Lesson 4.3: Life Science – Reproduction & Meiosis

Weekly Focus: Reading Comprehension
Weekly Skill: Vocabulary Building

Lesson Summary: This week students will focus on the life science theme of reproduction and meiosis. They will also work with vocabulary in this area of life science to become more familiar with the content.

Materials Needed:

- Video **Unit 4.3 – Asexual Reproduction** (2:28 min)
- Handout for Video **Unit 4.3 Handout 1**
- Comprehension Reading **Unit 4.3 Handout 2**
- Review Cheat Sheet **Unit 4.3 Handout 3**
- Extra Work/Homework **Unit 4.3 Handout 4** (6-way Paragraphs, Introductory Level, #64, pages 128-129)

Objectives: Students will be able to…

- Activate prior knowledge in reproduction and meiosis with a video
- Read passages with vocabulary related to the reproduction of living things

College and Career Readiness Standards: RI, RST, WHST

ACES Skills Addressed: EC, LS, ALS, CT, SM, N

Notes: Please review and be familiar with classroom routine notes for: Handling Controversial Topics (**Routine 5**); reading for fluency strategies (**Routine 2**), summarizing techniques (**Routine 4**), and self-management skills (**Routine 1**). The notes for the different activities will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be two short answer portions (suggested 10 minutes each) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

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Lesson 4.3: Life Science – Reproduction & Meiosis

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.

Activities:

Warm-Up: Journal Writing	**Time: 5 - 10 minutes**

- As students enter the class, have the following written on the board or overhead **"All living things come from other living things. One way of reproduction is called asexual. What do you know about asexual reproduction?"** Have students create a **"KWL"** chart on a piece of notebook paper (below). This helps to activate students' prior knowledge by asking them what they already **K**now (column 1); students (collaborating as a classroom unit or within small groups) set goals specifying what they **W**ant to learn (column 2); and after reading students discuss what they have **L**earned (column 3).
- Students apply higher-order thinking strategies which help them construct meaning from what they read and help them monitor their progress toward their goals.

KWL Chart:

K - What (else) do I KNOW?	**W - What do I WANT to know?**	**L - What did I LEARN?**

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Activity 1: Video (Unit 4.3 Handout 1)	**Time: 20 - 25 minutes**

1) Distribute the handout (**Unit 4.3 Handout 1**) to students. The video is about asexual reproduction. You may want to review how to handle working with controversial topics (Classroom routines Handout 5). Although this is not a controversial topic, some students may feel a bit uncomfortable with the topic. You can remind students that science covers important topics that affect all of our lives.
2) Have students preview the questions prior to watching the video. See if they know or can predict any of the answers.
3) Have students watch the video. You may have to show the video two times – the first time for students to get the overall idea of the video and a second or third time for them to fill in the blanks with information.
4) After watching the video, ask students to check on their answers with classmates. Then review answers as a class. They can also fill in the "**L**" portion of the KWL chart from today's warm up.
5) The next activity in this lesson is to gain a better understanding of vocabulary and ideas related to the reproduction and meiosis.

Activity 2: Comprehension Reading (Unit 4.3 Handout 2)	**Time: 50 - 55 minutes**

1) Hand out **Unit 4.3 Handout 2** to students.
2) Explain to students they will read about reproduction and meiosis. Some of the material may be a review for some students and it may be new to others.
3) Discuss with students that when reading for comprehension, there are many strategies to use:

Lesson 4.3: Life Science – Reproduction & Meiosis

read the title to predict what the reading is about; look at the words in bold and their definitions on the left side of page; if there are images, look at them to get a better understanding; while reading remember to ask "What is this all about?"

4) Have students read the passage and answer the questions on page independently.

5) Circulate class while they are reading to make sure they understand the information presented and see if there are any questions.

6) Review answers as a whole class – note: some answers may vary – ask students with different answers to discuss theirs with the class.

Break: 10 minutes

Activity 3: Review Sheet (Unit 4.3 Handout 3)	**Time: 10 - 15 minutes**

1) Distribute **Unit 4.3 Handout 3** to students.

2) Explain to students that this was created by other students who studied similar material.

3) Ask students to review the information on the handout.

