

CHAPTER 10 ACTIVE READING WORKSHEETS

DNA, RNA, AND PROTEIN SYNTHESIS

Section 10-3: DNA Replication

Read the passage below, which covers topics from your textbook.
Answer the questions that follow.

The process of DNA replication occurs in a series of steps. In step 1, enzymes called **helicases** separate the DNA strands. Helicases move along the DNA molecule, breaking hydrogen bonds between the complementary nitrogenous bases. This action allows the two DNA strands of the double helix to separate. The Y-shaped region that results when the two strands separate is called a **replication fork**. During step 2, enzymes called **DNA polymerases** add complementary nucleotides, found floating freely inside the nucleus, to each of the original strands. As the nucleotides on the newly forming strand are added, covalent bonds form between the deoxyribose sugar of one nucleotide and the phosphate group of the next nucleotide on the growing strand. Hydrogen bonds form between the complementary nitrogenous bases on the original and new strands. By step 3, DNA polymerases finish replicating the DNA and fall off. Two new DNA molecules have formed. Each molecule has one original strand and one new strand.

Read each question and write your answer in the space provided.

SKILL: Sequencing Information

1. What happens after a replication fork is formed? _____

2. What event begins the process of DNA replication? _____

Circle the letter of the word or phrase that best completes the statement.

3. Each new DNA molecule has
 - a. one new strand and one original strand.
 - b. two new strands.
 - c. two original strands.
 - d. None of the above

SECTION 10-3 REVIEW

DNA REPLICATION

VOCABULARY REVIEW Define the following terms.

1. replication fork _____

2. helicase _____

3. semi-conservative replication _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. Before replication can take place,
 - a. DNA polymerases must add complementary nucleotides to the DNA.
 - b. the two strands of DNA must separate.
 - c. the covalent bonds in DNA must break.
 - d. helicases must break the bonds in the nucleotides.
- _____ 2. Replication of the two DNA strands takes place
 - a. in two different directions.
 - b. in the same direction of the replication fork.
 - c. in a direction opposite to that of the replication fork.
 - d. at right angles to the direction of the replication fork.
- _____ 3. In replication in prokaryotes,
 - a. there are two origins.
 - b. two replication forks move in opposite directions.
 - c. replication proceeds in one direction.
 - d. there are no replication forks.
- _____ 4. A mutation is a
 - a. change in the direction of a replication fork.
 - b. form of cancer.
 - c. kind of DNA replication.
 - d. change in the nucleotide sequence of DNA.
- _____ 5. Which of the following enzymes is involved with breaking hydrogen bonds?

a. DNA polymerase	c. DNA helicase
b. DNA ligase	d. Both a and b

SHORT ANSWER Answer the questions in the space provided.

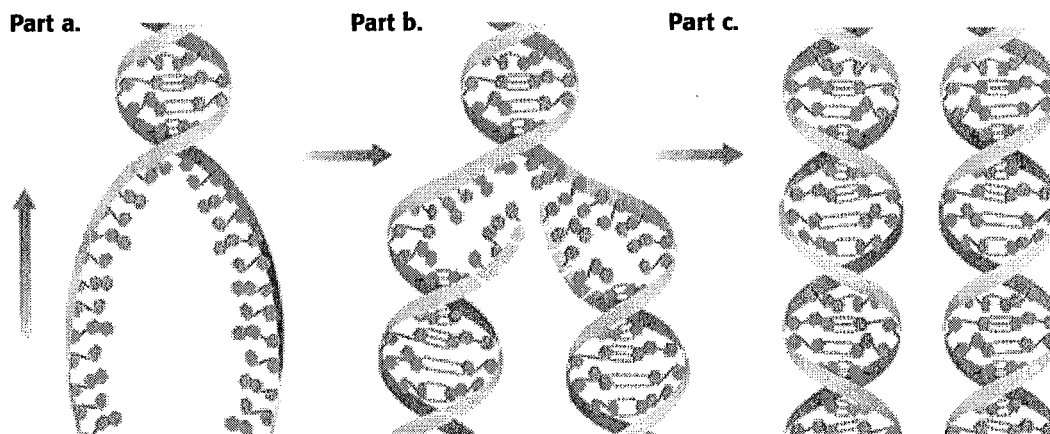
1. How does replication occur so quickly in eukaryotes?

2. Why is it important that exact copies of DNA are produced during replication?

3. How is DNA replication related to cancer?

4. **Critical Thinking** Why is it advantageous to have weak hydrogen bonds between complementary bases and strong covalent bonds between phosphate and deoxyribose groups in a DNA molecule?

STRUCTURES AND FUNCTIONS The figure below shows DNA replicating. In the space provided, describe what is occurring at each lettered section of the figure.



Part a. _____

Part b. _____

Part c. _____

Skills Worksheet

DNA, RNA, and Protein Synthesis

Complete the crossword puzzle using the clues provided.

ACROSS

2. five-carbon sugar found in DNA nucleotides
3. enzyme that adds nucleotides to exposed nitrogen bases
6. transfer of genetic material from one bacterium to another
8. The term *double* _____ is used to describe the shape of DNA.
10. a virus that infects bacteria
11. enzyme that separates DNA by breaking the hydrogen bonds that link the nitrogen bases
12. name for DNA subunit

DOWN

1. relationship of two DNA strands to each other
4. disease-causing
5. Base-_____ rules describe the arrangement of the nitrogen bases between two DNA strands.
7. the process by which DNA is copied
9. A replication _____ is the area that results after the double helix separates during replication.

