

DNA Replication Quiz Answer Key PDF

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What are Okazaki fragments?

- A. Short RNA sequences
- B. Segments of DNA synthesized on the leading strand
- C. Segments of DNA synthesized on the lagging strand ✓**
- D. Enzymes involved in DNA replication

What is the role of primase in DNA replication?

- A. Repair mismatches
- B. Synthesizing DNA
- C. Synthesizing RNA primers ✓**
- D. Unwinding DNA

Which enzyme is responsible for joining Okazaki fragments?

- A. DNA Helicase
- B. DNA Ligase ✓**
- C. DNA Polymerase
- D. Primase

Which enzymes have proofreading abilities during DNA replication? (Select all that apply)

- A. DNA Polymerase ✓**
- B. DNA Ligase
- C. Primase
- D. DNA Helicase

Which strand is synthesized continuously during DNA replication?

A. Leading strand ✓

B. Lagging strand

C. Template strand

D. Coding strand

Which processes are part of the elongation phase of DNA replication? (Select all that apply)

A. Unwinding of DNA ✓

B. Synthesis of new DNA strands ✓

C. Joining of Okazaki fragments ✓

D. Termination of replication

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

A. DNA Ligase

B. DNA Helicase ✓

C. DNA Polymerase

D. Primase

Which of the following are involved in the initiation of DNA replication? (Select all that apply)

A. Origin of replication ✓

B. DNA Helicase ✓

C. DNA Ligase

D. RNA Primer ✓

What is the direction of DNA synthesis?

A. 3' to 5'

B. 5' to 3' ✓

C. 2' to 4'

D. 1' to 2'

Why is the directionality of DNA synthesis (5' to 3') crucial for the replication process?

DNA synthesis occurs in the 5' to 3' direction because DNA polymerases can only add nucleotides to the 3' end, which is essential for accurate replication.

What mechanisms are in place to correct errors during DNA replication, and why are they important?

The primary mechanisms for correcting errors during DNA replication include the proofreading activity of DNA polymerases, which can detect and remove incorrectly paired nucleotides, and the mismatch repair system, which identifies and repairs mismatches that escape proofreading. These mechanisms are crucial for preventing mutations that could lead to diseases such as cancer.

Explain the significance of the origin of replication in DNA replication.

The origin of replication is significant because it is the specific location on the DNA where replication begins, enabling the DNA polymerase and other necessary proteins to initiate the process of copying the genetic material.

Discuss the differences between the leading and lagging strands during DNA replication.

During DNA replication, the leading strand is synthesized continuously in the 5' to 3' direction towards the replication fork, whereas the lagging strand is synthesized in short, discontinuous segments (Okazaki fragments) in the 5' to 3' direction away from the fork.

Which of the following statements about the lagging strand are true? (Select all that apply)

- A. It is synthesized continuously.
- B. It is synthesized in short fragments. ✓**
- C. It requires multiple RNA primers. ✓**
- D. It is synthesized in the 3' to 5' direction.

What is the primary function of DNA polymerase during DNA replication?

- A. Unwinding the DNA strands
- B. Synthesizing RNA primers
- C. Adding nucleotides to the growing DNA strand ✓**
- D. Joining Okazaki fragments

Where does DNA replication occur in eukaryotic cells?

- A. Cytoplasm
- B. Nucleus ✓**
- C. Ribosome
- D. Mitochondria

Describe the role of DNA helicase and how it contributes to the replication process.

DNA helicase unwinds the DNA double helix by breaking the hydrogen bonds between the base pairs, facilitating the replication process by creating two single-stranded templates for DNA polymerase to synthesize new complementary strands.

Which factors ensure the fidelity of DNA replication? (Select all that apply)

- A. Proofreading by DNA polymerase ✓**
- B. Mismatch repair system ✓**
- C. RNA primer synthesis
- D. DNA ligase activity

How does the cell ensure that DNA replication occurs only once per cell cycle?

The cell uses mechanisms involving the origin recognition complex (ORC) and cyclin-dependent kinases (CDKs) to ensure that DNA replication occurs only once per cell cycle.

What are the roles of single-strand binding proteins (SSBs) in DNA replication? (Select all that apply)

- A. Stabilizing single-stranded DNA ✓**
- B. Synthesizing RNA primers
- C. Prevent re-annealing of DNA strands ✓**
- D. Catalyzing the formation of phosphodiester bonds