4) Remind students that they need to have a good foundational knowledge of cells and the vocabulary of life science in order to answer some questions that may be on the GED 2014 test. Students should take time to write in the note section information they learned from today's lesson.

Wrap-Up: Summarize	**Time: 5 minutes**

Have students turn to a partner (or write in their journals) about what they have learned today about reproduction and meiosis. Ask them to tell a partner one thing they learned today in one or two sentences. *(Use Routine 4 Handout)*

Extra Work/Homework: Unit 4.3 handout 4	**Time: 30 minutes outside of class**

Students can preview the next lesson with a reading from 6-way paragraphs (Introductory Level, #64 pages 128-129) on DNA. This is an excellent opportunity for students work on new material in an independent manner.

Differentiated Instruction/ELL Accommodation Suggestions	**Activity**
If some students finish early, they can turn their paper over and summarize the reading passage. This is a good time to practice the short answer response on the 2014 GED Science module. One way to practice is to write a summary of the reading passage.	**Activity 2**
Teachers should be aware that ELLs could have some difficult time with some of the vocabulary encountered in video. You may have to watch the video a few times to make sure students understand the content before they work on filling in the handout.	**Activity 1**

Lesson 4.3: Life Science – Reproduction & Meiosis

Online Resources:

If students have Internet connection, they should watch the animated video on meiosis. There is a follow up quiz, too.

http://www.sumanasinc.com/webcontent/animations/content/meiosis.html

These are two other online video representations of meiosis. If possible, show to the entire class.

http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter3/animation__how_meiosis_works.html

http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter3/animation__stages_of_meiosis.html

Suggested Teacher Readings:

- GED Testing Service – GED Science Item Sample (to get an idea of what the test *may* be like)

http://www.gedtestingservice.com/itemsamplerscience/

- Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:

http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf

- Minnesota is getting ready for the 2014 GED test! – website with updated information on the professional development in Minnesota regarding the 2014 GED.

http://abe.mpls.k12.mn.us/ged_2014_2

- Essential Education's 2014 GED Test Curriculum Blueprint (PDF)

http://www.passged.com/media/pdf/educators/curriculum-blueprint.pdf

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Lesson 4.3: Life Science – Reproduction & Meiosis

Unit 4.3 Handout 1 (1 page total)

Asexual Reproduction

Watch the short video discussing the asexual reproduction. While watching, fill in the blanks with information presented. When you are finished, check with a classmate to see if you have the same information.

1. Sexual reproduction combine _____ from a mother and a father making a _____ unique organism.

2. In asexual reproduction all of the _____ come from a single parent.

3. Asexually offspring are genetically _____ to the parent.

4. Bacteria reproduce through cell division. The bacteria make a copy of its _____ and then sends it to the new bacteria cell.

5. Another form of asexual reproduction is _____, as in unicellular yeast cells.

6. Describe what the yeast cells do in this form of asexual reproduction.

_____

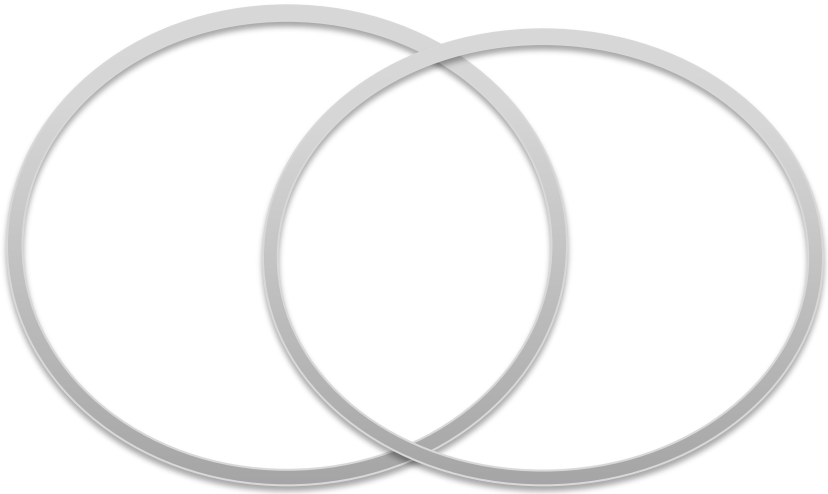
_____

_____

7. Some organisms, such as the sea anemone and worm _____ or fragment and continue to live as two identical living things.

