

# DNA History, Replication, and Protein Synthesis Practice Test (Sample)

## Study Guide



**Everything you need from our exam experts!**

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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

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- 1. The base pairing observed in DNA is due to which type of bonds between bases?**
  - A. Hydrogen bonds**
  - B. Ionic bonds**
  - C. Covalent bonds**
  - D. Metallic bonds**
  
- 2. Which of the following is a nucleic acid?**
  - A. DNA**
  - B. RNA**
  - C. Both DNA and RNA**
  - D. Neither**
  
- 3. Translation is defined as which of the following?**
  - A. The process where genetic information coded in mRNA directs the formation of a specific protein at a ribosome**
  - B. The process where DNA is copied into RNA**
  - C. The process of RNA splicing**
  - D. The process of DNA replication**
  
- 4. What are the four bases of DNA?**
  - A. Adenine, Thymine, Guanine, Cytosine**
  - B. Adenine, Uracil, Guanine, Cytosine**
  - C. Adenine, Thymine, Cytosine, Guanine**
  - D. Thymine, Adenine, Cytosine, Guanine**
  
- 5. Which molecule carries the genetic message from DNA to the ribosome?**
  - A. mRNA**
  - B. tRNA**
  - C. rRNA**
  - D. DNA**

- 6. RNA is best described as which of the following?**
- A. Ribonucleic acid that carries information from DNA to ribosomes**
  - B. A protein that catalyzes reactions**
  - C. A deoxyribonucleic acid variant**
  - D. A lipid involved in signaling**
- 7. Which type of bonds hold the two strands of DNA together between complementary base pairs?**
- A. Hydrogen bonds between complementary bases**
  - B. Covalent bonds within a nucleotide**
  - C. Ionic bonds between phosphate groups**
  - D. Metallic bonds in the DNA backbone**
- 8. Which includes the bases Guanine, Cytosine and Adenine?**
- A. DNA**
  - B. RNA**
  - C. Both DNA and RNA**
  - D. Neither**
- 9. Transcription takes place here (in a eukaryotic cell).**
- A. Nucleus**
  - B. Cytoplasm**
  - C. Mitochondria**
  - D. Ribosome**
- 10. In the context of this material, which process copies the DNA sequence into a messenger RNA?**
- A. Transcription**
  - B. Translation**
  - C. Replication**
  - D. Transduction**

## Answers

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

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## **Explanations**

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1. The base pairing observed in DNA is due to which type of bonds between bases?

- A. Hydrogen bonds**
- B. Ionic bonds**
- C. Covalent bonds**
- D. Metallic bonds**

Base pairing observed in DNA is due to hydrogen bonds between the bases. These are weak, noncovalent attractions that form between a hydrogen attached to a electronegative atom (like nitrogen or oxygen) and a lone pair on another electronegative atom. In DNA, adenine forms two hydrogen bonds with thymine, and guanine forms three hydrogen bonds with cytosine. This arrangement gives the precise A-T and G-C pairing and provides just the right balance of strength: stable enough to hold the two strands together, yet flexible enough to separate during replication and transcription. Covalent bonds would lock bases in place and prevent strand separation, ionic bonds aren't the type of interaction that occurs between uncharged bases in the DNA interior, and metallic bonds aren't relevant to biological molecules.

2. Which of the following is a nucleic acid?

- A. DNA**
- B. RNA**
- C. Both DNA and RNA**
- D. Neither**

Nucleic acids are the molecules that carry genetic information, built from nucleotides connected into long chains. DNA and RNA are both nucleic acids because each is a polymer of nucleotides with a sugar-phosphate backbone and bases. DNA uses deoxyribose and thymine, usually forming a double helix to store genetic information. RNA uses ribose and uracil, and it functions mainly in translating that information into proteins and in various other roles in the cell. The important point is that both types fit the definition of nucleic acids, so both are correct. Choosing only one type would overlook the other, and saying neither type exists contradicts well-established biology.

3. Translation is defined as which of the following?

- A. The process where genetic information coded in mRNA directs the formation of a specific protein at a ribosome**
- B. The process where DNA is copied into RNA**
- C. The process of RNA splicing**
- D. The process of DNA replication**

Translation is the process by which the information encoded in mRNA is used to build a protein at the ribosome. The ribosome reads each three-nucleotide codon on the mRNA, and a matching tRNA brings in the corresponding amino acid. As the ribosome moves along, amino acids are linked together by peptide bonds to form a growing polypeptide chain, which eventually folds into a functional protein. The start codon (AUG) sets the reading frame and codes for methionine, while stop codons signal termination of the protein. This differs from transcription, which copies DNA into RNA; RNA splicing, which removes introns from RNA; and DNA replication, which duplicates the DNA genome.

