Chapter 11 Review

READING TOOLBOX

1. **Two-Column Notes** Use two-column notes to summarize the phases of meiosis. Label the left column "Phases of meiosis" and the right column "Details."
2. **Concept Mapping** Make a concept map that shows the three sexual life cycles in multicellular organisms. Include the following words in your map: *meiosis, gametes, spores, zygote, haploid, gametophyte, sporophyte,* and *diploid.*

Using Key Terms

3. Use the following terms in the same sentence: *meiosis, crossing-over,* and *chromatids.*

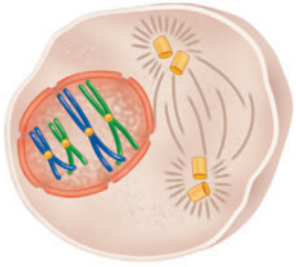
For each pair of terms, explain how the meanings of the terms differ.

4. *haploid* and *diploid*
5. *sperm* and *ovum*

Understanding Key Ideas

6. Cells that undergo meiosis are
   - **a.** zygotes.
   - **b.** gametes.
   - **c.** germ cells.
   - **d.** somatic cells.

Use the diagram to answer the following question(s).



7. Which phase in meiosis is represented in the diagram?
   - **a.** anaphase I
   - **b.** prophase I
   - **c.** anaphase II
   - **d.** telophase I

8. Genes are exchanged between homologous chromosomes during
   - **a.** mitosis.
   - **b.** meiosis II.
   - **c.** fertilization.
   - **d.** crossing-over.

9. Which of the following is not directly produced by a germ cell?
   - **a.** egg
   - **b.** sperm
   - **c.** zygote
   - **d.** gamete

10. Which is *not* a form of asexual reproduction?
    - **a.** budding
    - **b.** binary fission
    - **c.** fragmentation
    - **d.** alternation of generations

11. Homologous chromosomes move to opposite poles during
    - **a.** prophase I.
    - **b.** anaphase I.
    - **c.** prophase II.
    - **d.** anaphase II.

12. Chromosomes that have the same shape, size, and type of genes, but not necessarily the same form of these genes, are called
    - **a.** autosomes.
    - **b.** homologues.
    - **c.** chromatids.
    - **d.** sex chromosomes.

13. Which of the following is a difference between a sporophyte and a gametophyte?
    - **a.** A sporophyte is diploid, and a gametophyte is haploid.
    - **b.** A sporophyte is a plant, and a gametophyte is an animal.
    - **c.** A sporophyte is multicellular, and a gametophyte is unicellular.
    - **d.** A sporophyte undergoes only mitosis, and a gametophyte undergoes both mitosis and meiosis.

Explaining Key Ideas

14. **Explain** the difference between a diploid life cycle and a haploid life cycle.
15. **Distinguish** mitosis from meiosis.
16. **Identify** what type of organisms have a life cycle that alternates between diploid and haploid.
17. **Describe** the process of alternation of generations.

Assignment Guide

Section	Questions
1	10, 25
2	1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 15, 21, 22, 23, 24, 26, 27, 28, 29, 30
3	2, 13, 14, 16, 17, 18, 19, 20

Review

Reading Toolbox

1. Encourage students to use their own words as part of the descriptions.
2. See previous page for answer to concept map.

Using Key Terms

3. In prophase I of *meiosis,* genetic variation increases when one *chromatid* overlaps another in a process called *crossing-over.*
4. A *haploid* cell contains one set of chromosomes. A *diploid* cell contains two sets of chromosomes.
5. *Sperm* is the male gamete produced by animals. *Ovum* is the female gamete produced by animals.

Understanding Key Ideas

6. c 7. b 8. d 9. c
10. d 11. b 12. b 13. a

Explaining Key Ideas

14. A diploid life cycle occurs with cells in the diploid state that undergo meiosis to create haploid gametes. A haploid life cycle occurs with cells in the haploid state that undergo mitosis to create multicellular organisms.
15. Mitosis produces new cells that are genetically identical. Meiosis produces new cells that are genetically different.
16. Plants and most multicellular protists have a life cycle that alternates between haploid and diploid phases.
17. Alternation of generations is marked by the cycle of haploid and diploid stages in the life cycle of the organism.