8. Fill in the Venn diagram with information presented in the video.

Sexual Reproduction



Asexual

Unit 4.3 Handout 1 (1 page total)

Asexual Reproduction TEACHER ANSWER KEY

Watch the short video discussing the asexual reproduction. While watching, fill in the blanks with information presented. When you are finished, check with a classmate to see if you have the same information.

1. Sexual reproduction combine ____**genes**_____ from a mother and a father making a ____**genetically**_____ unique organism.

2. In asexual reproduction all of the _____**genes**_____ come from a single parent.

3. Asexually offspring are genetically _____**identical**_____ to the parent.

4. Bacteria reproduce through cell division. The bacteria make a copy of its ___**DNA**_____ and then sends it to the new bacteria cell.

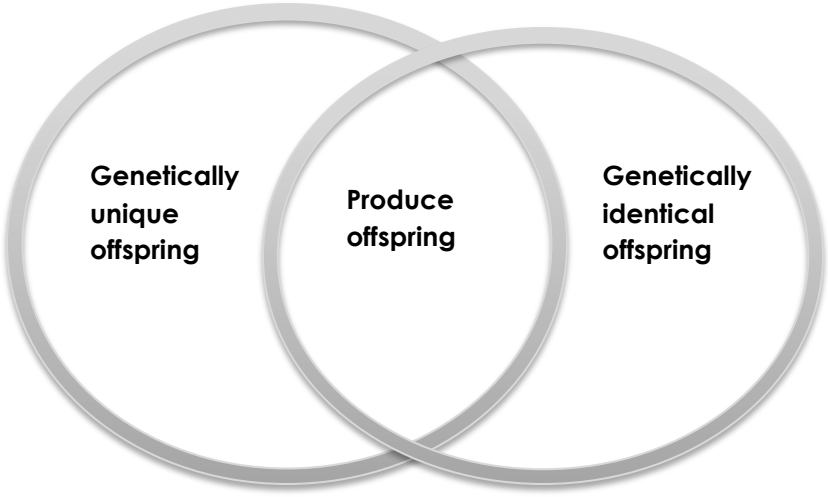
5. Another form of asexual reproduction is ___**budding**_____, as in unicellular yeast cells.

6. Describe what the yeast cells do in this form of asexual reproduction.

Answers may vary. Suggested answer: Unicellular yeast cells grow new cells off the side of another. When the cell is developed, the cell falls off and a new yeast cell is produced.

7. Some organisms, such as the sea anemone and worm _____**split**_____ or fragment and continue to live as two identical living things.

8. Fill in the Venn diagram with information presented in the video.



Unit 4.3 Handout 2 (7 pages total)

The Reproduction of Living Things

Vocabulary

1. **asexual reproduction**—reproduction of an offspring requiring just one parent
2. **base pairs**—two chemicals bases that join together to form gene in DNA
3. **budding**—type of asexual reproduction in which a parent sprouts a smaller version of itself
4. **double helix**—the shape of a DNA molecule; shaped like a twisted ladder
5. **egg cells**—female sex cells
6. **fertilization**—when an egg and sperm cell join together
7. **fission**—type of asexual reproduction when an organism splits into two identical organisms
8. **fragmentation**—type of asexual reproduction in which an offspring grows from the piece of a parent
9. **gene**—chemical base in DNA that determines traits
10. **meiosis**—the division of a sex cell
11. **mitosis**—process in which the base pairs in a DNA molecule come apart and then form copies of DNA strands with other disconnected bases
12. **sexual reproduction**—reproduction of an offspring requiring two parents
13. **sperm cells**—male sex cells
14. **spore formation**—type of asexual reproduction in which a tiny cell breaks open and releases spores into the atmosphere
15. **zygote**—the first cell that is produced from fertilization

The Reproduction of Living Things

Brief #1: Asexual Reproduction

Focus

During asexual reproduction, only one parent is required.

All living things come from other living things. You came from your parents, and someday you may have children of your own.

