
- A) a single nucleus gives rise to two daughter nuclei.
  - B) the daughter nuclei are genetically identical to the parent nucleus.
  - C) the centromeres separate at the onset of anaphase I.
  - D) homologous chromosomes synapse in prophase I.
  - E) no spindle forms.
9. A plant has a diploid chromosome number of 12. An egg cell of that plant has 5 chromosomes. The most probable explanation is
- A) normal mitosis.
  - B) normal meiosis.
  - C) nondisjunction in meiosis I.
  - D) nondisjunction in meiosis I and II.
  - E) nondisjunction in mitosis.
10. The number of daughter chromosomes in a human cell in anaphase II of meiosis is
- A) 2.
  - B) 23.
  - C) 46.
  - D) 69.
  - E) 92.