Chapter 5 Study Guide

THE BIG IDEA

Inherited genes are the basis of an organism's traits.

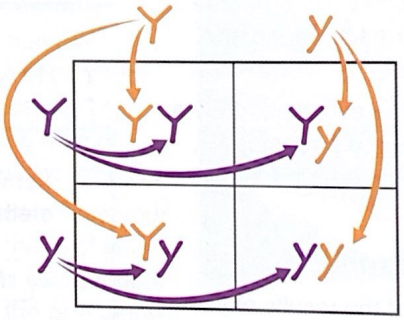
Key Concepts Summary

Lesson 1: Mendel and His Peas

- Mendel performed cross-pollination experiments to track which traits were produced by specific parental crosses.
- Mendel found that two genetic factors—one from a sperm cell and one from an egg cell—control each trait.
- **Dominant** traits block the expression of **recessive** traits. Recessive traits are expressed only when two recessive factors are present.

Lesson 2: Understanding Inheritance

- **Phenotype** describes how a trait appears.
- **Genotype** describes alleles that control a trait.
- **Punnett squares** and pedigrees are tools to model patterns of inheritance.
- Many patterns of inheritance, such as **codominance** and **polygenic inheritance,** are more complex than Mendel described.



Lesson 3: DNA and Genetics

- **DNA** contains an organism's genetic information.
- **RNA** carries the codes for making proteins from the nucleus to the cytoplasm. RNA also forms part of ribosomes.
- A change in the sequence of DNA, called a **mutation,** can change the traits of an organism.

Vocabulary

heredity p. 149
genetics p. 149
dominant trait p. 155
recessive trait p. 155

gene p. 160
allele p. 160
phenotype p. 160
genotype p. 160
homozygous p. 161
heterozygous p. 161
Punnett square p. 162
incomplete dominance p. 164
codominance p. 164
polygenic inheritance p. 165

DNA p. 170
nucleotide p. 171
replication p. 172
RNA p. 173
transcription p. 173
translation p. 174
mutation p. 175

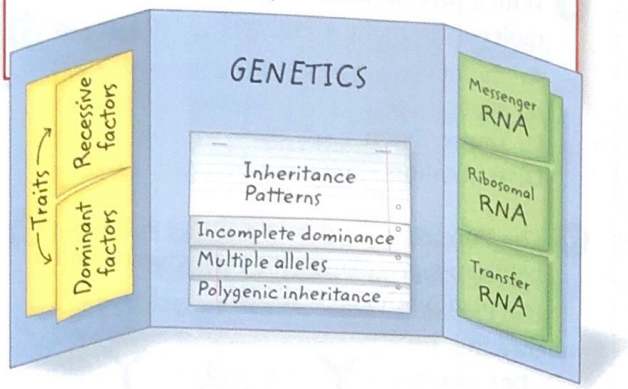
Personal Tutor

Vocabulary eFlashcards
Vocabulary eGames

FOLDABLES®

Chapter Project

Assemble your lesson Foldables as shown to make a Chapter Project. Use the project to review what you have learned in this chapter.



