DNA Replication and DNA Storage Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Table of Contents

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. A complex transposon will code for which extra features?

A. Replication and Antibiotic Resistance

B. Transcription Factors

C. Methylation Enzymes

D. Ribosomal RNA Genes

2. Which enzyme carries out primer removal in prokaryotic DNA replication via 5' to 3' exonuclease activity?

A. DNA polymerase II

B. DNA ligase

C. DNA polymerase I

D. DNA polymerase III

3. In DNA replication, which enzyme seals the sugar-phosphate backbone once replication is complete?

A. RNA primase

B. Helicase

C. DNA ligase

D. DNA polymerase

4. What is the result if transposons are inserted into another region?

A. Chromosomal Translocation

B. Mutation

C. Gene Amplification

D. No Effect

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

A. G1 Phase

B. S Phase

C. G2 Phase

D. M Phase

6. In which domain of organisms are DNA polymerases I, II and III present?

- **A. Prokaryotes**
- **B. Eukaryotes**
- **C. Archaea**
- **D. Viruses**

7. Okazaki fragments are produced on which strand?

- **A. Lagging strand**
- **B. Leading strand**
- **C. Template strand**
- **D. Coding strand**

8. Which chromatin contains a large amount of satellite DNA?

- **A. Euchromatin**
- **B. Heterochromatin**
- **C. Nucleosome Rich Chromatin**
- **D. Telomeric Chromatin**

9. Approximately how many genes are present in the human genome?

- **A. ~20,000**
- **B. ~30,000**
- **C. ~24,000**
- **D. ~40,000**

10. Which enzyme relieves torsional strain during replication?

- **A. Helicase**
- **B. Topoisomerase**
- **C. Primase**
- **D. DNA Ligase**

Answers

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

Explanations

1. A complex transposon will code for which extra features?

A. Replication and Antibiotic Resistance

B. Transcription Factors

C. Methylation Enzymes

D. Ribosomal RNA Genes

Complex transposons carry more than just the genes needed to move themselves; they can include additional cargo that helps the host adapt or survive. The most common extra features carried by these elements are antibiotic resistance genes, which let bacteria survive exposure to antibiotics when the transposon spreads to new genomes. In some cases, a complex transposon may also include genes that support its own propagation, such as replication-related or mobilization-related genes, reinforcing its ability to spread. This combination of mobility genes plus resistance or other useful cargo is what makes a complex transposon notable. Transcription factors are regulated proteins encoded by the host or captured by mobile elements, but they're not the classic cargo associated with complex transposons. Methylation enzymes and ribosomal RNA genes are not typical components carried by these elements: methyltransferases can exist in various contexts, but are not a defining feature of complex transposons, and ribosomal RNA genes are essential, large, and not commonly packaged into mobile elements because that would hinder their movement.

2. Which enzyme carries out primer removal in prokaryotic DNA replication via 5' to 3' exonuclease activity?

A. DNA polymerase II

B. DNA ligase

C. DNA polymerase I

D. DNA polymerase III

In prokaryotic DNA replication, RNA primers must be removed and replaced with DNA. The enzyme that handles this task uses 5' to 3' exonuclease activity to chew away the RNA primer from its 5' end while its own polymerase activity fills in the resulting gap with DNA—this coordinated activity is nick translation. That combination is a hallmark of DNA polymerase I, so it's the enzyme responsible for primer removal in this context. After the primer is replaced, DNA ligase seals the remaining nick. The other enzymes play different roles: DNA polymerase III primarily does the bulk DNA synthesis but doesn't remove primers with 5' to 3' exonuclease activity; DNA polymerase II is mainly involved in repair; and DNA ligase by itself only seals nicks without primer removal.

3. In DNA replication, which enzyme seals the sugar-phosphate backbone once replication is complete?

A. RNA primase

B. Helicase

C. DNA ligase

D. DNA polymerase

Sealing the sugar-phosphate backbone after replication is accomplished by DNA ligase. On the lagging strand, DNA is synthesized in short fragments called Okazaki fragments. After these fragments are extended and RNA primers are removed and replaced with DNA, ligase steps in to join the ends, forming the final phosphodiester bonds that create a continuous backbone. The other enzymes have different roles: RNA primase builds the primers needed to start synthesis, helicase unwinds the double helix, and DNA polymerase adds nucleotides to grow the new strands but cannot connect fragment ends by itself. DNA ligase is the enzyme that completes the job by sealing those remaining nicks.

