

Lesson Outline

LESSON 1

Sexual Reproduction and Meiosis

A. What is sexual reproduction?

1. Sexual repro. produces an offspring when genetic materials from two different sex cells combine.
 - a. The female sex cell, a(n) egg, forms in an ovary.
 - b. The male sex cell, a(n) sperm, forms in a testis.
2. During a process called fertilization, an egg cell and a sperm cell join together. The new cell that forms is called a(n) zygote.

B. Diploid Cells

1. Organisms that reproduce sexually make two kinds of cells—
body cells and sex cells.
2. Body cells are diploids; they have pairs of chromosomes.
3. If a zygote has too many or too few chromosomes, it will not develop properly.
4. Different organisms have different numbers of chromosomes.
5. homologous are pairs of chromosomes that have genes for the same traits arranged in the same order.

C. Haploid Cells

1. Sex cells are haploids; they have only one chromosome from each pair of chromosomes.
2. In meiosis, one diploid cell divides and makes four haploid cells.

D. The Phases of Meiosis

1. Meiosis involves two divisions of the nucleus and the cytoplasm. These divisions, known as meiosis I and meiosis II, result in four haploid cells.
2. During interphase, the reproductive cell grows and duplicates its chromosomes.
3. During meiosis I, each pair of duplicated homologous chromosomes separate.
4. After meiosis I, the two cells formed during this stage go through a second division of the nucleus and cytoplasm called meiosis II. During meiosis II, sister chromatids separate to produce four haploid cells.

Lesson Outline continued

E. Why is meiosis important?

1. Meiosis forms sex cells with the correct haploid number of chromosomes. This maintains the correct diploid number of chromosomes in organisms when sex cells join.
2. Meiosis creates genetic variation by producing haploid cells.

F. How do mitosis and meiosis differ?

1. During mitosis and cell division, a body cell and its nucleus divide once and produce two identical cells.
2. During meiosis, a reproductive cell and its nucleus divide twice and produce four cells—two pairs of identical haploid cells.

G. Advantages of Sexual Reproduction

1. Sexual reproduction produces offspring that have a new combination of DNA. This results in genetic variation among individuals.
2. Genetic variation gives individuals within a population slight differences that might be an advantage if the environment changes.
3. Selective breeding has been used to develop desirable traits in plants and animals.

H. Disadvantages of Sexual Reproduction

1. One disadvantage of sexual reproduction is that organisms have to grow and develop until they are mature enough to produce haploid cells.
2. Another disadvantage is that searching for a mate takes time and energy and might expose individuals to predators, diseases, or harsh environmental conditions.

Key Concept Builder 

LESSON 1

Sexual Reproduction and Meiosis

Key Concept What is the order of the phases of meiosis, and what happens in each phase?

Directions: Work with a partner. On each line, write the term or phrase that correctly completes each sentence.

Meiosis I	
Phase	Description
Prophase I	1. Chromosomes that are duplicated during <u>interphase</u> remain sister chromatids. 2. <u>homologous chromosomes</u> join and form pairs. 3. The membrane surrounding the nucleus <u>breaks</u> apart.
Metaphase I	4. Homologous chromosome pairs align along the <u>center</u> of the cell. 5. <u>Spindle</u> fibers attach to each pair.
Anaphase I	6. Pairs of duplicated <u>homologous</u> chromosomes separate and are pulled toward opposite ends of the cell. 7. <u>sister chromatids</u> stay together.
Telophase I	8. A nuclear membrane forms around each group of chromosomes. The cytoplasm divides forming <u>two</u> daughter cells. 9. <u>sister chromatids</u> remain together.

Meiosis II	
Phase	Description
Prophase II	10. <u>chromosomes</u> do not duplicate. <u>Nuclear membrane</u> breaks apart.
Metaphase II	11. Sister chromatids <u>align</u> along the middle of the cell.
Anaphase II	12. Sister chromatids of each duplicated chromosome are <u>pulled apart</u> and move to <u>opposite ends</u> .
Telophase II	13. A nuclear membrane forms around each set of chromatids, which are again called <u>chromosomes</u> . 14. The cytoplasm divides, and <u>4 haploid</u> cells form. 15. Each cell has <u>half</u> the number of chromosomes as the original cell.