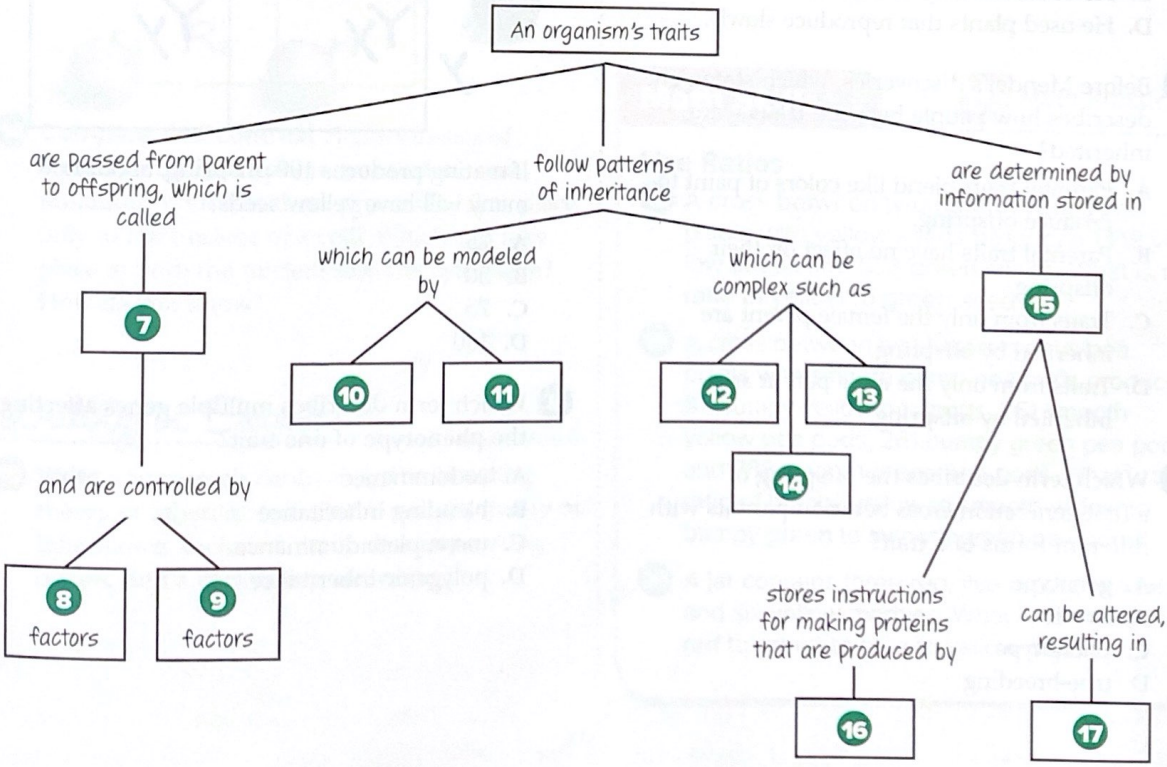
Use Vocabulary

1. The study of how traits are passed from parents to offspring is called _____.
2. The passing of traits from parents to offspring is _____.
3. Human height, weight, and skin color are examples of characteristics determined by _____ _____.
4. A helpful device for predicting the ratios of possible genotypes is a(n) _____.
5. The code for a protein is called a(n) _____.
6. An error made during the copying of DNA is called a(n) _____.

Link Vocabulary and Key Concepts

Interactive Concept Map

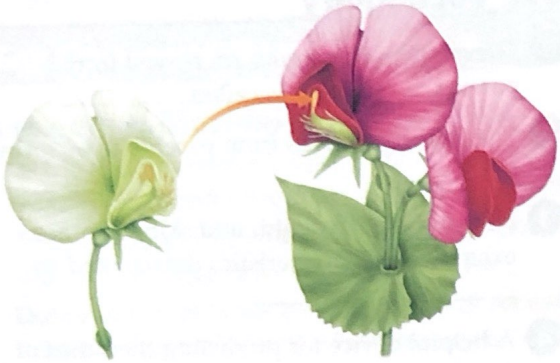
Copy this concept map, and then use vocabulary terms from the previous page to complete the concept map.



Chapter 5 Review

Understand Key Concepts

1 The process shown below was used by Mendel during his experiments.



What is the process called?

A. cross-pollination
B. segregation
C. asexual reproduction
D. blending inheritance

2 Which statement best describes Mendel's experiments?

A. He began with hybrid plants.
B. He controlled pollination.
C. He observed only one generation.
D. He used plants that reproduce slowly.

3 Before Mendel's discoveries, which statement describes how people believed traits were inherited?

A. Parental traits blend like colors of paint to produce offspring.
B. Parental traits have no effect on their offspring.
C. Traits from only the female parent are inherited by offspring.
D. Traits from only the male parent are inherited by offspring.

4 Which term describes the offspring of a first-generation cross between parents with different forms of a trait?

A. genotype
B. hybrid
C. phenotype
D. true-breeding

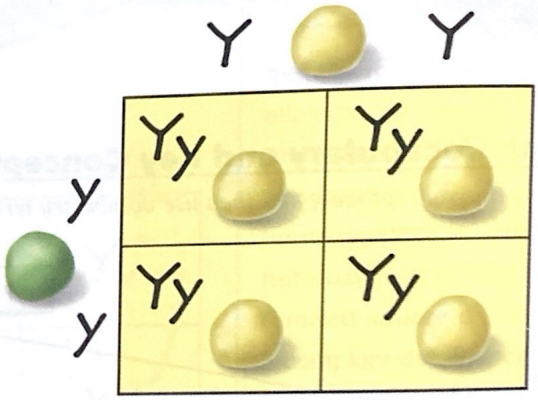
5 Which process makes a copy of a DNA molecule?

A. mutation
B. replication
C. transcription
D. translation

6 Which process uses the code on an RNA molecule to make a protein?

A. mutation
B. replication
C. transcription
D. translation

7 The Punnett square below shows a cross between a pea plant with yellow seeds and a pea plant with green seeds.



If mating produces 100 offspring, about how many will have yellow seeds?

A. 25
B. 50
C. 75
D. 100

8 Which term describes multiple genes affecting the phenotype of one trait?

A. codominance
B. blending inheritance
C. incomplete dominance
D. polygenic inheritance

Online Test Practice

Critical Thinking

9. **Compare** heterozygous genotype and homozygous genotype.

10. **Distinguish** between multiple alleles and polygenic inheritance.

11. **Give an example** of how the environment can affect an organism's phenotype.

12. **Predict** In pea plants, the allele for smooth pods is dominant to the allele for bumpy pods. Predict the genotype of a plant with bumpy pods. Can you predict the genotype of a plant with smooth pods? Explain.

13. **Interpret Graphics** In tomato plants, red fruit *(R)* is dominant to yellow fruit *(r)*. Interpret the Punnett square below, which shows a cross between a heterozygous red plant and a yellow plant. Include the possible genotypes and corresponding phenotypes.