#### 4. What are the four bases of DNA?

- A. Adenine, Thymine, Guanine, Cytosine**
- B. Adenine, Uracil, Guanine, Cytosine**
- C. Adenine, Thymine, Cytosine, Guanine**
- D. Thymine, Adenine, Cytosine, Guanine**

DNA is built from four bases: adenine, thymine, guanine, and cytosine. In the DNA double helix, adenine pairs with thymine and guanine pairs with cytosine. Thymine is used in DNA, while RNA uses uracil instead of thymine. So the correct answer lists exactly these four bases—adenine, thymine, guanine, and cytosine. An option that includes uracil would describe RNA, not DNA, which is why this set is the best representation of DNA's bases.

#### 5. Which molecule carries the genetic message from DNA to the ribosome?

- A. mRNA**
- B. tRNA**
- C. rRNA**
- D. DNA**

The message from DNA to the ribosome is carried by messenger RNA. During transcription, the DNA sequence is copied into mRNA, which then travels to the ribosome. There, the codons on mRNA are read to determine the order of amino acids to be linked into a protein, with transfer RNA delivering the correct amino acids and ribosomal RNA forming the ribosome itself. DNA stores the information, but it is the mRNA that acts as the actual messenger to the ribosome.

#### 6. RNA is best described as which of the following?

- A. Ribonucleic acid that carries information from DNA to ribosomes**
- B. A protein that catalyzes reactions**
- C. A deoxyribonucleic acid variant**
- D. A lipid involved in signaling**

RNA is the ribonucleic acid that carries genetic information from DNA to the ribosome to guide protein synthesis. In cells, DNA holds the genetic blueprint, and messenger RNA copies that code during transcription. This mRNA then travels to ribosomes, where it serves as the template that determines the sequence of amino acids in a growing protein. That makes the statement describing RNA as a ribonucleic acid that transfers information from DNA to ribosomes the best choice. The other descriptions refer to a protein (not RNA), to DNA (deoxyribonucleic acid) rather than RNA, or to a lipid (RNA is not a lipid).

7. Which type of bonds hold the two strands of DNA together between complementary base pairs?

- A. Hydrogen bonds between complementary bases**
- B. Covalent bonds within a nucleotide**
- C. Ionic bonds between phosphate groups**
- D. Metallic bonds in the DNA backbone**

The two DNA strands are held together by hydrogen bonds formed between complementary bases on opposite strands. These hydrogen bonds are enough to keep the strands paired yet allow them to separate when DNA is replicated or transcribed. Adenine pairs with thymine using two hydrogen bonds, while guanine pairs with cytosine using three hydrogen bonds, which also helps explain why GC-rich regions are a bit more stable. The backbone of each strand is made up of covalent phosphodiester bonds linking sugar and phosphate units; these bonds hold each strand together but do not connect the two strands to each other. Ionic bonds between phosphate groups aren't the main force keeping the strands together, and metallic bonds aren't present in DNA. So the key interaction between the strands is hydrogen bonding between complementary bases.

8. Which includes the bases Guanine, Cytosine and Adenine?

- A. DNA**
- B. RNA**
- C. Both DNA and RNA**
- D. Neither**

Guanine, cytosine, and adenine are three of the four nitrogenous bases found in nucleic acids. In DNA, the bases are adenine, thymine, cytosine, and guanine. In RNA, the bases are adenine, uracil, cytosine, and guanine. The bases adenine, cytosine, and guanine occur in both DNA and RNA, while thymine is unique to DNA and uracil to RNA. Therefore, because these three bases are present in both types of nucleic acids, the statement that includes Guanine, Cytosine, and Adenine is true for both DNA and RNA.

9. Transcription takes place here (in a eukaryotic cell).

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

Transcription uses DNA as a template to make RNA, and in a eukaryotic cell this work happens inside the nucleus because that's where the DNA resides and where the RNA polymerase machinery operates. After transcription, the RNA is processed in the nucleus (capping, splicing, and polyadenylation) before it exits to the cytoplasm to be translated. Translation, by contrast, occurs on ribosomes in the cytoplasm or on the rough endoplasmic reticulum. While mitochondria do conduct some transcription within that organelle, the main site for transcribing the nuclear genome is the nucleus, making it the best answer.

**10. In the context of this material, which process copies the DNA sequence into a messenger RNA?**

**A. Transcription**

**B. Translation**

**C. Replication**

**D. Transduction**

Transcribing DNA into messenger RNA is transcription. In this process, RNA polymerase binds to a gene's promoter, unwinds the DNA, and uses one DNA strand as a template to synthesize a complementary RNA molecule. The produced mRNA carries the genetic message from the nucleus to ribosomes in the cytoplasm, where it is read during translation to build a protein. Translation is the step that uses the mRNA to assemble amino acids, replication copies DNA to DNA for cell division, and transduction refers to DNA transfer via a virus, not RNA synthesis from DNA.

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## 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](mailto:hello@examzify.com).**

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

**<https://dnahistoryproteinsynthesis.examzify.com>**

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

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