

Genetics: The Science of Heredity ▪ *Reading/Notetaking Guide***Mendel's Work** (pp. 154–159)

This section describes how Gregor Mendel identified the method by which characteristics are passed from parents to their offspring.

Use Target Reading Skills

As you read, complete the outline about Mendel's work. Use the red headings for the main idea and the blue headings for the supporting ideas.

I. Mendel's experiments**A. Crossing pea plants**

1.

2.

B.**C.****II.****A.****B.****C.****Introduction** (p. 154)

1. Gregor Mendel experimented with hundreds of pea plants to understand the process of _____.

Match the term with its definition.

Term	Definition
_____ 2. heredity	a. The scientific study of heredity
_____ 3. genetics	b. Physical characteristics
_____ 4. traits	c. The passing of traits from parents to offspring

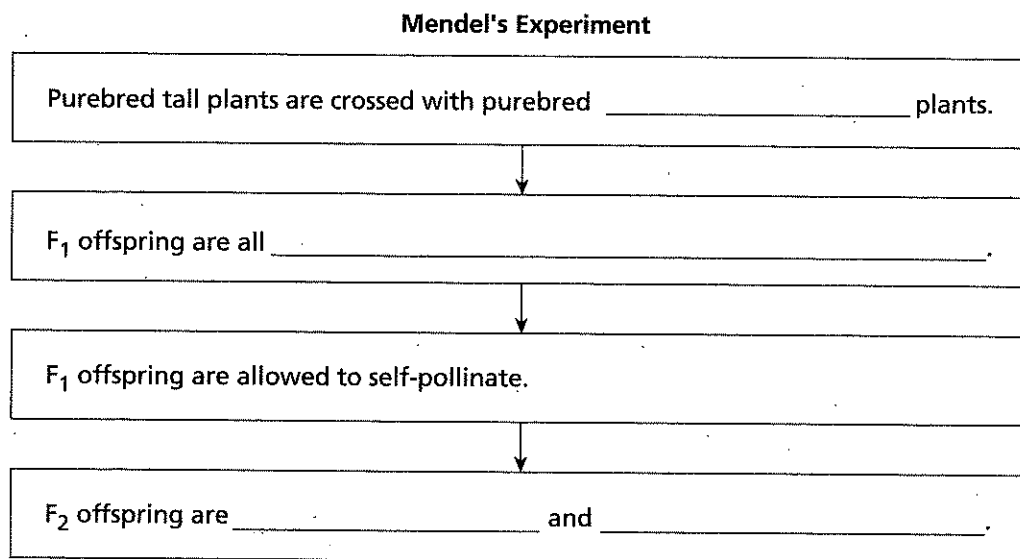
Mendel's Experiments (pp. 155–156)

5. In a flower, the female sex cells, or eggs, are produced by the _____. Pollen, which contains the male sex cells, or sperm, is produced by the _____.

6. What are purebred organisms?

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7. Complete the flowchart below to summarize Mendel's experiment with pea plants.



8. Circle the letter of other traits in garden peas that Mendel studied.
- a. seed size, seed shape, seed color
 - b. seed color, pod color, flower shape
 - c. flower size, pod shape, seed coat color
 - d. pod color, seed shape, flower position
9. Two forms of the trait of seed shape in pea plants are _____ and _____.

Dominant and Recessive Alleles (pp. 157–159)

10. Circle the letter of each sentence that is true about alleles.
- a. Recessive alleles are never present when dominant alleles are present.
 - b. Alleles are different forms of a gene.
 - c. A trait controlled by a dominant allele always shows up in the organism when the allele is present.
 - d. Recessive alleles hide dominant alleles.
11. Is the following sentence true or false? Only pea plants that have two recessive alleles for short stems will be short. _____

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Mendel's Work *(continued)*

Match the pea plant with its combination of alleles.

