Genetics: The Science of Heredity

Part B

The Cell and Inheritance
The DNA Connection

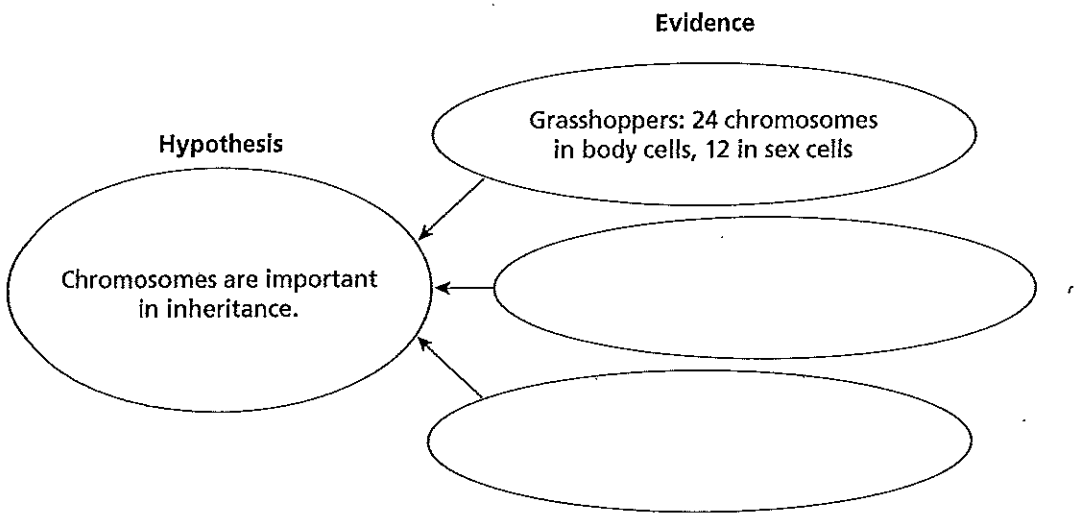
Name _____ Date _____ Class _____

The Cell and Inheritance (pp. 92–96)

This section describes how one set of chromosomes from each parent is passed on to the offspring.

Use Target Reading Skills

As you read, identify the evidence that supports the hypothesis that genes are found on chromosomes. Write the evidence in the graphic organizer below.



Chromosomes and Inheritance (p. 93)

1. Circle the letter of each sentence that is true about what Sutton observed about chromosome number.
   a. Grasshopper sex cells have half the number of chromosomes as body cells.
   b. Grasshopper body cells have half the number of chromosomes as sex cells.
   c. Grasshopper body cells and sex cells have the same number of chromosomes.
   d. When grasshopper sex cells join, the fertilized egg has the same number of chromosomes as the body cells of the parents.
2. What is the chromosome theory of inheritance?

_____

_____

_____

Meiosis (pp. 94–95)

