

# CASE

## Activity 7.1.2 Splitting Genes

### Purpose

Mitosis, the process of cellular division, creates two genetically identical diploid ( $2n$ ) daughter cells from the diploid parent cell. Meristematic and other plant cells undergo mitosis to generate healthy tissues for the plant. Gamete cells, including eggs and pollen, are different than the typical plant cells you have studied previously in this course. Haploid ( $1n$ ) gamete cells pass genetic material onto offspring during fertilization. These haploid gamete cells are produced using another cell division process, called meiosis.

The whole process of gametogenesis, or the formation of gametes, includes both meiotic and mitotic division producing egg and pollen cells. The egg cell, in particular, is very unique. An egg cell contains multiple sets of genetic material in multiple nuclei. What other differences exist between gamete cells and other plant cells? How do gamete cells contribute to new plants that are genetically diverse? Finally, how do gamete cells ensure the survival of the seed they produce?

### Materials

#### Per student:

- *Plant and Soil Science: Fundamentals and Applications* textbook
- Pencil
- *Agriscience Notebook*

### Procedure

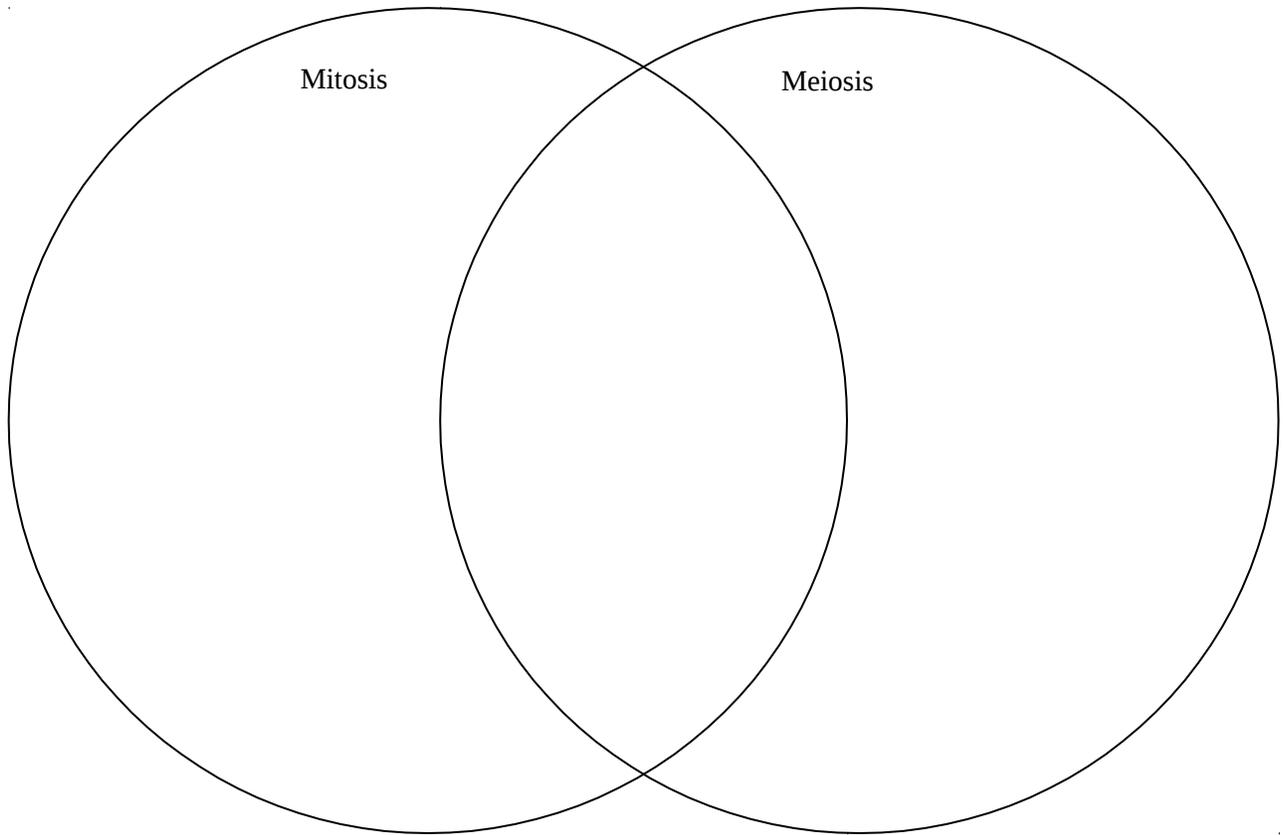
Ancient Egyptians used the hieroglyphics alphabet, consisting of small pictures, to record information. You will develop your own set of small pictures to accompany the story of meiosis.

1. Review page 350 (Meiosis) of *Plant and Soil Science: Fundamentals and Applications*.
2. Sketch, label, and describe each step of the process of meiosis in Table 1. Include the following items:
  - Number of chromosomes (haploid, diploid, or triploid).
  - Number of cells or nuclei produced in each step.
  - Purpose of step or product.

- Other pertinent cell parts that contribute to offspring success and survival.
1. Review pages 351-352 of *Plant and Soil Science: Fundamentals and Applications*.
  2. Describe the fertilization process in Table 2. Include the following information:
    - A labeled sketch of each step.
    - Number of chromosomes (haploid, diploid, or triploid).
    - Purpose of step or product, or how each structure contributes to the success and survival of the seed.

## Conclusion

1. How are pollen and egg cells different than most other plant cells? Pollen and egg cells are haploid gametes
2. What specific plant structures produce pollen and egg cells? Ovules produce egg cells and anthers produce pollen cells
3. What do gamete cells contribute to offspring? Gamete cells contribute 1 chromosome each to the offspring
4. How many sets of chromosomes do gamete cells contain? Gamete cells contain 1 set of chromosomes
5. Use the Venn diagram to compare and contrast the processes of mitosis and meiosis.



Drawing will be presented at checkin on Sunday

3.

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

## Activity 7.1.2 Student Worksheet

**Table 1. Steps of Meiosis**

Step	Pollen Grains	Chromosome Number	Egg Cells	Chromosome Number
Diploid Cell (Parent)	Drawings will be submitted in person on Sunday	2__n		__2__n
Meiosis		_1__n		__1__n
Cell Death	N/A	N/A		__0__n
Mitosis		_2__n		__2__n
Mitosis	N/A	N/A		__2__n

Nuclei Death	N/A	N/A		<u>5</u> n
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**Table 2. Steps in Pollination and Fertilization**

Step	Description	Chromosome Number	Purpose or Contribution to Seed Success
Pollination		<u>1</u> n	Pollen transfers from anther to stigma
Pollen Tube Formation		<u>3</u> n	Pollen gamete moves through it to unite with egg in ovary
Pollen Unites with Egg Nucleus		<u>2</u> n	Fertilization occurs
Double Fertilization		<u>5</u> n	When endosperm nucleus forms
Zygote Develops into Embryo		<u>2</u> n	A seed develops
Endosperm Nucleus Develops into Endosperm		<u>3</u> n	Food for the embryo

<b>Ovary Develops into Fruit</b>		N/A	Aids in the dispersal of the seeds
<b>Ovule Wall Develops into Seed Coat</b>		N/A	Provides protection to the new plant