

## Section 11–3 Exploring Mendelian Genetics (pages 270–274)

*This section describes Mendel's principle of independent assortment. It also tells about traits that are controlled by multiple alleles or multiple genes.*

### Independent Assortment (pages 270–271)

- In a two-factor cross, Mendel followed \_\_\_\_\_ different genes as they passed from one generation to the next.
- Write the genotypes of the true-breeding plants that Mendel used in his two-factor cross.

**Phenotype**

**Genotype**

- |  |              |
|--|--------------|
| <ol style="list-style-type: none"> <li>round yellow peas</li> <li>wrinkled green peas</li> </ol> | <p>_____</p> |
|--|--------------|
- Circle the letter that best describes the F<sub>1</sub> offspring of Mendel's two-factor cross.
    - Homozygous dominant with round yellow peas
    - Homozygous recessive with wrinkled green peas
    - Heterozygous dominant with round yellow peas
    - Heterozygous recessive with wrinkled green peas
  - Is the following sentence true or false? The genotypes of the F<sub>1</sub> offspring indicated to Mendel that genes assort independently.  
\_\_\_\_\_
  - How did Mendel produce the F<sub>2</sub> offspring? \_\_\_\_\_  
\_\_\_\_\_
  - Circle the letter of the phenotypes that Mendel would expect to see if genes segregated independently.
    - round and yellow
    - wrinkled and green
    - round and green
    - wrinkled and yellow
  - What did Mendel observe in the F<sub>2</sub> offspring that showed him that the alleles for seed shape segregate independently of those for seed color? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - What were the phenotypes of the F<sub>2</sub> generation that Mendel observed? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - What was the ratio of Mendel's F<sub>2</sub> generation for the two-factor cross? \_\_\_\_\_  
\_\_\_\_\_

**Chapter 11, Introduction to Genetics** *(continued)*

10. Complete the Punnett square below to show the predicted results of Mendel’s two-factor cross.

**MENDEL’S TWO-FACTOR CROSS**  
*RrYy × RrYy*

	<i>RY</i>	<i>Ry</i>	<i>rY</i>	<i>ry</i>
<i>RY</i>				
<i>Ry</i>				
<i>rY</i>				
<i>ry</i>				

11. State Mendel’s principle of independent assortment. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**A Summary of Mendel’s Principles** *(page 272)*

12. Circle the letter of each sentence that is true about Mendel’s principles.
- a. The inheritance of biological characteristics is determined by genes that are passed from parents to their offspring.
  - b. Two or more forms of the gene for a single trait can never exist.
  - c. The copies of genes are segregated from each other when gametes are formed.
  - d. The alleles for different genes usually segregate independently of one another.
13. When two or more forms of the gene for a single trait exist, some forms of the gene may be \_\_\_\_\_ and others may be \_\_\_\_\_.

**Beyond Dominant and Recessive Alleles** *(pages 272–273)*

14. Is the following sentence true or false? All genes show simple patterns of dominant and recessive alleles. \_\_\_\_\_

15. Complete the compare-and-contrast table of the different patterns of inheritance.

**PATTERNS OF INHERITANCE**

Type	Description	Examples
	One allele is not completely dominant over another. The heterozygous phenotype is somewhere in between the two homozygous phenotypes.	
	Both alleles contribute to the phenotype of the organism.	
	Genes have more than two alleles.	
	Two or more genes control a trait.	

**Applying Mendel’s Principles (page 274)**

16. List three criteria Thomas Hunt Morgan was looking for in a model organism for genetic studies.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

17. Is the following sentence true or false? Mendel’s principles apply not just to pea plants but to other organisms as well. \_\_\_\_\_

**Genetics and the Environment (page 274)**

18. Characteristics are determined by interaction between genes and the \_\_\_\_\_.