There are two different ways in which living things reproduce themselves. One way is called asexual reproduction. **Asexual reproduction means that the offspring of a living organism comes from a single parent and has the exact DNA as the parent.**

Vocabulary

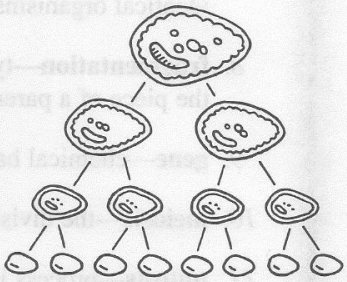
1. asexual reproduction
2. fission
3. budding

Types of Asexual Reproduction

There are several different types of asexual reproduction. In this unit, we will discuss fission, budding, spore formation, and fragmentation.

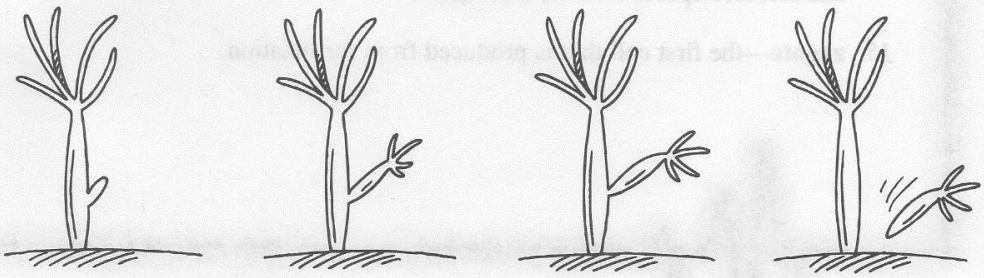
✓ **Fission**

Microorganisms such as bacteria are reproduced by the process of fission. **During fission, an organism splits into two identical organisms**. Each new organism has the ability to grow to the same size as the original, single parent. The fission process can reproduce organisms very quickly.



✓ **Budding**

There are many smaller organisms that use the process of budding to reproduce themselves. **During budding, a single parent forms a smaller version of itself that sprouts from its own body.** The bud has the exact same DNA as its parent. Once the bud is large enough, it breaks off of the parent.



The Reproduction of Living Things

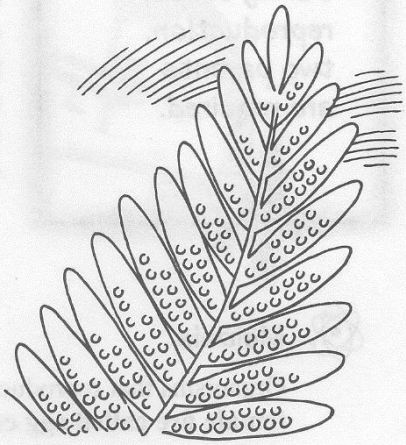
Brief #1: Asexual Reproduction *(cont.)*

Types of Asexual Reproduction *(cont.)*

✓ **Spore Formation**

There are some types of plants, algae, and fungi that reproduce themselves by a using a process called spore formation.

During spore formation, a tiny cell with a kind of protective coating is produced on the plant, algae, or fungus. When the weather is just right, the spore breaks open and tiny spores are released. These tiny spores have the same DNA as the parent spore. They form new organisms that are identical to the single parent.



spores on a fern plant

✓ **Fragmentation**

Fragmentation is another type of asexual reproduction. **During fragmentation, a new organism is grown from a part of the parent.** For example, if a sea star, certain kinds of worms, or other types of plants and fungus are cut apart, a new and identical organism can grow from the pieces.

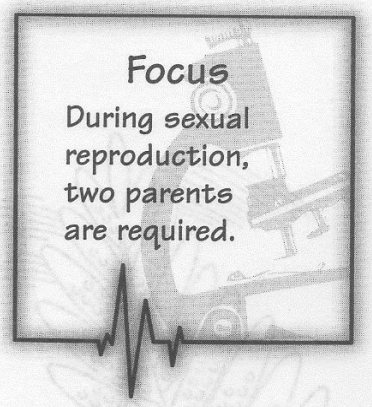
a sea star undergoing the process of fragmentation

Vocabulary

4. spore formation
5. fragmentation

The Reproduction of Living Things

Brief #2: Sexual Reproduction



Sexual reproduction is a process that requires two parents. **During sexual reproduction, the offspring or new organism gets half of its DNA from one male parent and the other half from one female parent.** The new organism has a combination of DNA, so it is not an exact copy of either one of its parents.

