DNA REPLICATION AND DNA STORAGE PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. Which statement best describes the proofreading capability of DNA polymerases in prokaryotes?

A. DNA polymerases I and III have 3′ 5′ exonuclease proofreading

B. DNA polymerase II alone provides proofreading

C. No polymerase has proofreading

D. DNA polymerases I and II have 3′ 5′ exonuclease proofreading

2. Okazaki fragments are produced on which strand?

A. Lagging strand

B. Leading strand

C. Template strand

D. Coding strand

3. Which activity provides proofreading during DNA synthesis?

A. 5′ 3′ exonuclease activity of DNA polymerases.

B. Mismatch repair during S-phase.

C. 3′ 5′ exonuclease activity of DNA polymerases.

D. Topoisomerase activity.

4. The DNA that remains largely noncoding and repetitive constitutes the majority of the genome.

A. Ribosomal DNA

B. Protein-coding DNA

C. Repetitive DNA

D. Messenger RNA genes

5. During which specific phase of interphase is DNA replicated?

A. G1 Phase

B. S Phase

C. G2 Phase

D. M Phase

6. Which process fills gaps left after RNA primers are removed during replication?

A. Ligases alone seal the gaps.

B. Topoisomerases fill in with nucleotides.

C. DNA polymerases fill in the gaps with DNA and DNA ligase seals.

D. Primers are added again.

7. During DNA replication, the leading strand is best described as which of the following?

A. Synthesized 5′ to 3′ toward the fork

B. Synthesized 3′ to 5′ away from the fork

C. Made in short fragments called Okazaki fragments

D. Requires RNA primers to start each fragment

8. When DNA strands separate, what space forms that expands in both directions?

A. Replication fork

B. Transcription unit

C. Replication bubble

D. Helix

9. In which direction does DNA polymerase I primarily break down the RNA primer via exonuclease function?

A. 3′ 5′

B. Both directions

C. It does not break down primers

D. 5′ 3′

10. Which DNA replication enzyme has a 5′ 3′ exonuclease function to remove the primer?

A. DNA polymerase I

B. DNA polymerase II

C. DNA polymerase III

D. DNA ligase

Answers

1. B
2. A
3. C
4. C
5. B
6. C
7. A
8. C
9. D
10. A

Explanations

1. Which statement best describes the proofreading capability of DNA polymerases in prokaryotes?

A. DNA polymerases I and III have 3′ 5′ exonuclease proofreading

B. DNA polymerase II alone provides proofreading

C. No polymerase has proofreading

D. DNA polymerases I and II have 3′ 5′ exonuclease proofreading

Proofreading during prokaryotic DNA replication relies on 3′ 5′ exonuclease activity to remove mismatched nucleotides as synthesis occurs. The primary copying enzyme, DNA polymerase III, provides most of this proofreading through its exonuclease function, greatly boosting fidelity. DNA polymerase I also has 3′ 5′ exonuclease proofreading, though its main roles are removing RNA primers and filling in gaps after Okazaki fragments rather than bulk synthesis. DNA polymerase II does have proofreading capability, but it is mainly involved in DNA repair rather than serving as the sole replicative proofreading enzyme. So proofreading in bacteria is a collaborative effort, with Pol III doing the bulk of it and Pol I contributing, while Pol II offers an additional, supportive role rather than being the sole source of proofreading.

2. Okazaki fragments are produced on which strand?

A. Lagging strand

B. Leading strand

C. Template strand

D. Coding strand

DNA polymerase can only add nucleotides in the 5′ to 3′ direction. Because the two DNA strands run antiparallel, the strand oriented 3′ to 5′ toward the fork must be copied in short bursts as the fork opens. These short, newly made pieces are called Okazaki fragments. The other strand runs 5′ to 3′ toward the fork, so it can be synthesized continuously as the fork advances. Primase lays down RNA primers for each fragment, and later DNA ligase joins the fragments into a continuous strand. So Okazaki fragments form on the lagging strand, not the leading strand, and the terms template or coding strand are more relevant to transcription than to this replication concept.

3. Which activity provides proofreading during DNA synthesis?

A. 5′ 3′ exonuclease activity of DNA polymerases.

B. Mismatch repair during S-phase.

C. 3′ 5′ exonuclease activity of DNA polymerases.

D. Topoisomerase activity.

Proofreading during DNA synthesis is carried out by the 3′ 5′ exonuclease activity of DNA polymerases. As nucleotides are added in the 5′ 3′ direction, the polymerase checks the newly added base; if a mismatch is detected, its 3′ end is resected by the exonuclease domain, removing the incorrect nucleotide and a few preceding ones if needed. This allows the polymerase to reinsert the correct base and continue synthesis with high fidelity. In contrast, the 5′ 3′ exonuclease activity is mainly used to remove RNA primers or perform nick translation rather than proofreading the nascent strand. Mismatch repair operates after replication to fix errors on the newly synthesized strand, not during synthesis itself. Topoisomerase relieves torsional strain from supercoiling and does not participate in proofreading.

