4 Chapter Review

the BIG idea

In sexual reproduction, genes are passed from parents to offspring in predictable patterns.

CONTENT REVIEW
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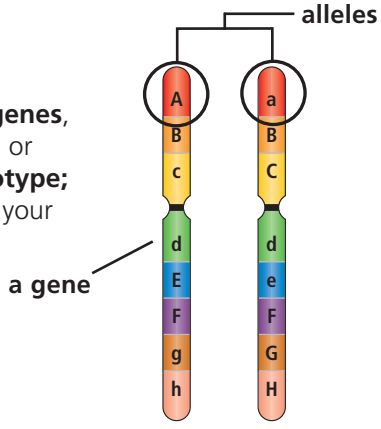
KEY CONCEPTS SUMMARY

1 Living things inherit traits in patterns.

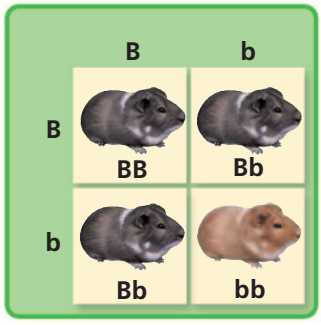
Offspring inherit **alleles**, which are forms of **genes**, from their parents. Alleles can be **dominant** or **recessive**. The alleles you have are your **genotype;** the observable characteristics that come from your genotype are your **phenotype**.



VOCABULARY
sexual reproduction p. 102
gene p. 102
heredity p. 102
allele p. 103
phenotype p. 106
genotype p. 106
dominant p. 107
recessive p. 107

2 Patterns of heredity can be predicted.

Punnett squares show possible outcomes of heredity. **Ratios** and **percentages** can be used with Punnett squares to express the **probability** of particular outcomes.

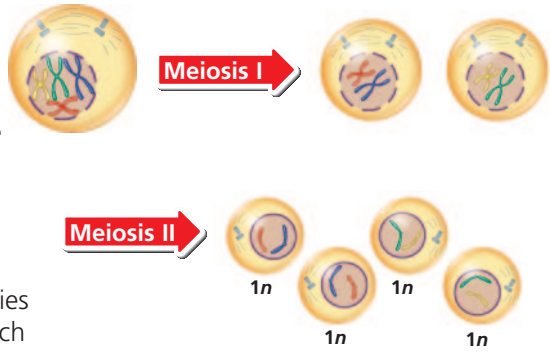


B = black fur
b = brown fur

VOCABULARY
Punnett square p. 110
ratio p. 112
probability p. 112
percentage p. 112

3 Meiosis is a special form of cell division.

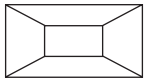
- At the beginning of meiosis I, the parent cell has two copies of each chromosome pair.
- During meiosis I, the homologs of the chromosome pair separate; there are two cells, each with two copies of one homolog from each pair.
- During meiosis II, the two copies of each homolog separate; each daughter cell has one homolog.



VOCABULARY
gamete p. 118
egg p. 118
sperm p. 118
fertilization p. 118
meiosis p. 119

Reviewing Vocabulary

Make a frame for each of the vocabulary terms listed below. Write the term in the center. Think about how each term is related to the Big Idea of the chapter. Decide what information to frame it with. Use definitions, examples, descriptions, parts, or pictures.



1. allele

2. heredity

3. ratio

4. probability

Describe how the vocabulary terms in the following pairs of words are related to each other. Explain the relationship in a one- or two-sentence answer. Underline each vocabulary word or term in your answers.

5. phenotype, genotype

6. dominant, recessive

Reviewing Key Concepts

Multiple Choice *Choose the letter of the best answer.*

7. Which is an example of an acquired trait?
- **a.** eye color
- **b.** hair color
- **c.** blood type
- **d.** ability to read

8. The unit of heredity that determines a particular trait is known as
- **a.** a chromosome
- **b.** a gamete
- **c.** a gene
- **d.** a phenotype

9. A human female would have which set of sex chromosomes?
- **a.** XX
- **b.** YY
- **c.** XY
- **d.** XxYy

10. If one copy of a dominant allele is present in a genotype, then the trait the allele codes for is
- **a.** expressed in the phenotype
- **b.** not expressed in the phenotype
- **c.** partially expressed in the phenotype
- **d.** not expressed in an offspring's phenotype

11. In guinea pigs, the allele for black fur (B) is dominant, and the allele for brown fur (b) is recessive. If a BB male mates with a Bb female, what percentage of offspring are likely to have black fur?
- **a.** 100 percent
- **b.** 75 percent
- **c.** 50 percent
- **d.** 25 percent

12. If one parent has two dominant alleles and another parent has two recessive alleles, the offspring will have
- **a.** the recessive phenotype
- **b.** the dominant phenotype
- **c.** two dominant alleles
- **d.** two recessive alleles

13. Cells that contain half the usual number of chromosomes are
- **a.** fertilized egg cells
- **b.** gametes
- **c.** alleles
- **d.** diploid cells

14. The process that produces haploid (1*n*) cells is known as
- **a.** mitosis
- **b.** reproduction
- **c.** meiosis
- **d.** fertilization

15. What happens when fertilization occurs?
- **a.** Two 2*n* cells combine in a new cell.
- **b.** Two 1*n* cells combine into a new cell.
- **c.** Two 2*n* daughter cells are produced.
- **d.** Two 1*n* daughter cells are produced.