3. What is meiosis?

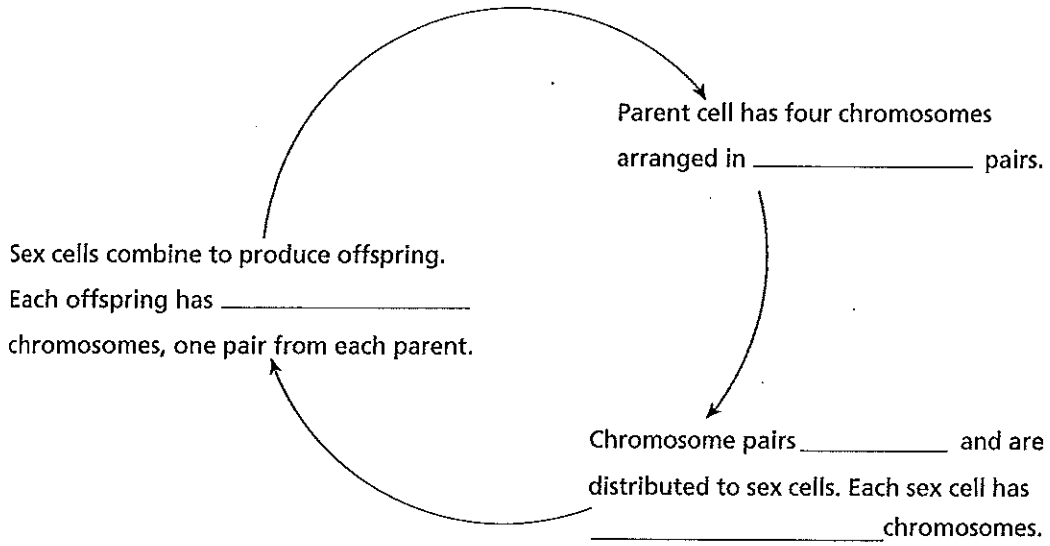
_____

_____

_____

The Cell and Inheritance *(continued)*

4. Complete the cycle diagram, which describes the events that occur during meiosis in an organism whose body cells have four chromosomes.



5. A Punnett square is a shorthand way to show the events that occur during _____.

6. Is the following sentence true or false? During meiosis, the two alleles for each gene stay together. _____

7. If the male parent cell is heterozygous for a trait, *Tt*, what alleles could the sperm cells possibly have?

_____

_____

A Lineup of Genes (p. 96)

8. How many pairs of chromosomes do human body cells contain?

_____

9. How are the genes lined up in a pair of chromosomes?

_____

_____

_____

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The Cell and Inheritance

Understanding Main Ideas

Complete the table below by filling in the spaces with the correct stage of meiosis—Beginning, Meiosis I, Meiosis II, End.

Event	Stage in Meiosis
The double-stranded chromosomes move to the center of the cell. The centromeres separate.	1. _____
Two cells form, each with half the number of chromosomes. Each chromosome still has two chromatids.	2. _____
Four sex cells form with half the number of chromosomes as the parental cells.	3. _____
The chromosomes are copied.	4. _____

Answer the following questions in the spaces provided.

5. What is the chromosome theory of inheritance?

_____

_____

6. Why is it important that sex cells have half the number of chromosomes as body cells?

_____

_____

_____

_____

_____

Building Vocabulary

Fill in the blank to complete the statement.

7. The process by which the number of chromosomes is reduced by half to form sex cells is called _____.

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The DNA Connection (pp. 97–103)

This section tells how the DNA molecule is related to genes, chromosomes, and the inheritance of traits.

Use Target Reading Skills

As you read, complete the flowchart below to show protein synthesis. Put the steps of the process in separate boxes in the flowchart in the order in which they occur.

Protein Synthesis

DNA provides code to form messenger RNA.

↓

Messenger RNA attaches to ribosome.

↓

↓

The Genetic Code (p. 98)

1. Circle the letter of each sentence that is true about genes, chromosomes, and proteins.
   a. Genes control the production of proteins in an organism's cells.
   b. Proteins help determine the size, shape, and other traits of an organism.
   c. Chromosomes are made up mostly of proteins.
   d. A single gene on a chromosome contains only one pair of nitrogen bases.