Vocabulary

1. sexual production
2. egg cells
3. sperm cells
4. meiosis
5. fertilization
6. zygote

Meiosis

Organisms that reproduce sexually have special cells called sex cells. **The sex cells of the female are called egg cells. The sex cells of the male are called sperm cells.**

All of the cells in an organism have a certain number of chromosomes. For example, every cell in the body of a chicken has 78 chromosomes, and every cell in a pineapple has 50 chromosomes.

But sex cells are different from other kinds of cells in an organism. The sex cells only have half of the number of chromosomes that are in the other cells. That means that there are 39 chromosomes in the sex cells of a chicken and 25 in the sex cell of a pineapple.

Chromosomes and Sex Cells

Animal/Plant	Total # of Chromosomes	# of Sex Chromosomes
cabbage	18	9
cat	38	19
dog	78	39
elephant	56	28
human	46	23
yeast	32	16

Sex cells are produced by a process called meiosis. **During meiosis, a single sex cell divides and produces four new cells.** Each new cell only has half of the chromosomes of the parent. So in humans, an egg cell has 23 chromosomes and a sperm cell has 23 chromosomes.

The Reproduction of Living Things

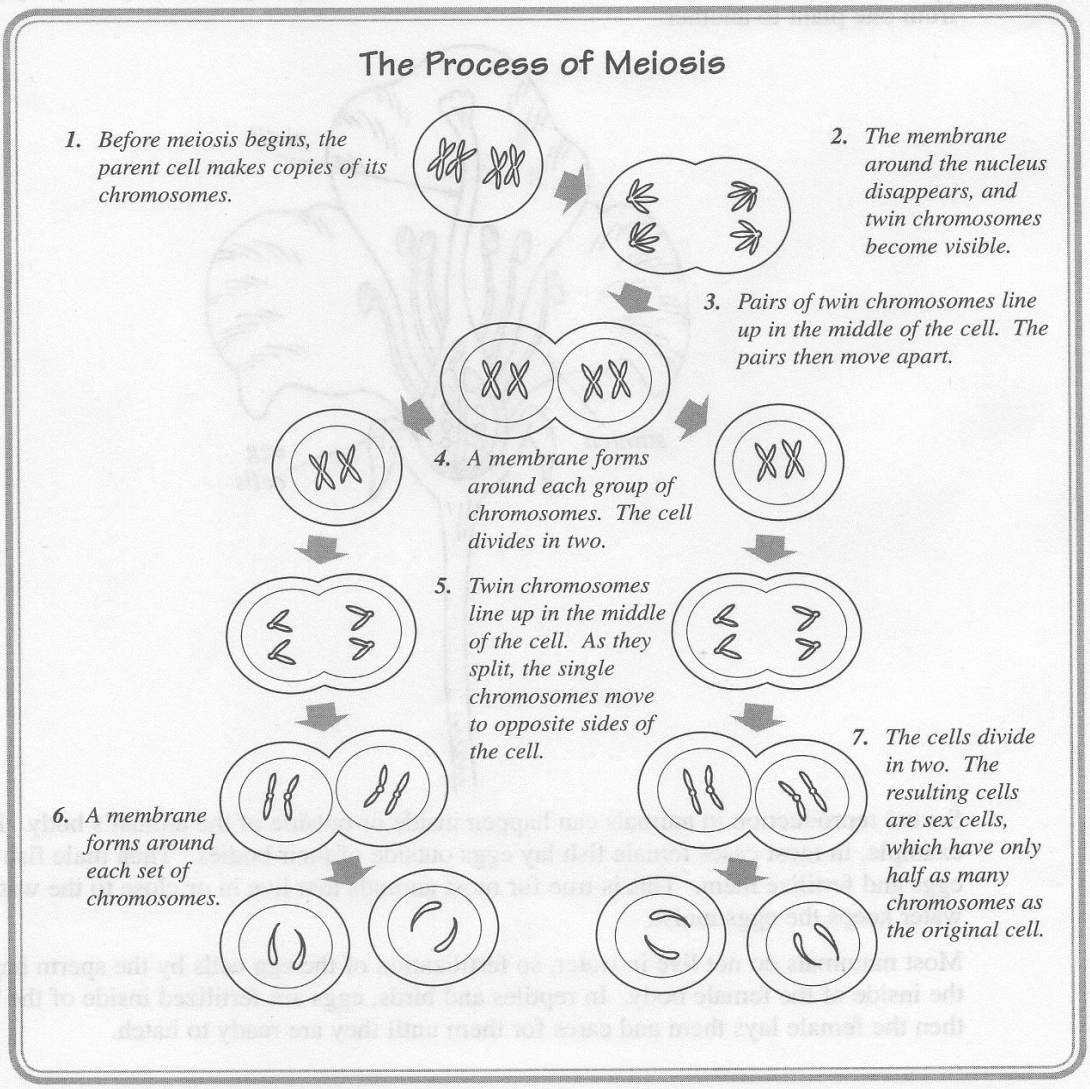
Brief #2: Sexual Reproduction *(cont.)*

Meiosis *(cont.)*

Sexual reproduction in an organism is when the egg cell and the sperm cell join together. This process is called fertilization. The first new cell that is produced from fertilization is called a zygote. Because the zygote is a combination of two different parents, it has half of the chromosomes from the egg cell and half of the chromosomes from the sperm cell.