- | Pea Plant | Combination of Alleles |
|--------------------------|---|
| _____ 12. purebred short | a. Two alleles for tall stems |
| _____ 13. purebred tall | b. One allele for tall stems and one allele for short stems |
| _____ 14. hybrid tall | c. Two alleles for short stems |
15. A dominant allele is represented by a(n) _____ letter.
16. A recessive allele is represented by a(n) _____ letter.
17. How might a geneticist write the alleles to show that a tall pea plant has one allele for tall stems and one allele for short stems?

18. Is the following sentence true or false? Because of Mendel's work, he is often called the Father of Genetics. _____

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Probability and Heredity (pp. 162–167)

This section explains what probability is and how the laws of probability can be used in the study of genetics.

Use Target Reading Skills

After you read the section, reread the paragraphs that contain definitions of Key Terms. Use all the information you have learned to write a definition of each Key Term in your own words.

probability _____

Punnett square _____

phenotype _____

genotype _____

homozygous _____

heterozygous _____

codominance _____

Principles of Probability (pp. 162–163)

1. A number that describes how likely it is that a certain event will occur is called _____.
2. Circle the letter of each answer that equals the probability that a tossed coin will land heads up.
 - a. 1 in 2
 - b. $\frac{1}{2}$
 - c. 50 percent
 - d. 20 percent
3. Is the following sentence true or false? When you toss a coin 20 times, you will always get 10 heads and 10 tails. _____
4. If you toss a coin five times and it lands heads up each time, can you expect the coin to land heads up on the sixth toss? Explain.

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Probability and Genetics (pp. 164–165)







5. When Mendel crossed two hybrid plants for stem height (Tt), what results did he always get?

6. Mendel realized that the principles of probability could be used to _____ the results of genetic crosses.

7. A chart that shows all the possible combinations of alleles that can result from a genetic cross is called a(n) _____.

8. In a genetic cross, the _____ that each parent passes to its offspring is based on _____.

9. Write in the alleles of the parents and the possible allele combinations of the offspring in the Punnett square below. Both parents are tall. Three of the offspring are tall, and one is short.

<p>_____</p>  <p>_____</p>		
	 <p>_____</p>	 <p>_____</p>
<p>_____</p>  <p>_____</p>	 <p>_____</p>	 <p>_____</p>

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Probability and Heredity (*continued*)

Phenotypes and Genotypes (p. 166)

Match the term with its definition.

Term	Definition
_____ 10. phenotype	a. Describes an organism with two identical alleles for a trait
_____ 11. genotype	b. An organism's physical appearance, or visible traits
_____ 12. homozygous	c. An organism's genetic makeup, or allele combinations
_____ 13. heterozygous	d. Describes an organism that has two different alleles for a trait

14. Mendel used the term _____ to describe heterozygous pea plants.

Codominance (p. 167)

15. Is the following sentence true or false? In codominance, the alleles are neither dominant nor recessive. _____
16. In cattle, red hair and white hair are codominant. Cattle with both white hair and red hair are _____.

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Genes, DNA, and Proteins (pp. 175–181)

This section tells what forms the genetic code, how cells produce proteins, and how mutations can affect organisms.

Use Target Reading Skills

As you read, write questions about The Genetic Code. In the right column, write answers and a summary statement that expresses the main idea.

Questions	Notes: The Genetic Code
What is the function of genes?	_____

What do proteins do?	_____

	Summary Statement:

The Genetic Code (p. 176)

- Circle the letter of each sentence that is true about genes, chromosomes, and proteins.
 - Genes control the production of proteins in an organism's cells.
 - Proteins help determine the size, shape, and other traits of an organism.
 - Chromosomes are made up of RNA.
 - A single gene on a chromosome contains only one pair of nitrogen bases.
- What are the four nitrogen bases that make up a DNA molecule?