4. The DNA that remains largely noncoding and repetitive constitutes the majority of the genome.

A. Ribosomal DNA

B. Protein-coding DNA

C. Repetitive DNA

D. Messenger RNA genes

Many organisms have most of their DNA not encoding proteins. The bulk of the genome is made up of noncoding, repetitive sequences such as transposable elements, satellite DNA, and simple sequence repeats. These repetitive elements can exist in many copies, filling up the genome and making noncoding DNA the majority. Only a small fraction of the genome codes for proteins, and the genes that are transcribed into messenger RNA come from those coding regions. So the description points to repetitive DNA as the predominant component of the genome.

5. During which specific phase of interphase is DNA replicated?

A. G1 Phase

B. S Phase

C. G2 Phase

D. M Phase

DNA replication happens during the S phase of interphase. During this phase, the cell duplicates its entire genome, producing sister chromatids for each chromosome that stay connected at the centromere until mitosis. This doubling of DNA content ensures that, when the cell eventually divides, each daughter cell receives an identical set of chromosomes. The other interphase phases are for growth and preparation (G1 and G2), while mitosis (M phase) is when chromosomes are separated, not replicated.

6. Which process fills gaps left after RNA primers are removed during replication?

A. Ligases alone seal the gaps.

B. Topoisomerases fill in with nucleotides.

C. DNA polymerases fill in the gaps with DNA and DNA ligase seals.

D. Primers are added again.

When RNA primers are removed during replication, the gap is filled by DNA polymerases synthesizing DNA in place of the RNA. This DNA replacement creates a continuous strand, and then DNA ligase seals the remaining nick by forming the final phosphodiester bond. Ligase by itself can't add nucleotides to fill the gap, and topoisomerases don't insert DNA bases—they primarily relieve supercoiling. Primers are not re-added at this stage; they're replaced by DNA and then sealed to complete the strand.

7. During DNA replication, the leading strand is best described as which of the following?

A. Synthesized 5′ to 3′ toward the fork

B. Synthesized 3′ to 5′ away from the fork

C. Made in short fragments called Okazaki fragments

D. Requires RNA primers to start each fragment

The main idea here is that DNA polymerases add nucleotides only to the 3′ end, so new DNA grows in the 5′ to 3′ direction. At the replication fork, the template strand that runs 3′ to 5′ toward the fork allows continuous synthesis toward the fork, producing a leading strand. This continuous, forward synthesis in the 5′ to 3′ direction toward the fork is what makes the leading strand best described as such. In contrast, the lagging strand runs opposite, so it's made away from the fork in short Okazaki fragments, each needing a new RNA primer to start, which is why that description fits the lagging strand.

8. When DNA strands separate, what space forms that expands in both directions?

A. Replication fork

B. Transcription unit

C. Replication bubble

D. Helix

When DNA strands separate during replication, an expanding region of unpaired DNA forms called a replication bubble. This bubble grows in both directions as helicase unwinds at the origin and the two replication forks move outward from each end, exposing more parental DNA to be copied. The forks sit at the edges of this space, where new DNA synthesis occurs. In contrast, a transcription unit is the stretch of DNA that gets transcribed into RNA, and the helix simply refers to the double-stranded form of DNA. So the expanding space created by strand separation is the replication bubble.

9. In which direction does DNA polymerase I primarily break down the RNA primer via exonuclease function?

A. 3′ 5′

B. Both directions

C. It does not break down primers

D. 5′ 3′

During lagging-strand synthesis, the RNA primer must be removed and replaced with DNA. DNA polymerase I has a 5′ 3′ exonuclease activity that chews away RNA nucleotides starting from the primer's 5′ end, while its 3′ 5′ exonuclease activity handles proofreading of DNA. This 5′ 3′ exonuclease action is what clears the RNA primer, creating a gap that the polymerase activity fills with DNA, after which ligase seals the nick. Therefore, the primer is removed in the 5′ to 3′ direction. The 3′ 5′ direction is not used for primer removal, and primer removal is not bidirectional.

10. Which DNA replication enzyme has a 5′ 3′ exonuclease function to remove the primer?

A. DNA polymerase I

B. DNA polymerase II

C. DNA polymerase III

D. DNA ligase

During replication, the RNA primer that starts each short DNA segment must be removed and replaced with DNA. The enzyme that does this uses a 5′ to 3′ exonuclease activity to digest the RNA primer from its 5′ end, while its own polymerase activity adds the correct DNA in its place. This combination of primer removal and DNA synthesis is characteristic of DNA polymerase I in bacteria. After the primer is removed and the gap filled, DNA ligase seals the remaining nick to make a continuous strand. Other enzymes listed either lack this 5′ to 3′ exonuclease function, or their primary roles are proofreading or sealing nicks rather than primer removal, so they don't carry out this specific primer cleanup.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://dnareplicationdnastorage.examzify.com

We wish you the very best on your exam journey. You've got this!