

## ***Multiplication in Cells?***

Name: \_\_\_\_\_ Teacher: \_\_\_\_\_ Period: \_\_\_\_\_

***INTRODUCTION:***

*In this activity, you will explore the fascinating processes of mitosis and meiosis. You will form chromosomes using licorice so you can visualize the processes. Recall that mitosis is the process by which a cell of a plant or animal divides to form two new cells, each containing the same number of chromosomes as the original cell. Recall that meiosis is the process by which the number of chromosomes in reproductive cells of sexually reproducing organisms is reduced to half the original number, resulting in the production of gametes or spores. You should be aware of the following important aspects of mitosis and meiosis:*

Process	Stages	Important Events	Results	Uses
Mitosis	Interphase Prophase Metaphase Anaphase Telophase	Replication of chromosomes; chromosomes line up single file in random order in metaphase	2 cells identical to original or parent cell and each other	Asexual reproduction,  Growth  Replacement of damaged cells
Meiosis	2 divisions labeled I and II	Replication of chromosomes; chromosomes line up in homologous pairs during First Division and members of pairs separate; chromosome copies separate during Second Division without replicating	4 haploid or monoploid sex cells or gametes	Sexual reproduction

***OBJECTIVE:*** *Why am I accomplishing this activity?*

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***MATERIALS:***

1. Plastic zippered bag with licorice sticks, four (4) pieces of red and four (4) pieces of black.
2. Colored pencils and/or markers.
3. Plain paper for diagrams.
4. Napkins or paper towels.

***PROCEDURE:***

1. You and your partner have five minutes for each demonstration of the cell division process and the replication process of meiosis and mitosis. Perform

*these demonstrations in order of occurrence to your partner using the licorice chromosomes.*

- 2. Recall that the parent cell in each process will have two pairs of homologous chromosomes, one black pair and one red pair.*
- 3. You will have 30 minutes to create diagrams and write a description comparing and contrasting each of the processes you created using the pieces of plain paper, markers and/or coloring pencils provided.*
- 4. Once the diagrams and descriptions are completed, display them in order on your desk or lab table.*
- 5. After completion of the activity, you will be allowed to eat the licorice chromosomes.*

**DISCUSSION QUESTIONS:**

- 1. What happens to the chromosome number in mitosis?*

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- 2. What happens to the chromosome number in meiosis ?*

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- 3. How does metaphase of mitosis compare to metaphase I of meiosis?*

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- 4. What are the purposes of each process?*

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- 5. What are the similarities (compare) in the two processes?*

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- 6. What are the differences (contrast) in the two processes?*

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- 7. How are both processes related to sexual reproduction?*

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- 8. If a cell undergoing mitosis has 6 chromosomes, how many chromosomes will be found in each daughter cell? \_\_\_\_\_*

- 9. If a cell undergoing meiosis has 6 chromosomes, how many chromosomes will be found in each gamete? \_\_\_\_\_*

## ANSWERS TO DISCUSSION QUESTIONS

1. *Mitosis: It remains the same.*
2. *Meiosis: It is reduced or cut in half.*
3. *In metaphase of mitosis, the chromosomes line up in single file in any order along the equator of the cell. In metaphase I of meiosis, the chromosomes line up in pairs on the equator.*
4. *Mitosis uses are asexual reproduction, growth, and replacement of damaged cells. Meiosis use is sexual reproduction.*
5. *Both are cell division processes and require duplication of chromosomes or genetic material. Replication or duplication occurs before the chromosomes are visible.*
6. *Lineup of chromosomes in metaphase, number of cells produced, chromosome number in new cells.*
- 7.
8. *Six, 6.*
9. *Three, 3.*

### *Multiplication in Cells? Rubric*

CATEGORY	4	3	2	1
<b>Use of Class Time</b>	Used time well during each class period. Focused on getting the project done. Never distracted others.	Used time well during each class period. Usually focused on getting the project done and never distracted others.	Used some of the time well during each class period. There was some focus on getting the project done but occasionally distracted others.	Did not use class time to focus on the project OR often distracted others.
<b>Graphics - Relevance</b>	All graphics are related to the topic and make it easier to understand.	All graphics are related to the topic and most make it easier to understand.	All graphics relate to the topic.	Graphics do not relate to the topic.
<b>Required Elements</b>	The diagram includes all required elements as well as additional information.	All required elements are included on the diagram.	All but 1 of the required elements is included on the diagram.	Several required elements are missing.