2. A DNA molecule is made up of these four nitrogen bases.
   a. _____ b. _____
   c. _____ d. _____

The DNA Connection *(continued)*

3. What is the genetic code?

_____

_____

_____

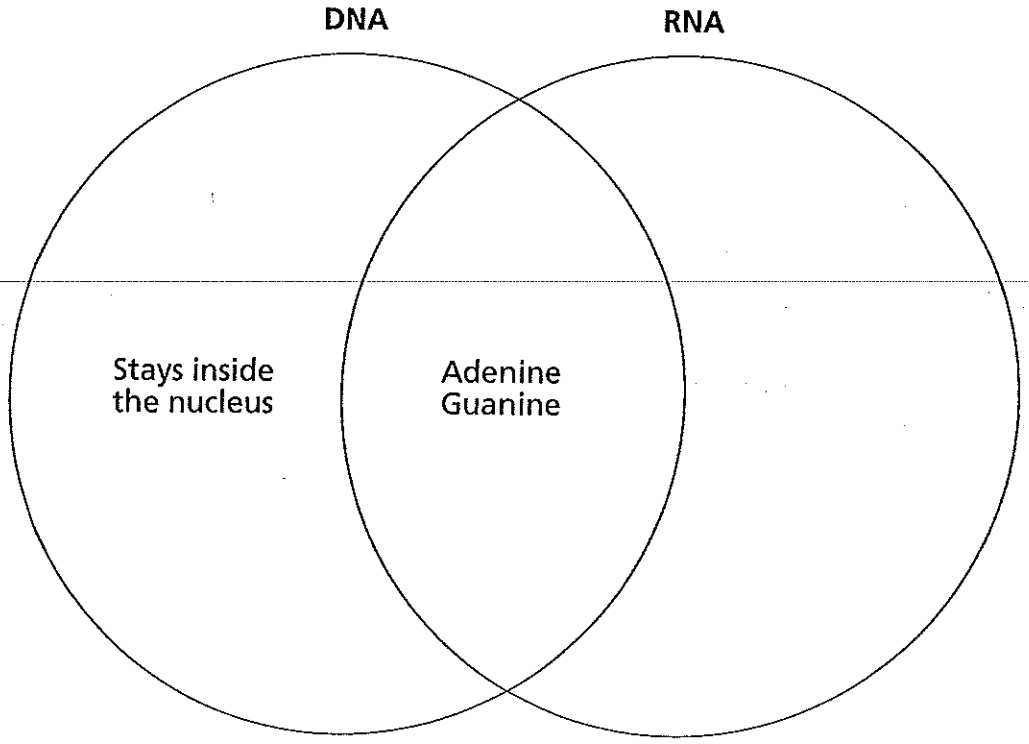
4. One group of three nitrogen bases codes for one _____.

How Cells Make Proteins (pp. 99–101)

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 this 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.



8. List the two kinds of RNA and tell 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 carries amino acids to the ribosome.
   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. 102–103)

11. What is a mutation?

   _____

   _____

   _____

12. How can mutations affect protein synthesis in cells?

   _____

   _____

   _____

   _____

The DNA Connection *(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 _____.

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The DNA Connection

Understanding Main Ideas

Complete the table below by stating whether each mutation is helpful, harmful, or neutral to the organism.

Mutation	Effect
White lemur (in a zoo)	1. _____
Cancer	2. _____
Antibiotic-resistant bacteria	3. _____
White lemur (in the wild)	4. _____

Answer the following questions on the lines provided.

5. Describe what occurs during protein synthesis.

_____

_____

_____

_____

_____

_____

6. What is the genetic code?

_____

_____

_____

Building Vocabulary

Fill in the blank to complete each statement.

