DNA, RNA, Protein and Mutations Practice Test (Sample)

Study Guide

BY EXAMZIFY

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

1. What is the mRNA strand for the DNA sequence TCG ATT CGA CGC?

A. AGC UAA GCU GCG

B. ACG UAA GCU GCG

C. AGC UAG GCU GCG

D. AGC UUU GCU GCG

2. What is a codon?

A. A nucleotide triplet that codes for a sugar

B. A group of 3 DNA bases that codes for one amino acid

C. A group of 3 RNA bases that codes for one amino acid

D. A sequence of 3 amino acids

3. Which type of RNA carries the genetic message from the nucleus to the ribosome?

A. mRNA

B. tRNA

C. rRNA

D. snRNA

4. What is the complementary DNA strand for the sequence ATC GCA TGG ATCG?

A. TAG CGT ACC TAGC

B. ATC GCA TGG ATCG

C. TCG ATT CGA CGA

D. TAG CGA ACC TCG

5. Which process writes an RNA copy based on a DNA template?

A. Transcription

B. Translation

C. Replication

D. Splicing

6. What is the Central Dogma of Biology?

A. Protein → RNA → DNA

B. RNA → DNA → Protein

C. DNA → RNA → Protein

D. DNA → Protein → RNA

7. If a codon that codes for glycine becomes a codon for alanine, this is

A. Missense mutation

B. Nonsense mutation

C. Silent mutation

D. Frameshift mutation

8. Which molecule can exit the nucleus to participate in protein synthesis?

A. DNA

B. mRNA

C. tRNA

D. rRNA

9. What type of bond holds bases together?

A. Peptide bonds

B. Covalent bonds

C. Ionic bonds

D. Hydrogen bonds

10. Which mutation can occur without changing the amino acid due to codon redundancy?

A. Silent Mutation

B. Substitution Mutation

C. Inversion Chromosomal Mutation

D. Translocation Chromosomal Mutation

Answers

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

Explanations

1. What is the mRNA strand for the DNA sequence TCG ATT CGA CGC?

A. AGC UAA GCU GCG

B. ACG UAA GCU GCG

C. AGC UAG GCU GCG

D. AGC UUU GCU GCG

Transcription makes an mRNA sequence that is complementary to the DNA template strand, with uracil replacing thymine. The given DNA is the template strand, read 3' to 5'. Map each base: T pairs with A, C with G, G with C, A with U. Doing this across TCG ATT CGA CGC yields AGC UAA GCU GCG in the correct 5' to 3' direction. The middle segment ATT becomes UAA in mRNA, which is a stop codon in translation but doesn't affect transcription. The other sequence options don't follow the required base-pairing for this template strand.

2. What is a codon?

A. A nucleotide triplet that codes for a sugar

B. A group of 3 DNA bases that codes for one amino acid

C. A group of 3 RNA bases that codes for one amino acid

D. A sequence of 3 amino acids

A codon is a three-nucleotide unit in mRNA that specifies a single amino acid to be added during protein synthesis. The ribosome reads mRNA in these triplets, using the genetic code to determine which amino acid to incorporate. Because codons are in RNA, they use uracil (U) instead of thymine (T). While several codons can code for the same amino acid, each codon targets one amino acid (or signals to start/stop translation). The other options describe incorrect premises: a codon is not a triplet that codes for a sugar, not a group of DNA bases, and not a sequence of amino acids.

3. Which type of RNA carries the genetic message from the nucleus to the ribosome?

A. mRNA

B. tRNA

C. rRNA

D. snRNA

Messenger RNA carries the genetic message from the nucleus to the ribosome. In transcription, the DNA template is used to synthesize a complementary mRNA strand, which then exits the nucleus and travels to the cytoplasm. At the ribosome, the sequence of codons in mRNA directs which amino acids are added, with tRNA delivering each amino acid according to the anticodon it contains. The other RNA types have different roles: tRNA shuttles amino acids to the ribosome, rRNA forms the core of the ribosome and helps catalyze peptide bond formation, and snRNA participates in splicing of pre-mRNA in the nucleus.