Key Concept Builder 

LESSON 1

Sexual Reproduction and Meiosis

Key Concept Why is meiosis important?

Directions: Answer each question on the lines provided.

1. If a male organism has 40 chromosomes in each body cell, how many chromosomes does a female of the same species have in each body cell? 40

2. How many homologous pairs of chromosomes does the male have? 20

3. How many chromosomes would be in a sperm cell and in an egg cell? 20

4. How many chromosomes would be in an offspring? 40

5. How many pairs of homologous chromosomes would be in an offspring? 20

6. What is the difference between a diploid cell and a haploid cell?

diploid - 2N - body / somatic cell -
Mitosis

haploid - N - reproductive / sex cell -
Meiosis

7. How does meiosis help maintain diploid cells in offspring? Use the terms *chromosomes*, *diploid*, *haploid*, *fertilized egg*, and *sex cells* in your answer.

meiosis produces haploid cells. These
cells have 1/2 the # of chromosomes of a
diploid in an adult organism. When
sex cells combine, fertilized egg has a
haploid set of chromosomes from each
parent. It is a diploid cell that
develops into a diploid offspring.

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Lesson Quiz B

LESSON 1

Sexual Reproduction and Meiosis

Completion

Directions: On each line, write the term that correctly completes each sentence.

1. During meiosis, one diploid cell divides to make four haploid cells.
2. fertilization is the joining of an egg cell and a sperm cell.
3. The production of an offspring that results when the genetic materials from two different cells combine is called sexual reproduction.
4. A new cell formed by the joining of a sperm and an egg is called a(n) zygote.
5. During meiosis II, the cells formed during this stage go through a second division of the nucleus and the cytoplasm.
6. In a pair of homologous chromosomes, one chromosome is inherited from each parent.

Short Answer

Directions: Respond to each statement on the lines provided.

7. **Compare** and **contrast** the events of meiosis I with the events of meiosis II.

Meiosis 1: homologous chromosome
XX pairs

Meiosis 2: sister chromatids of
X X chromosomes

8. **Explain** the importance of meiosis.

provide genetic variation

selective breeding for preferred
traits

Lesson Outline**LESSON 2****Asexual Reproduction****A. What is asexual reproduction?**

1. In asexual repr., one parent organism produces offspring without meiosis and fertilization.
2. Because the offspring of asexual reproduction inherit all their DNA from one parent, they are genetically identical to each other and their parent.

B. Types of Asexual Reproduction

1. Cell division in prokaryotes is known as binary fission
2. During fission, DNA is copied and the cell splits to form two identical offspring. The original cell no longer exists.
3. Many unicellular eukaryotes reproduce by mitotic cell division. In this type of asexual reproduction, an organism forms two offspring through mitosis and cell division
4. In budding, a new organism grows on the body of its parent by mitosis and cell division. When the bud becomes large enough, it can break from the parent and live on its own.
5. regeneration occurs when an offspring grows from a piece of its parent.
 - a. Sea stars, sea urchins, sea cucumbers, and planarians can reproduce through regeneration.
 - b. Many animals can regenerate damaged or lost body parts. This is not reproduction; offspring are not produced.
6. vegetative reproduction is a form of asexual reproduction in which offspring grow from a part of a parent plant. (propagation)
7. cloning is a type of asexual reproduction developed by scientists and performed in laboratories. It produces identical individuals from a cell or from a cluster of cells taken from a multicellular organism.
8. Using a cloning method called tissue culture, plant growers and scientists can use a meristem to make a copy of a plant with desirable traits.
9. Because all of a clone's DNA come from one parent, the clone is a genetic copy of its parent.