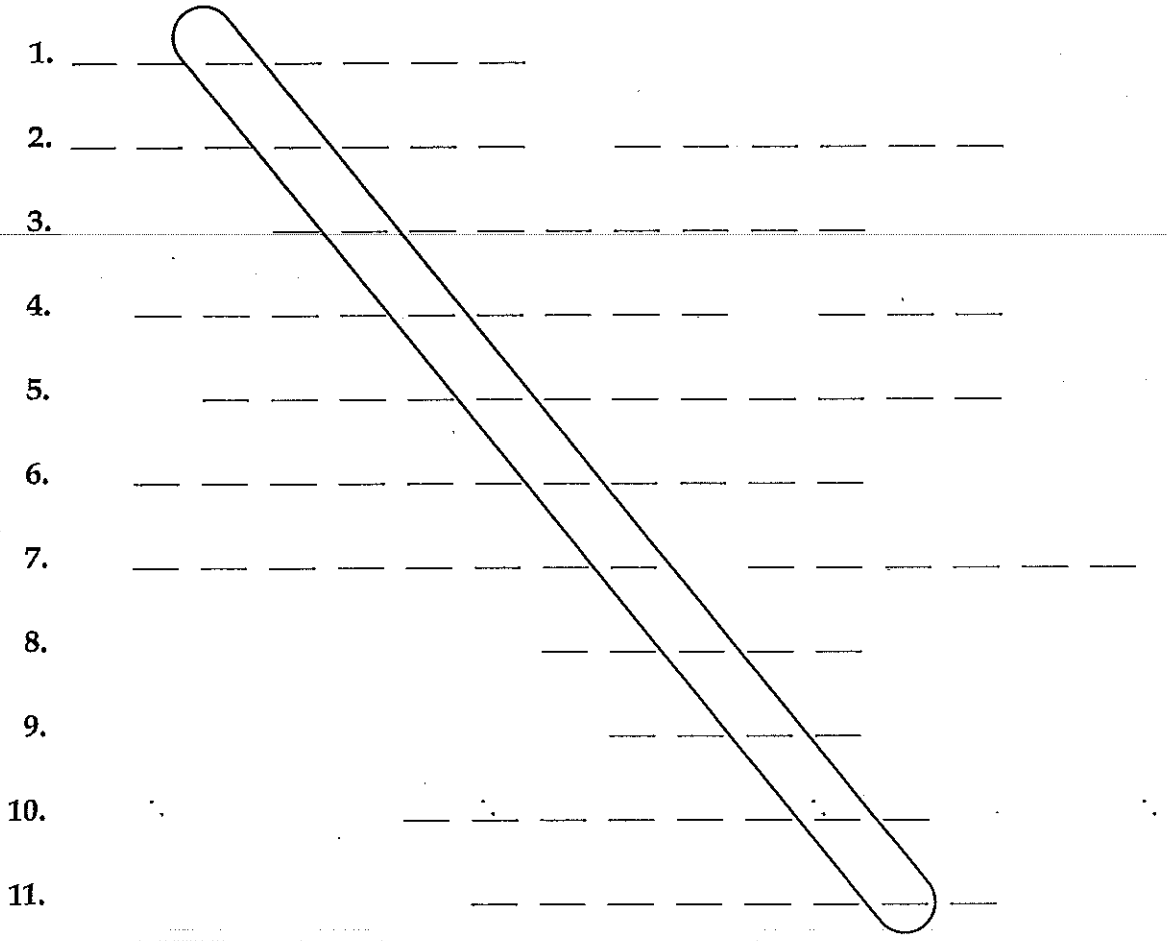
7. A type of RNA that carries amino acids and adds them to the growing protein is called _____.
8. _____ is RNA that copies the coded message from the DNA in the nucleus and carries the message into the cytoplasm.

Key Terms

Use the clues below to identify Key Terms from the chapter. Write the terms below, putting one letter in each blank. When you finish, the word enclosed in the diagonal lines will reveal what Mendel studied.

Clues

1. The process by which the number of chromosomes is reduced by half in sex cells
2. A chart that shows all possible allele combinations resulting from a genetic cross
3. An organism's physical appearance
4. RNA that is a copy of the DNA message
5. Describes an organism that has two different alleles for a trait
6. Number that describes the likelihood that a certain event will occur
7. An allele whose trait always shows up in the organism when the allele is present
8. Physical characteristic of an organism
9. A factor that controls a trait
10. The scientific study of heredity
11. Offspring of many generations that have the same trait



Name _____ Class _____ Date _____

Genetics Quiz 2 review

Know the most important difference between mitosis and meiosis:

Know the chromosome theory of inheritance:

Know why is it important that sex cells have half the number of chromosomes as body cells:

Know the process of protein synthesis:

Know how mutations can happen:

Know the genetic code:

Know the difference between messenger RNA and transfer RNA:

Be able to compare and contrast DNA and RNA:

Be able to describe in 4 steps process of protein synthesis: