

## Chapter 12 DNA and RNA

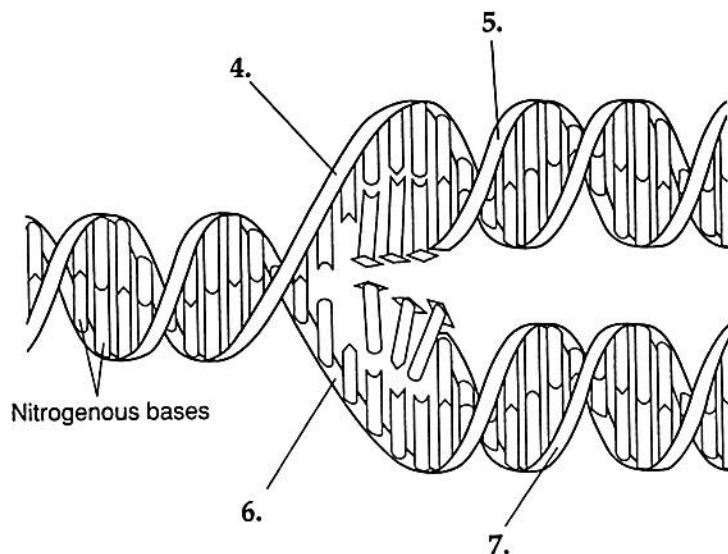
## Section Review 12-2

### Reviewing Key Concepts

**Completion** On the lines provided, choose the words that correctly complete the following sentences.

1. During DNA replication, the DNA molecule \_\_\_\_\_ (separates/combines) into two strands.
2. At the end of DNA replication, \_\_\_\_\_ (four/two) new strands of DNA have been produced, giving a total of \_\_\_\_\_ (four/six) strands of DNA.
3. New DNA is replicated in strands complementary to old DNA because production of new DNA follows the rules of \_\_\_\_\_ (base pairing/the double helix).

**Identifying Structures** On the lines corresponding to the numbers on the diagram, write whether the strand pointed to is an original strand or a new strand.



4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_

### Reviewing Key Skills

8. **Hypothesizing** The length of a bacterium's DNA may be 1000 times the length of the cell within which it is contained. Suggest an explanation for how this can occur.  
 \_\_\_\_\_  
 \_\_\_\_\_
9. **Comparing and Contrasting** How does the structure of a eukaryotic chromosome during mitosis differ from its structure during the rest of the cell cycle?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Chapter 12 DNA and RNA

## Section Review 12-3

### Reviewing Key Concepts

**Completion** *On the lines provided, complete the following sentences.*

1. The three main types of RNA are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. Copying part of a nucleotide sequence of DNA into a complementary sequence in RNA is called \_\_\_\_\_.
3. An enzyme that binds to DNA during transcription is RNA \_\_\_\_\_.
4. During the process of \_\_\_\_\_, the information carried by mRNA is used to produce proteins.
5. Each tRNA molecule contains three unpaired bases, called the \_\_\_\_\_, which ensure that amino acids are added in the correct sequence.

### Reviewing Key Skills

6. **Comparing and Contrasting** How are DNA and RNA similar? How are they different?  
\_\_\_\_\_  
\_\_\_\_\_

7. **Comparing and Contrasting** How are the three types of RNA different?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. **Hypothesizing** How would it benefit a cell to possess a sequence of DNA that could be transcribed and then edited into several different mRNA molecules?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. **Applying Concepts** What amino acid sequence would be produced from the mRNA sequence CGCUAUAGC?  
\_\_\_\_\_  
\_\_\_\_\_

10. **Applying Concepts** Suppose the DNA sequence GCTATATCG was changed to GCGATATCG. How would the products of transcription and translation be affected?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Chapter 12 DNA and RNA

## Section Review 12-4

### Reviewing Key Concepts

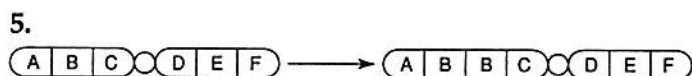
**Completion** On the lines provided, complete the following sentences.

- Genetic information is altered when changes in the DNA sequence, called \_\_\_\_\_, occur.
- Changes in the DNA sequence of a single gene are called \_\_\_\_\_.
- The DNA sequence of an entire chromosome is affected by a(an) \_\_\_\_\_.

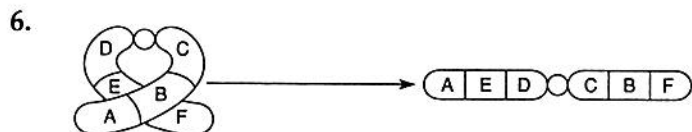
**Identifying Structures** On the lines provided, identify each diagram as one of the following mutations: translocation, inversion, duplication, deletion. Then, describe what happens during each mutation.