4. What is the result if transposons are inserted into another region?

A. Chromosomal Translocation

B. Mutation

C. Gene Amplification

D. No Effect

When a transposon moves into a new genomic region, it changes the DNA sequence at that location or alters how that region is regulated. That kind of change is a mutation—the DNA has been altered from its original state. If the insertion lands inside a gene, it can disrupt the coding sequence and disrupt the protein, often causing loss or change of function. If it inserts into a promoter or enhancer, it can change how much or when the gene is expressed. Even if the insertion ends up in a noncoding stretch that doesn't immediately affect a gene, it still represents a genomic change, i.e., a mutation. Other scenarios like swapping chromosome segments between regions (translocation) or simply increasing gene copy number (amplification) describe different phenomena and are not the direct consequence of a single insertion event. So the result of a transposon inserting into another region is best described as a mutation.

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. In which domain of organisms are DNA polymerases I, II and III present?

A. Prokaryotes

B. Eukaryotes

C. Archaea

D. Viruses

Understanding how DNA replication enzymes differ among organisms helps explain why this trio points to prokaryotes. In bacteria, the replicative workhorse is DNA polymerase III, which builds the new DNA strands. DNA polymerase I then handles removing RNA primers used to start synthesis and fills in the resulting gaps with DNA. DNA polymerase II mainly participates in DNA repair and can act as a backup polymerase when needed. In contrast, eukaryotes use different polymerases for replication (such as alpha, delta, and epsilon) and mitochondria (gamma), and archaea rely on their own distinct polymerases. So, the presence of DNA polymerases I, II, and III reflects the bacterial (prokaryotic) replication system, making prokaryotes the best answer.

7. 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.

8. Which chromatin contains a large amount of satellite DNA?

A. Euchromatin

B. Heterochromatin

C. Nucleosome Rich Chromatin

D. Telomeric Chromatin

Satellite DNA is made up of many tandem repeats of short DNA motifs that are highly abundant in the centromeric and pericentromeric regions of chromosomes. Those regions are packaged as constitutive heterochromatin, which is densely packed, generally transcriptionally silent, and enriched with repetitive DNA and specific chromatin marks that keep it compact. Euchromatin, by contrast, is gene-rich and more open, with far fewer repeats. Telomeric chromatin has telomere-specific repeats, not the abundant satellite DNA characterizing centromeric regions. So the chromatin containing a large amount of satellite DNA is heterochromatin.

9. Approximately how many genes are present in the human genome?

A. ~20,000

B. ~30,000

C. ~24,000

D. ~40,000

The question is probing how many genes the human genome contains. Gene counting depends on what you include as a gene (protein-coding genes and various noncoding RNA genes), and the numbers reported have shifted a bit with newer annotations. A widely cited figure for the number of genes in humans sits in the 20,000 to 25,000 range, with about 24,000 often used as a representative total. That makes about 24,000 the best fit among the options because it lands right in the commonly cited ballpark. The other numbers are further from the typical annotated gene counts: around 20,000 is plausible for protein-coding genes, but including noncoding RNA genes pushes the total higher, and 30,000 or 40,000 would be considered overestimates given standard annotations.

10. Which enzyme relieves torsional strain during replication?

A. Helicase

B. Topoisomerase

C. Primase

D. DNA Ligase

Torsional strain ahead of the replication fork is relieved by a topoisomerase. As helicase unwinds the DNA, the remaining helix becomes increasingly twisted, creating positive supercoiling that would hinder progression. Topoisomerase relieves this by briefly cutting one strand (or both strands in the larger class), letting the DNA rotate and unwind the excess twist, then resealing the breaks. This prevents stalling and keeps replication moving. The other enzymes have different roles: primase lays down RNA primers, DNA polymerase builds the new strand, and DNA ligase seals nicks after fragments are joined.

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!