Now that the zygote has a full set of chromosomes, it will divide using the process of mitosis and form a new organism.

The Process of Meiosis



The Reproduction of Living Things

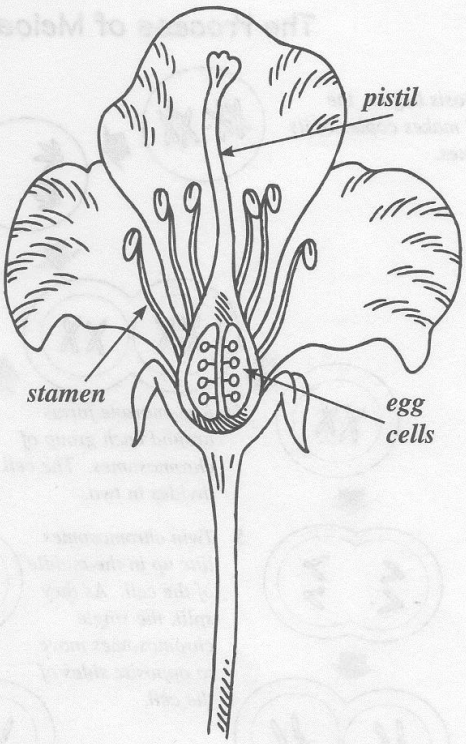
Brief #2: Sexual Reproduction *(cont.)*

Fertilization

Fertilization can happen in different ways in living things that use sexual reproduction as a method for producing new organisms.

In flowering plants, the sperm cells are located in the pollen. Pollen is the powdery substance that you can often see blowing off of plants. It is produced in the part of the plant called the stamen. A plant's egg cells are produced by the pistil. When pollen is transferred from the stamen to the pistil, pollination (fertilization) has occurred.

The wind and animals like bees, birds, and mammals help to pollinate by carrying pollen from one plant to another.



Sexual reproduction in animals can happen inside or outside of the animal's body. For example, in most cases female fish lay eggs outside of their bodies. Then male fish find the eggs and fertilize them. This is true for most animals that live in or close to the water. The water keeps the eggs moist.

Most mammals do not live in water, so fertilization of the egg cells by the sperm happens on the inside of the female body. In reptiles and birds, eggs are fertilized inside of the body, and then the female lays them and cares for them until they are ready to hatch.

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Answer the following questions from the reading passage on reproduction.