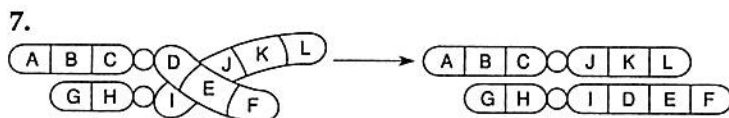
4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_



7. \_\_\_\_\_

### Reviewing Key Skills

- Comparing and Contrasting** How are frameshift and substitution mutations similar? How are they different?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Applying Concepts** How can polyploidy in plants benefit humans?  
\_\_\_\_\_  
\_\_\_\_\_
- Applying Concepts** Compare the original sequence GCA CCG AGA to the mutant sequence GCA CAC GAG and determine what type of mutation has occurred.  
\_\_\_\_\_

## Chapter 12 DNA and RNA

## Section Review 12-5

### Reviewing Key Concepts

**Short Answer** On the lines provided, answer the following questions.

1. What causes the *lac* genes in *E. coli* to turn off?  
\_\_\_\_\_
2. What causes the *lac* genes in *E. coli* to turn on?  
\_\_\_\_\_
3. Are most eukaryotic genes controlled individually or as groups?  
\_\_\_\_\_

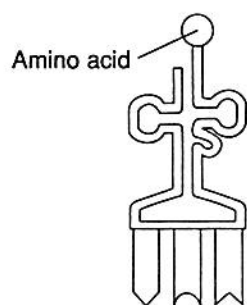
### Reviewing Key Skills

4. **Comparing and Contrasting** How are the regulatory sequences of prokaryotic and eukaryotic DNA similar? How are they different?  
\_\_\_\_\_  
\_\_\_\_\_
5. **Applying Concepts** Why does the complexity of gene regulation mirror the complexity of the organism in which it is found?  
\_\_\_\_\_  
\_\_\_\_\_
6. **Comparing and Contrasting** How does the DNA possessed by the cells of the different tissues of an organism differ from the DNA expressed by those cells?  
\_\_\_\_\_  
\_\_\_\_\_
7. **Applying Concepts** Explain the role of the *lac* operon in *E. coli*.  
\_\_\_\_\_  
\_\_\_\_\_
8. **Inferring** Explain the function of the TATA box.  
\_\_\_\_\_  
\_\_\_\_\_
9. **Comparing and Contrasting** Compare the role of *hox* genes in humans and fruit flies.  
\_\_\_\_\_  
\_\_\_\_\_
10. **Inferring** Given that 600 million years after they shared a common ancestor, mice and fruit flies possess developmental genes that are very similar, what can be inferred about the effect of mutation upon these genes?  
\_\_\_\_\_  
\_\_\_\_\_

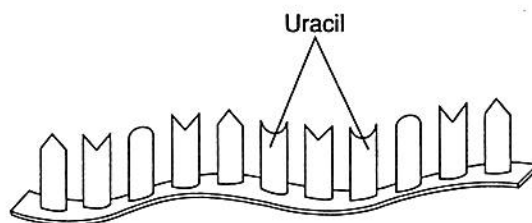
## Chapter 12 DNA and RNA

## Chapter Vocabulary Review

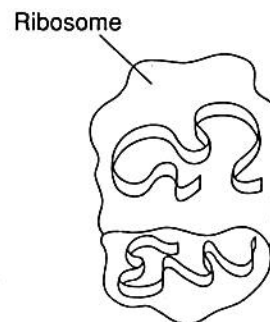
**Labeling Diagrams** On the lines provided, identify each kind of RNA.



1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_

**Matching** On the lines provided, write the letter of the answer that best matches each description.

- |                           |   |
|---------------------------|---|
| _____ 4. transformation   | a. process in which one strain of bacteria changes into another one                       |
| _____ 5. bacteriophage    | b. process in which DNA makes a copy of itself  |
| _____ 6. histone          | c. protein that DNA wraps around in eukaryotic chromosomes                                |
| _____ 7. replication      | d. virus that infects bacteria  |
| _____ 8. DNA polymerase   | e. signal in DNA that indicates to an enzyme where to bind to make RNA                    |
| _____ 9. promoter         | f. a change in the genetic material   |
| _____ 10. introns         | g. sections of RNA molecules that are removed before a eukaryotic gene becomes functional |
| _____ 11. codon           | h. a group of genes that operate together   |
| _____ 12. mutation        | i. three nucleotides that specify a single amino acid to be added to a polypeptide        |
| _____ 13. polyploidy      | j. process in which cells become specialized in structure and function                    |
| _____ 14. operon          | k. the principal enzyme involved in DNA replication                                       |
| _____ 15. differentiation | l. condition of having extra sets of chromosomes  |

**Completion** On the lines provided, complete the following sentences:

16. A(an) \_\_\_\_\_ is made up of three parts: a deoxyribose sugar, a phosphate group, and a nitrogenous base.
17. The principle of \_\_\_\_\_ states that hydrogen bonds can form only between certain bases in DNA.

18. Eukaryotic chromosomes contain both DNA and protein tightly packed together to form a substance called \_\_\_\_\_.
19. During the process of \_\_\_\_\_, RNA molecules are produced by copying part of the nucleotide sequence of DNA into a complementary sequence in RNA.
20. The enzyme that uses one strand of DNA as a template to assemble nucleotides into a strand of RNA is called \_\_\_\_\_.
21. After introns have been cut out of RNA molecules, the remaining pieces called \_\_\_\_\_ are spliced together.
22. The decoding of an mRNA message into a protein is known as \_\_\_\_\_.
23. The three bases on the tRNA molecule that are complementary to one of the mRNA codons are called a(an) \_\_\_\_\_.
24. When the *lac* repressor protein binds to the \_\_\_\_\_, the *lac* operon is turned off.
25. A series of genes, called the \_\_\_\_\_, controls the development of organs and tissues in various parts of an embryo.

**Chapter 12 DNA and RNA****Graphic Organizer****Flowchart**

*Using information from the chapter, complete the flowchart for DNA replication by arranging the events listed below in the order they occur.*

DNA polymerase joins individual nucleotides to produce a new strand; DNA molecule "unzips" and the two strands unwind; DNA polymerase proofreads the new strands; Unwound strands of DNA serve as templates for new DNA.

1.



2.



3.



4.