16. Which does not occur during meiosis?
- **a.** Four haploid daughter cells are produced.
- **b.** Two diploid daughter cells are produced.
- **c.** Only cells that are gametes are produced.
- **d.** Daughter cells are produced that contain half the chromosomes of the parent cell.

Short Answer *Write a short answer to each question.*

17. In what case would a recessive allele be expressed in the phenotype of an offspring?

18. Describe the purpose of a Punnett square.

19. How does the number of chromosomes in a person's sex cells compare with the number of chromosomes in the body cells?

Thinking Critically

20. **INFER** How was Mendel able to infer that each offspring of two parent pea plants had a pair of "factors" for a particular trait?

21. **COMMUNICATE** Briefly describe how heredity works. Use the terms *gene* and *chromosome* in your explanation.

22. **APPLY** Can a dwarf pea plant ever have a dominant allele? Explain.

23. **ANALYZE** How is a Punnett Square used to show both the genotype and phenotype of both parents and offspring?

24. **APPLY** In rabbits, the allele for black fur is dominant over the allele for white fur. Two black rabbits have a litter of eight offspring. Six of the offspring have black hair and two have white hair. What are the genotypes of the parents? Explain.

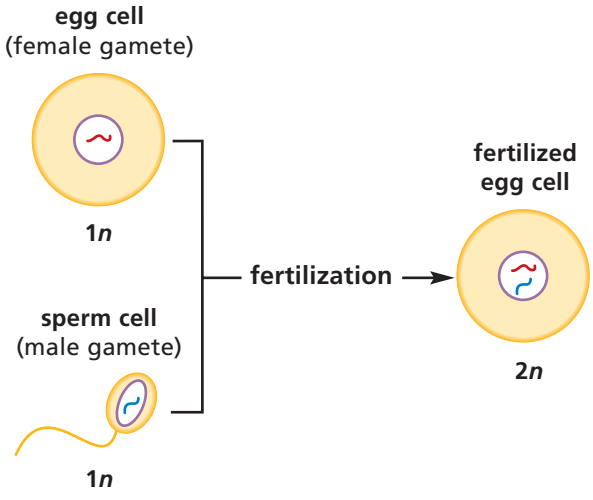
Use the Punnett square below to answer the next two questions.

	B	b
b	Bb	bb
b	Bb	bb

25. **CALCULATE** A parent has one dominant allele for black fur (B) and one recessive allele for white fur (b). The other parent has two recessive alleles for white fur. In this cross what is the chance that an offspring will be born with black fur? With white fur?

26. **CALCULATE** What is the percentage chance that an offspring will have the recessive phenotype?

27. **ANALYZE** This diagram shows the process of fertilization. Which of the cells shown are haploid? Explain.



28. **SUMMARIZE** Briefly describe what happens during meiosis I and meiosis II. What is the function of meiosis?

the BIG idea

29. **INFER** Look again at the picture on pages 98–99. Now that you have finished the chapter, how would you change or add details to your answer to the question on the photograph?

30. **SYNTHESIZE** Write one or more paragraphs explaining how Mendel's observations of pea plants contributed to the study of modern genetics. Use these terms in your explanation.

gene	phenotype
allele	dominant
trait	recessive
genotype	

UNIT PROJECTS

If you need to create graphs or other visuals for your project, be sure you have grid paper, poster board, markers, or other supplies.

Standardized Test Practice

For practice on your state test, go to . . .
TEST PRACTICE
CLASSZONE.COM

Analyzing data

The chart below shows the phenotypes of pea-plant offspring.

Phenotypes of Pea Plants	
Phenotype	Number of Offspring
Regular (D)	12
Dwarf (d)	4

Use the chart to answer the questions below.

1. What percentage of pea plants showed the dominant phenotype?
- **a.** 100 percent
- **b.** 75 percent
- **c.** 50 percent
- **d.** 25 percent

2. What percentage of pea plants showed the recessive phenotype?
- **a.** 100 percent
- **b.** 75 percent
- **c.** 50 percent
- **d.** 25 percent

3. What is the genotype of the dwarf pea plants?
- **a.** DD
- **b.** Dd
- **c.** dd
- **d.** cannot tell

4. What are the possible genotypes of the regular pea plants?
- **a.** DD and dd
- **b.** DD and Dd
- **c.** Dd and dd
- **d.** cannot tell

5. What are the genotypes of the parents?
- **a.** Dd and dd
- **b.** DD and Dd
- **c.** Dd and Dd
- **d.** dd and dd

6. Which statement is true, based on the data in the chart?
- **a.** If both parents were Dd, then none of the offspring would be dwarf.
- **b.** If both parents were DD, then none of the offspring would be dwarf.
- **c.** If one parent were Dd and the other were dd, then none of the offspring would be regular.
- **d.** If one parent were DD and the other parent were dd, then none of the offspring would be regular.

Extended Response

7. Traits for a widow's peak hairline (W) and curly hair (C) are controlled by dominant alleles. A family of eight has three children with widow's peaks. All six children have curly hair. Use your knowledge of heredity to write one or two paragraphs explaining the possible genotypes of the parents.

8. A student proposes a hypothesis that traits that are dominant are more common in the general population than traits with recessive alleles. Describe a procedure you might use to test this hypothesis.