Using Science Graphics

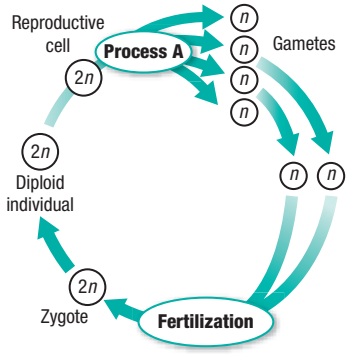
18. meiosis
19. animals

Critical Thinking

20. An alternation of generations life cycle has both multicellular diploid structures and multicellular haploid structures. A diploid life cycle has only multicellular diploid structures, and a haploid life cycle has only multicellular haploid structures.

Using Science Graphics

Use the diagram below to answer the following question(s).



18. What occurs at Process A?

19. What organisms typically have the life cycle shown in this diagram?

Critical Thinking

20. Recognizing Patterns Which feature of an alternation of generations life cycle distinguishes this life cycle from both a diploid life cycle and a haploid life cycle?

21. Evaluating Results What would be the result of crossing-over between chromatids of the same homologous chromosome?

22. Analyzing Results Occasionally, homologous chromosomes fail to separate during meiosis I. Using the hypothetical example of an adult organism that has two pairs of chromosomes, describe the chromosomal makeup of the eggs that would result from this error in meiosis.

23. Evaluating Results If a cell begins meiosis with two pairs of homologous chromosomes, how many chromatids will be in each cell that is produced at the end of meiosis I?

24. Forming Reasoned Opinions Is there a relationship between the number of chromosomes and the complexity of an organism? Give support for your answer.

Connecting Key Ideas

25. Constructing Explanations The unicellular protist *Paramecium* can reproduce asexually by binary fission. How would binary fission in this eukaryote differ from binary fission in a prokaryote?

Alternative Assessment

26. Research Use the Internet to investigate captive-breeding programs for endangered species in zoos. Compare the genetic variation of captive-bred animals with the genetic variation of wild animals. What can researchers do to help maintain genetic diversity in breeding programs?

27. Building Models Collect materials to use in building models of the different stages of meiosis and mitosis. Attach your models to poster boards, and label each stage and the structures present in meiosis and mitosis.

Writing for Science

28. Report Write a brief report that summarizes the effects of various treatments for infertility. Find out how the production of gametes may be affected in some people who are infertile.

Math Skills

29. Making Calculations If the diploid chromosome number of a species is 24, how many chromosomes would a haploid cell have?

a. 12
b. 24
c. 36
d. 48

30. Problem Solving Consider a hypothetical species with a diploid number of 4 chromosomes. What would be the diploid chromosome number of the offspring in the 10th generation after meiotic production of gametes?

Connecting Key Ideas

21. There would be no new genetic combinations resulting from crossing-over between chromatids of the same homologous chromosome because they are genetically identical.

22. If one pair of chromosomes failed to separate, eggs would have either three chromosomes or one chromosome.

23. There will be four chromatids because there will be two chromosomes with two chromatids each.

24. No. Students should use **Figure 3** to give examples of simple organisms that have more chromosomes than more complex organisms do.

Connecting Key Ideas

25. Binary fission in a eukaryote would involve breaking down the nuclear envelope and then reforming it around two new sets of genetic material, which a prokaryote would not have to do because they do not have nuclear membranes.

Alternative Assessment

26. Captive breeding programs attempt to increase genetic diversity through selective breeding, but this can be difficult if numbers are low. Researchers can document the genetic makeup of each individual in a breeding program in order to mate individuals that are genetically different.

27. Answers should represent the stages as shown in **Figure 4.**

Writing for Science

28. Answers might include summaries of one or more of the following types of treatments for infertility: in vitro fertilization (IVF); donor egg IVF; artificial insemination; tubal embryo transfer (TET); gamete intrafallopian transfer (GIFT); and drug treatments, (such as clomiphine citrate, pergonal, and metrodin).

Math Skills

29. a

30. After 10 generations in which gametes were produced by meiosis, the diploid chromosome number would still be 4.