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Genes, DNA, and Proteins *(continued)*

3. What is the genetic code?

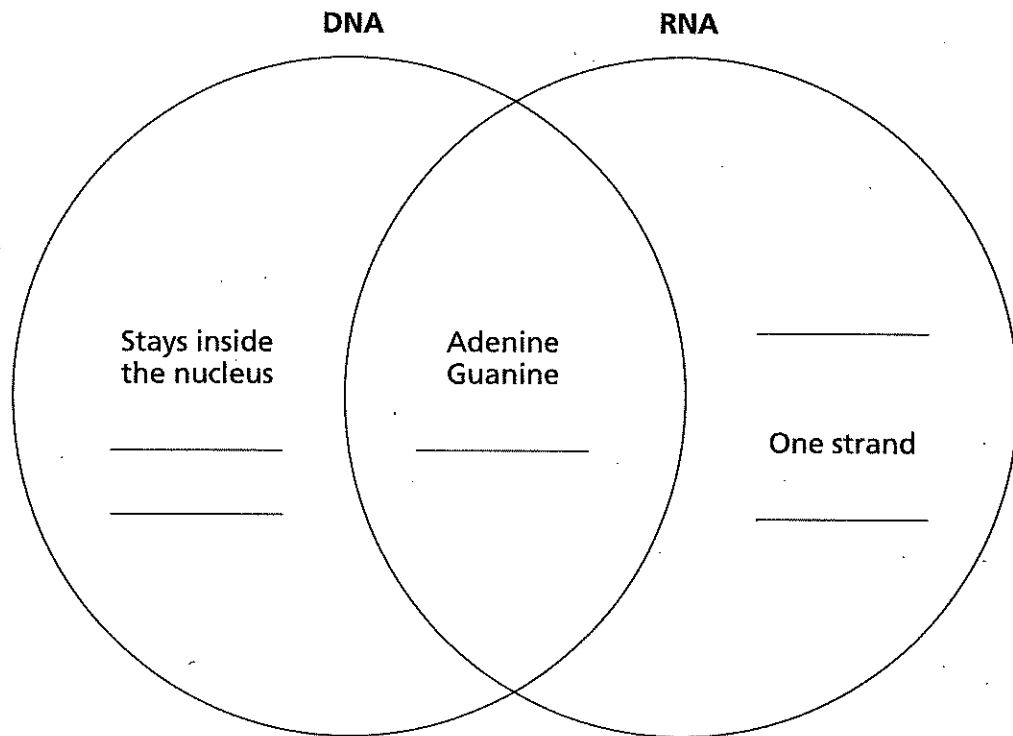
4. One group of three nitrogen bases codes for one _____.

How Cells Make Proteins (pp. 177–179)

5. During protein synthesis, the cell uses information from a _____ on a chromosome to produce a specific _____.

6. Proteins are made on _____ in the cytoplasm of the cell.

7. Complete the Venn diagram to show some of the similarities and differences between DNA and RNA. Tell where each nucleic acid is located and what bases it contains.



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8. List the two kinds of RNA, and describe their jobs.

a. _____

b. _____

9. Circle the letter of the first step in protein synthesis.

a. Transfer RNA carries amino acids to the ribosome.

b. The ribosome releases the completed protein chain.

c. Messenger RNA enters the cytoplasm and attaches to a ribosome.

d. DNA "unzips" to direct the production of a strand of messenger RNA.

10. Circle the letter of the last step in protein synthesis.

a. Transfer RNA attaches to the messenger RNA and reads the message by matching up with three-letter codes of bases.

b. The protein chain grows longer as each transfer RNA molecule adds an amino acid.

c. Messenger RNA enters the cytoplasm and attaches to a ribosome.

d. DNA "unzips" to direct the production of a strand of messenger RNA.

Mutations (pp. 180–181)

11. What is a mutation?

12. How can mutations affect protein synthesis in cells? What is the result?

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Genes, DNA, and Proteins *(continued)*

13. Circle the letter of each sentence that is true about mutations.
- a. Cells with mutations will always make normal proteins.
 - b. Some mutations occur when one nitrogen base is substituted for another.
 - c. Some mutations occur when chromosomes don't separate correctly during meiosis.
 - d. Mutations that occur in a body cell can be passed on to an offspring.
14. Mutations can be a source of genetic _____.
15. Is the following sentence true or false? All mutations are harmful.

16. Mutations that are _____ improve an organism's chances for survival and reproduction.
17. Whether a mutation is harmful or helpful depends partly on an organism's _____.