

# DNA Structure And Replication Worksheet Answer Key PDF

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## Part 1: Building a Foundation

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**What is the shape of the DNA molecule?**

undefined. A) Triple Helix

**undefined. B) Double Helix ✓**

undefined. C) Single Strand

undefined. D) Quadruple Helix

The DNA molecule is commonly described as a double helix.

**Which of the following are components of a nucleotide? (Select all that apply)**

**undefined. A) Sugar ✓**

**undefined. B) Phosphate Group ✓**

undefined. C) Lipid

**undefined. D) Nitrogenous Base ✓**

A nucleotide consists of a sugar, a phosphate group, and a nitrogenous base.

**Describe the base pair rule in DNA.**

**The base pair rule states that adenine pairs with thymine and cytosine pairs with guanine.**

**List the four nitrogenous bases found in DNA.**

1. 1st Base

**Adenine**

2. 2nd Base

**Thymine**

3. 3rd Base

**Cytosine**

4. 4th Base

**Guanine**

The four nitrogenous bases in DNA are adenine, thymine, cytosine, and guanine.

**In which direction does DNA polymerase synthesize a new strand?**

undefined. A) 3' to 5'

**undefined. B) 5' to 3' ✓**

undefined. C) 2' to 4'

undefined. D) 1' to 6'

DNA polymerase synthesizes a new strand in the 5' to 3' direction.

## Part 2: Understanding and Interpretation

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**Which enzyme is responsible for unwinding the DNA double helix during replication?**

undefined. A) Ligase

**undefined. B) Helicase ✓**

undefined. C) Primase

undefined. D) DNA Polymerase

Helicase is the enzyme responsible for unwinding the DNA double helix.

**What are the roles of DNA polymerase in replication? (Select all that apply)**

**undefined. A) Adding nucleotides to the new strand ✓**

undefined. B) Unwinding the DNA helix

**undefined. C) Proofreading the new DNA strand ✓**

undefined. D) Synthesizing RNA primers

DNA polymerase adds nucleotides, proofreads the new strand, and synthesizes RNA primers.

**Explain why DNA replication is described as semi-conservative.**

DNA replication is semi-conservative because each new DNA molecule consists of one original strand and one newly synthesized strand.

### Part 3: Application and Analysis

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If a DNA strand has the sequence 5'-ATCG-3', what will be the sequence of the complementary strand?

undefined. A) 5'-TAGC-3'

undefined. **B) 3'-TAGC-5'** ✓

undefined. C) 5'-CGAT-3'

undefined. D) 3'-CGAT-5'

The complementary strand will have the sequence 3'-TAGC-5'.

During DNA replication, which of the following processes occur on the lagging strand? (Select all that apply)

undefined. A) Continuous synthesis

undefined. **B) Formation of Okazaki fragments** ✓

undefined. **C) Use of RNA primers** ✓

undefined. **D) Joining of fragments by ligase** ✓

On the lagging strand, Okazaki fragments are formed, and RNA primers are used.

Describe a real-world scenario where errors in DNA replication could lead to genetic disorders.

Errors in DNA replication can lead to mutations that may cause genetic disorders such as cystic fibrosis or sick cell anemia.

Which statement best describes the relationship between the leading and lagging strands during DNA replication?

undefined. A) Both are synthesized continuously.

undefined. **B) The leading strand is synthesized continuously, while the lagging strand is synthesized in fragments.** ✓

undefined. C) Both are synthesized in fragments.

undefined. D) The leading strand is synthesized in fragments, while the lagging strand is synthesized continuously.

The leading strand is synthesized continuously, while the lagging strand is synthesized in fragments.

**Analyze the role of enzymes in DNA replication. Which of the following statements are true? (Select all that apply)**

undefined. **A) Helicase separates the DNA strands. ✓**

undefined. **B) Ligase joins Okazaki fragments. ✓**

undefined. C) Primase removes RNA primers.

undefined. **D) DNA polymerase synthesizes new DNA strands. ✓**

Helicase separates the DNA strands, ligase joins Okazaki fragments, and DNA polymerase synthesizes new DNA strands.

**Compare and contrast the roles of DNA polymerase and ligase in DNA replication.**

**DNA polymerase synthesizes new DNA strands and proofreads them, while ligase joins Okazaki fragments on the lagging strand.**

## Part 4: Evaluation and Creation

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**Which of the following scenarios would most likely result in a mutation during DNA replication?**

undefined. A) Helicase unwinds the DNA too slowly.

undefined. **B) DNA polymerase fails to proofread correctly. ✓**

undefined. C) Primase synthesizes too many primers.

undefined. D) Ligase joins fragments too quickly.

If DNA polymerase fails to proofread correctly, it is likely to result in a mutation.

**Evaluate the potential consequences of a malfunction in DNA ligase during replication. (Select all that apply)**

undefined. **A) Incomplete DNA strands ✓**

undefined. **B) Increased mutation rate ✓**

undefined. C) Continuous synthesis on the lagging strand

undefined. **D) Fragmentized DNA ✓**

A malfunction in DNA ligase could lead to incomplete DNA strands, increased mutation rates, and fragmented DNA.

**Propose a hypothetical experiment to test the efficiency of a new DNA polymerase variant in replicating DNA accurately.**

**An experiment could involve comparing the accuracy and speed of the new DNA polymerase variant against a standard polymerase using controlled conditions.**