1. What is the first cell produced by sexual reproduction called?

A. a coyote **B.** a zimmo **C.** an egglet **D.** a zygote

2. Reproduction that requires one male and one female parent is called

A. asexual reproduction **B.** meiosis **C.** sexual reproduction **D.** budding

3. What is meiosis?

A. cell division **B.** sex cell division **C.** pollination **D.** chromosomes

5. A new organism growing from the pieces of a parent is called.

A. fragmentation **B.** budding **C.** fission **D.** spore formation

6. Living organisms reproduce by

A. asexual reproduction **B.** sexual reproduction **C.** unisexual reproduction **D.** A & B

7. Describe asexual reproduction. Provide examples of this process.

_____

_____

_____

_____

8. Explain the process of meiosis.

_____

_____

_____

_____

UNIT 4.3 Handout 2 TEACHER ANSWER KEY

1. What is the first cell produced by sexual reproduction called?

A. a coyote **B.** a zimmo **C.** an egglet **D.** **a zygote**

2. Reproduction that requires one male and one female parent is called

A. asexual reproduction **B.** meiosis **C.** **sexual reproduction** **D.** budding

3. What is meiosis?

A. cell division **B.** **sex cell division** **C.** pollination **D.** chromosomes

5. A new organism growing from the pieces of a parent is called.

A. **fragmentation** **B.** budding **C.** fission **D.** spore formation

6. Living organisms reproduce by

A. asexual reproduction **B.** sexual reproduction **C.** unisexual reproduction **D.** **A & B**

7. Describe asexual reproduction. Provide examples of this process.

Answers may vary. Suggested answer: Asexual reproduction means that the offspring of a living organism comes from a single parent and has the exact DNA as the parent. There are 4 different types of asexual reproduction: fission, budding, spore formation, and fragmentation. Bacteria are reproduced through fission. Smaller organisms such as hydra reproduce by budding. Algae and fungi reproduce through spore formation. A sea star or a worm reproduces by fragmentation.

8. Explain the process of meiosis.

Answers may vary. Suggested answer: Meiosis is the process in which sex cells are produced. During meiosis, a single sex cell is divided and produces four new cells. Each new cell only has half the chromosomes of the parent. So an egg cells has 23 chromosomes, and a sperm cell has 23 chromosomes.

Unit 4.3 Handout 3 (1 page total)

Reproduction & Meiosis

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Biology

Big Picture

Reproduction is how organisms produce offspring. There are two main types of reproduction: asexual reproduction, where one parent produces offspring identical to itself, and sexual reproduction, where two parents produce unique offspring. A key part of sexual reproduction is meiosis, which produces gametes (reproductive cells) with half the usual number of chromosomes. During fertilization, a male gamete joins with a female gamete to form an offspring cell containing genes from both parents.

Key Terms

Asexual Reproduction: Reproduction involving a single parent.

Sexual Reproduction: Reproduction involving two parents.

Gamete: Reproductive cells.

Haploid: Cell having only one chromosome of each type.

Diploid: Cell having two of each type of chromosome (twice the amount of chromosomes in haploids).

Fertilization: Process in which two gamete cells unite.

Zygote: A fertilized cell (the result of fertilization).

Meiosis: Cell division where the number of chromosomes is cut in half (results in haploids).

Gametogenesis: Process where haploid cells become gametes.

Crossing-Over: When genetic information is exchanged between homologous chromosomes.

Independent Assortment: When cells divide in meiosis, each individual chromosome is separated randomly and independently.

Asexual Reproduction

In **asexual reproduction**, all offspring produced are identical to the parent and to themselves.

Types of asexual reproduction:

- Binary fission: a type of cell division that is also a method of asexual reproduction, where a parent cell splits into 2 identical daughter cells
- Fragmentation: parent cell splits into fragments that become identical daughter cells
- Budding: offspring is attached to the parent like a bud while it grows, then it breaks away once it's grown

Asexual reproduction allows organisms such as bacteria to reproduce very quickly.

Sexual Reproduction

Sexual reproduction produces unique offspring whose cells contain a mix of chromosomes from the 2 parents

- Parents produce **gametes** with half the number of chromosomes during **meiosis**
- Gametes combine to form a **zygote** during **fertilization**
- Zygote has the normal number of chromosomes; half from mother, half from father

Meiosis

- Produces haploid gametes; only certain cells in multicellular organisms go through meiosis.
- Meiosis is essentially two cell divisions that produces four **haploid** cells.

Notes

Unit 4.3 Handout 3

TEACHER ANSWER KEY

1. a. **B** (broad idea)
b. **N** (narrow idea)
c. **M** main idea)

2. **b**

3. **a**

4. **c**

5. **d**

6. **d**