# CHAPTER 1 Mendel's Investigations

## Lesson 6.1: True or False

**Name**_____ **Class**_____ **Date**_____

*Write true if the statement is true or false if the statement is false.*

_____ 1. A homozygous individual could have a *Bb* genotype.

_____ 2. In Mendel's experiments, purple flowers are dominant over white flowers.

_____ 3. Heredity is the science of genetics.

_____ 4. In Mendel's initial experiments, white flowers disappeared after the first parental crosses.

_____ 5. It was his knowledge of genes that allowed Mendel to interpret his data correctly.

_____ 6. Having naturally light or dark skin is part of your phenotype.

_____ 7. Different alleles account for much of the variation in the characteristics of organisms.

_____ 8. Mendel showed that factors controlling different characteristics are inherited independently.

_____ 9. Mendel came up with the idea that two factors control a characteristic, such as pod color.

_____ 10. Mendel developed three laws of inheritance.

_____ 11. The expression of an organism's phenotype produces its genotype.

_____ 12. After he published his work, Mendel achieved great fame among scientists.

_____ 13. Through his experiments, Mendel was able to prove some aspects of the blending theory of inheritance.

_____ 14. A *Dd* genotype has two different alleles.

_____ 15. Flowers are the reproductive organs of plants.

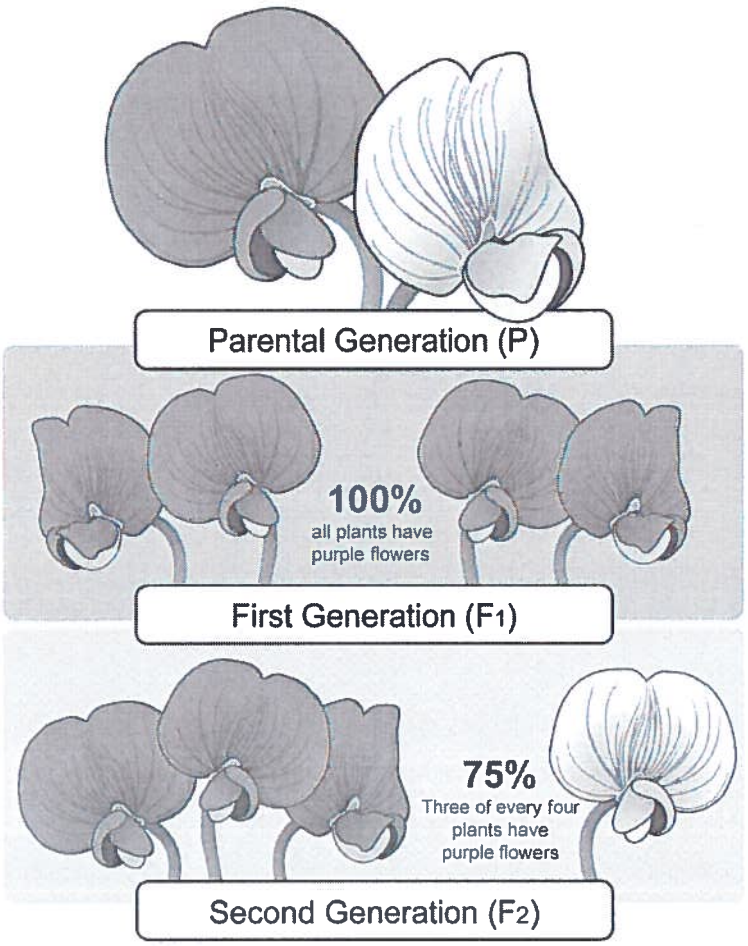
## Lesson 6.1: Critical Reading

**Name**_____ **Class**_____ **Date**_____

*Read these passages from the text and answer the questions that follow.*

**Mendel's First Set of Experiments**

At first, Mendel experimented with just one characteristic at a time. He began with flower color. As shown in the figure below, Mendel cross-pollinated purple- and white-flowered parent plants. The parent plants in the experiments are referred to as the P (for parent) generation.




This diagram shows Mendel's first experiment with pea plants. The F1 generation results from cross-pollination of two parent (P) plants. The F2 generation results from self-pollination of F1 plants.

**F1 and F2 Generations**

The offspring of the P generation are called the F1 (for filial, or "offspring") generation. As you can see from the figure above, all of the plants in the F1 generation had purple flowers. None of them had white flowers. Mendel wondered what had happened to the white-flower characteristic. He assumed some type of inherited factor produces white flowers and some other inherited factor produces purple flowers. Did the white-flower factor just disappear in the F1 generation? If so, then the offspring of the F1 generation —called the F2 generation —should all have purple flowers like their parents.

To test this prediction, Mendel allowed the F1 generation plants to self-pollinate. He was surprised by the results. Some of the F2 generation plants had white flowers. He studied hundreds of F2 generation plants, and for every three purple-flowered plants, there was an average of one white-flowered plant.

