

SECTION  
6.3MENDEL AND HEREDITY  
**Reinforcement**CHAPTER 6  
Meiosis and Mendel

**KEY CONCEPT** Mendel's research showed that traits are inherited as discrete units.

Traits are inherited characteristics, and **genetics** is the study of the biological inheritance of traits and variation. Gregor Mendel, an Austrian monk, first recognized that traits are inherited as discrete units. We call these units **genes**. Mendel conducted his experiments with pea plants, which were an excellent choice because they are easily manipulated, produce large numbers of offspring, and have a short life cycle. Mendel made three important decisions that helped him to see patterns in the resulting offspring.

- Use of purebred plants: Mendel used pea plants that had self-pollinated for so long that they had become genetically uniform, or **purebred**. This meant that the offspring looked like the parent plant. Because of this characteristic, Mendel knew that any differences he observed in the offspring were the result of his experiments.
- Control over breeding: At the start of his experiments, Mendel removed the male flower parts from the pea plants. He then pollinated the female flower part with pollen from a plant of his choosing, which produced offspring referred to as the  $F_1$  generation.
- Observation of "either-or" traits: Mendel studied seven traits that appeared in only two forms. For example, flowers were white or purple; peas were wrinkled or round.

Mendel observed that when he mated, or **crossed**, a purple-flowered plant with a white-flowered plant, for example, all of the  $F_1$  offspring had purple flowers. Mendel next allowed the  $F_1$  offspring to self-pollinate; that is, the plant mated with itself. In the resulting offspring, the  $F_2$  generation, approximately three-fourths of the flowers were purple and one-fourth were white. Mendel continued to find this 3:1 ratio for each of his crosses, regardless of the specific trait he was examining.

Based on his results, Mendel concluded that traits are inherited as discrete units. He also developed what is known as Mendel's first law, or the **law of segregation**. This law states the following:

- Organisms inherit two copies of each unit (gene), one from each parent.
- The two copies separate, or segregate, during gamete formation. As a result, organisms donate only one copy of each unit (gene) in their gametes.

1. In which generation of offspring did Mendel observe a 3:1 ratio in the appearance of the offspring?

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2. What is segregating in the law of segregation? When does this segregation occur?

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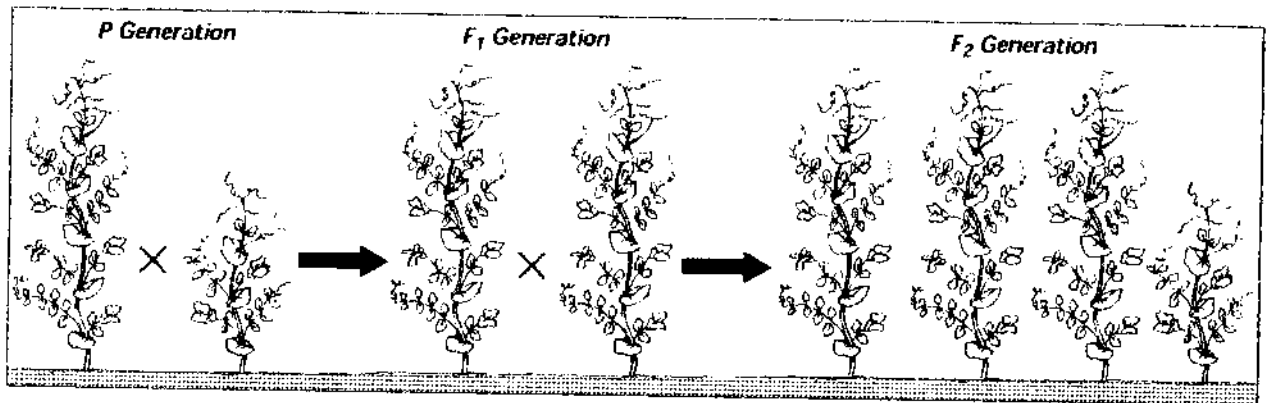
**SECTION 3-1**

**REVIEW AND REINFORCE**

**Mendel's Work**

**◆ Understanding Main Ideas**

Study the figure. Then answer the following questions on a separate sheet of paper.



1. What trait in pea plants is being studied in the cross above?
2. What are the two alleles of this trait?
3. Which allele is the dominant allele? Explain how you know.
4. Which allele is the recessive allele? Explain.
5. What alleles do the F<sub>1</sub> offspring have? Explain which allele was inherited from which parent.

**◆ Building Vocabulary**

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

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|---------------------------|---|
| _____ 6. genetics         | a. the passing of traits from parents to offspring                      |
| _____ 7. alleles          | b. an organism with two different alleles for a trait                   |
| _____ 8. traits           | c. factors that control traits  |
| _____ 9. recessive allele | d. physical characteristics of organisms                                |
| _____ 10. genes           | e. an allele whose trait always shows up in the organism                |
| _____ 11. hybrid          | f. the different forms of a gene  |
| _____ 12. heredity        | g. the scientific study of heredity                                     |
| _____ 13. dominant allele | h. an allele whose trait is masked in the presence of a dominant allele |