	R	r
r	Rr	rr
r	Rr	rr

14. **Compare and contrast** characteristics of replication, transcription, translation, and mutation. Which of these processes takes place only in the nucleus of a cell? Which can take place in both the nucleus and the cytoplasm? How do you know?

Writing in Science

15. **Write** a paragraph contrasting the blending theory of inheritance with the current theory of inheritance. Include a main idea, supporting details, and a concluding sentence.

REVIEW THE BIG IDEA

16. How are traits passed from generation to generation? Explain how dominant and recessive alleles interact to determine the expression of traits.

17. The photo below shows an albino offspring from a non-albino mother. If albinism is a recessive trait, what are the possible genotypes of the mother, the father, and the offspring?

Math Skills

Math Practice

Use Ratios

18. A cross between two heterozygous pea plants with yellow seeds produced 1,719 yellow seeds and 573 green seeds. What is the ratio of yellow to green seeds?

19. A cross between two heterozygous pea plants with smooth green pea pods produced 87 bumpy yellow pea pods, 261 smooth yellow pea pods, 261 bumpy green pea pods, and 783 smooth green pea pods. What is the ratio of bumpy yellow to smooth yellow to bumpy green to smooth green pea pods?

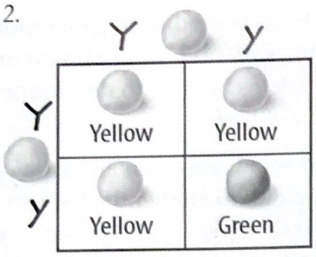
20. A jar contains three red, five green, two blue, and six yellow marbles. What is the ratio of red to green to blue to yellow marbles?

Standardized Test Practice

Record your answers on the answer sheet provided by your teacher or on a sheet of paper.

Multiple Choice

Use the diagram below to answer questions 1 and 2.



1 Which genotype belongs in the lower right square?

A YY
B Yy
C yY
D yy

2 What percentage of plants from this cross will produce yellow seeds?

A 25 percent
B 50 percent
C 75 percent
D 100 percent

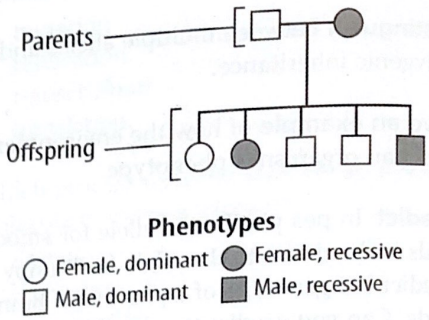
3 When Mendel crossed a true-breeding plant with purple flowers and a true-breeding plant with white flowers, ALL offspring had purple flowers. This is because white flowers are

A dominant.
B heterozygous.
C polygenic.
D recessive.

4 Which process copies an organism's DNA?

A mutation
B replication
C transcription
D translation

Use the chart below to answer question 5.



5 Based on the pedigree above, how many offspring from this cross had the recessive phenotype?

A 1
B 2
C 3
D 5

6 Which is NOT true of a hybrid?

A It has one recessive allele.
B It has pairs of chromosomes.
C Its genotype is homozygous.
D Its phenotype is dominant.

7 Alleles are different forms of a

A chromosome.
B gene.
C nucleotide.
D protein.

8 Which is true of an offspring with incomplete dominance?

A Both alleles can be observed in its phenotype.
B Every offspring shows the dominant phenotype.
C Multiple genes determine its phenotype.
D Offspring phenotype is a combination of the parents' phenotypes.

Use the diagrams below to answer question 9.

Before Replication

After Replication

9 The diagrams above show a segment of DNA before and after replication. Which occurred during replication?

A deletion

B insertion

C substitution

D translation

10 Which human characteristic is controlled by polygenic inheritance?

A blood type

B earlobe position

C eye color

D thumb shape

11 Mendel crossed a true-breeding plant with round seeds and a true-breeding plant with wrinkled seeds. Which was true of every offspring of this cross?

A They had the recessive phenotype.

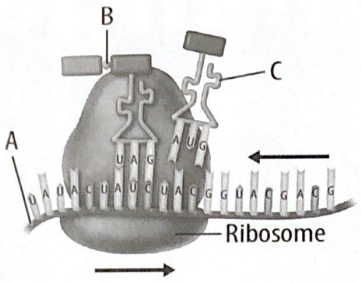
B They showed a combination of traits.

C They were homozygous.

D They were hybrid plants.

Constructed Response

Use the diagram below to answer questions 12 and 13.



12 Describe what is happening in the phase of translation shown in the diagram.

13 What are the three types of RNA in the diagram? How do these types work together during translation?

14 What is the importance of translation in your body?

15 Mendel began his experiments with true-breeding plants. Why was this important?

16 How did Mendel's experimental methods help him develop his hypotheses on inheritance?

17 What environmental factors affect the phenotypes of organisms other than humans? Provide three examples from nature. What factor, other than genes, affects human phenotype? Give two examples. Why is knowledge of this nongenetic factor helpful?

NEED EXTRA HELP?																	
If You Missed Question...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Go to Lesson...	2	2	1	3	2	1,2	2	2	3	2	1	3	3	3	1	1	2