**Law of Segregation**

Mendel did the same experiment for all seven characteristics. In each case, one value of the characteristic disappeared in the F1 plants and then showed up again in the F2 plants. And in each case, 75 percent of F2 plants had one value of the characteristic and 25 percent had the other value. Based on these observations, Mendel formulated his first law of inheritance. This law is called the **law of segregation**. It states that there are two factors controlling a given characteristic, one of which dominates the other, and these factors separate and go to different gametes when a parent reproduces.

*Questions*

1. What did Mendel do in his first experiment?

2. What was the outcome of the F1 generation in Mendel's first experiment?

3. What was the outcome of the F2 generation in Mendel's first experiment?

4. Did Mendel repeat his initial experiment with other characteristics? What were his results?

5. Explain the law of segregation. Discuss the reasoning Mendel used to develop this law.

## Lesson 6.1: Multiple Choice

**Name**_____ **Class**_____ **Date**_____

*Circle the letter of the correct choice.*

1. Why did Mendel choose to work with the garden pea plant?
   a. Because the pea plant is easy to work with.
   b. Because pea plants are fast growing.
   c. Because the pea plant has a number of characteristics, each with only two forms.
   d. all of the above
2. In Mendel's first experiment
   a. the F1 displayed all purple-flowered plants.
   b. the F1 displayed all white-flowered plants.
   c. the F2 displayed all purple-flowered plants.
   d. the F2 displayed half purple-flowered and half white-flowered plants.
3. The law of independent assortment states that
   a. two factors of the same characteristic separate into different gametes.
   b. there are dominant and recessive factors.
   c. factors controlling different characteristics are inherited independently of each other.
   d. there are two factors that control inheritance.
4. Looking at your dog will give information concerning
   a. the dog's genotype.
   b. the dog's phenotype.
   c. the dog's recessive alleles.
   d. the dog's heterozygous alleles.
5. Which sentence is correct?
   a. Different alleles of the same gene are located at the same locus on different homologous chromosomes.
   b. Different alleles of the same gene are located at different loci on different homologous chromosomes.
   c. Different genes of the same alleles are located at the same locus on different homologous chromosomes.
   d. Different alleles of the same gene are located at different loci on the same chromosome.
6. An *Aa* individual
   a. has a homozygous genotype.
   b. has a heterozygous phenotype.
   c. has a heterozygous genotype.
   d. has a homozygous phenotype.

7. In Mendel's initial experiments, an example of the F2 generation would be
   a. 75 round seed plants to 25 wrinkled seed plants
   b. 75 green seed plants to 25 yellow seed plants
   c. 75 white-flowered plants to 25 purple-flowered plants
   d. all of the above
8. Which of the following is part of the law of segregation? (1) there are two factors controlling a given characteristic, (2) one factor is dominant over the other factor, (3) the two factors separate into different gametes.
   a. 1 and 2
   b. 1 and 3
   c. 2 and 3
   d. 1, 2, and 3

## Lesson 6.1: Vocabulary I

**Name**_____ **Class**_____ **Date**_____

*Match the vocabulary word with the proper definition.*

**Definitions**

_____ 1. the science of heredity

_____ 2. an organism with two alleles of the same type

_____ 3. an organism with two different alleles

_____ 4. different version of a gene

_____ 5. states that there are two factors controlling a given characteristic, one of which dominates the other, and these factors separate and go to different gametes

_____ 6. states that factors controlling different characteristics are inherited independently of each other

_____ 7. expressed allele in a heterozygote

_____ 8. allele that is not expressed in a heterozygote

_____ 9. the offspring of cross-pollination

_____ 10. fertilization process in the sexual reproduction of plants

_____ 11. the alleles an individual inherits

_____ 12. the expression of an organism's genotype

**Terms**

a. allele

b. dominant allele

c. genetics

d. genotype

e. heterozygote

f. homozygote

g. hybrid

h. law of independent assortment

i. law of segregation

j. phenotype

k. pollination

l. recessive allele

## Lesson 6.1: Vocabulary II

**Name**_____ **Class**_____ **Date**_____

*Fill in the blank with the appropriate term.*

1. Mendel's discoveries formed the basis of _____, the science of heredity.

2. A(n) _____ is an alternative form of a gene.

3. _____ plants are a good choice to use by Mendel because they are fast growing and easy to raise.

4. Characteristics of organisms are controlled by _____ on chromosomes.

5. The law of _____ states that factors controlling different characteristics are inherited independently of each other.

6. In Mendel's first experiment, the F1 generation flowers were all _____ in color.

7. In all of Mendel's first experiments, in the F2 generation, for every _____ purple-flowered plants, there was an average of _____ white-flowered plant.

8. *BB* would be a _____ genotype.

9. The _____ refers to the organism's characteristics, such as purple or white flowers.

10. *Cc* would be a _____ genotype.

11. The position of a gene on a chromosome is called its _____.

12. The law of _____ states that there are two factors controlling a given characteristic and these factors separate and go to different gametes.

## Lesson 6.1: Critical Writing

**Name**_____ **Class**_____ **Date**_____

*Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.*

Describe dominant and recessive alleles, providing examples from Mendel's work.