Lesson Outline continued

10. Asexual reproduction enables organisms to reproduce without a(n) mate/partner
11. Asexual reproduction also enables some organisms to rapidly produce a large number of offspring
12. Asexual reproduction produces offspring that are genetically identical to each other and to their parents. This results in minimal genetic variation within a population.
13. Genetic variation is important because it can give organisms a better chance of survival if the environment changes.
14. Genetic changes, called mutations, can occur and then be passed to offspring; this can affect the offspring's ability to survive.

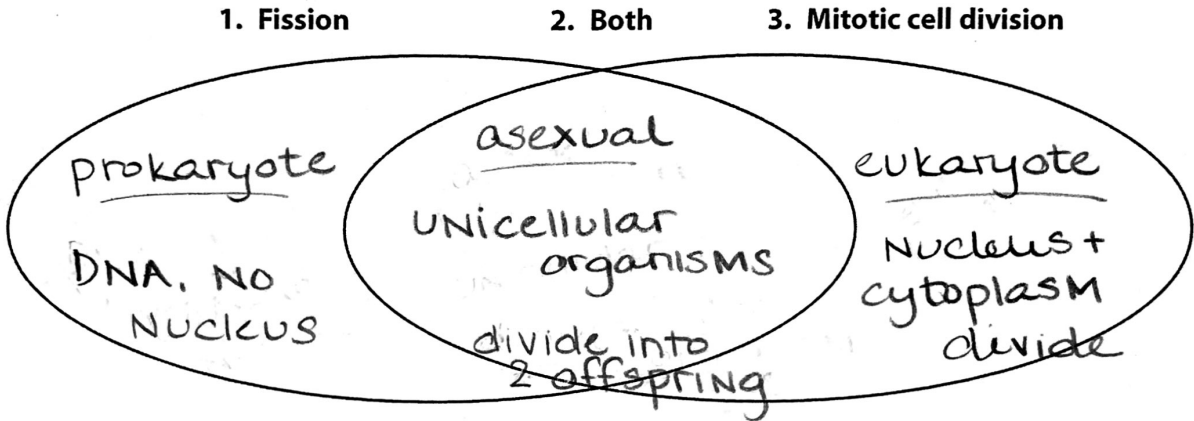
Key Concept Builder 

LESSON 2

Asexual Reproduction

Key Concept How do the types of asexual reproduction differ?

Directions: Complete the Venn diagram by writing features of fission on the left and mitotic cell division on the right. Write what they have in common in the center.



Directions: Respond to each statement in the space provided.

<p>4. Draw a picture showing a hydra budding.</p>	<p>5. Explain how budding can produce new organisms.</p> <p>organism grows on the body of parent, breaks off when big enough</p>
<p>6. Draw a picture showing a planarian forming two offspring by animal regeneration.</p>	<p>7. Explain how animal regeneration can produce new organisms.</p> <p>offspring grows from a piece of its parent</p>
<p>8. Draw a picture showing vegetative reproduction. propagation</p>	<p>9. Explain how vegetative reproduction can produce new organisms.</p> <p>offspring grows from a part of a parent plant (root, stem, leaf)</p>

Lesson Quiz B

LESSON 2

Asexual Reproduction

Completion

Directions: On the line, write the term that correctly completes each sentence.

1. Prokaryotic cell division is called binary fission
2. budding is a type of asexual reproduction that occurs when an offspring grows on the body of its parent by mitosis and cell division.
3. Animal regeneration occurs when an offspring grows from a piece of its parent.
4. The process in which one parent produces offspring without meiosis and fertilization is called asexual reproduction
5. The process of cloning produces identical individuals in a laboratory from cells taken from a multicellular organism.
6. Vegetative reproduction occurs when an offspring grows from part of a parent plant. (propogation)

Short Answer

Directions: Respond to each statement on the lines provided.

7. **Write** an example of asexual reproduction and an organism that uses it.

fission - bacteria
budding - hydra
regeneration - starfish
vegetative reproduction - strawberries

8. **Explain** one advantage of asexual reproduction.

reproduce w/o a mate
rapidly produce large # of offspring