4. What is the complementary DNA strand for the sequence ATC GCA TGG ATCG?

A. TAG CGT ACC TAGC

B. ATC GCA TGG ATCG

C. TCG ATT CGA CGA

D. TAG CGA ACC TCG

Base pairing rules determine complementary strands: A pairs with T and C pairs with G. To build the complementary strand, replace each base in the given sequence with its partner in the same order: A→T, T→A, C→G, G→C. Doing this for ATCG CGA TGG ATCG yields TAGCGTACCTAGC. That sequence matches the option starting with TAGCGTACCTAGC, which is why it's the correct complement. The other sequences don't fit because they either repeat the original sequence, have incorrect length, or mix bases in a way that doesn't follow the A↔T and C↔G pairing.

5. Which process writes an RNA copy based on a DNA template?

A. Transcription

B. Translation

C. Replication

D. Splicing

Transcription is the process of making an RNA copy from a DNA template. During transcription, RNA polymerase binds to a gene's promoter, reads the DNA sequence, and builds an RNA strand in the 5' to 3' direction using ribonucleoside triphosphates. The resulting RNA is complementary to the DNA template (with uracil replacing thymine) and can become mRNA, tRNA, or rRNA used by the cell. This is different from replication, which copies DNA; translation, which uses RNA to synthesize proteins; and splicing, which edits RNA after transcription.

6. What is the Central Dogma of Biology?

A. Protein → RNA → DNA

B. RNA → DNA → Protein

C. DNA → RNA → Protein

D. DNA → Protein → RNA

Genetic information in cells moves in a fixed direction: DNA → RNA → Protein. First, transcription copies a gene's DNA sequence into messenger RNA, using RNA polymerase. Then translation uses that mRNA as a blueprint to assemble a chain of amino acids into a protein on a ribosome, with the help of transfer RNAs. This two-step flow explains how genetic information stored in DNA ultimately produces the functional molecules—proteins—that drive most cellular tasks. There are special cases, like retroviruses, where RNA is reverse-transcribed into DNA, but for the typical cellular pathway the direction remains DNA to RNA to Protein.

7. If a codon that codes for glycine becomes a codon for alanine, this is

A. Missense mutation

B. Nonsense mutation

C. Silent mutation

D. Frameshift mutation

Changing a codon to code for a different amino acid produces a missense mutation. Here, one nucleotide change makes the glycine codon specify alanine instead, so the protein would incorporate a different amino acid at that position. It's not a silent mutation because the amino acid actually changes, not stays the same; it's not a nonsense mutation because no stop codon is created; and it's not a frameshift because the reading frame of all downstream codons isn't altered. In this case, a single-nucleotide substitution (glycine codon to alanine codon) alters the protein sequence, which is the essence of a missense mutation.

8. Which molecule can exit the nucleus to participate in protein synthesis?

A. DNA

B. mRNA

C. tRNA

D. rRNA

The key idea is that the genetic message must leave the nucleus to be read and used for building protein. In eukaryotic cells, DNA stays inside the nucleus, and a copy of its information is transcribed into messenger RNA. This messenger RNA is processed and then exits the nucleus through nuclear pores into the cytoplasm, where a ribosome reads its codons and translates them into a chain of amino acids to form a protein. While other RNA types like tRNA and rRNA are also involved in translation, they are part of the machinery or deliver amino acids rather than carrying the instruction from DNA to be read by the ribosome. So the molecule that exits the nucleus to participate in protein synthesis as the information carrier is the messenger RNA.

9. What type of bond holds bases together?

A. Peptide bonds

B. Covalent bonds

C. Ionic bonds

D. Hydrogen bonds

Bases in DNA are held together by hydrogen bonds. These are relatively weak, non-covalent attractions that form between complementary bases: adenine pairs with thymine via two hydrogen bonds, and guanine pairs with cytosine via three hydrogen bonds. This arrangement provides enough stability to keep the double helix intact, yet allows the strands to separate during replication and transcription. Peptide bonds connect amino acids in proteins, covalent bonds form the backbone within molecules, and ionic bonds involve full charges between ions—none of these are what couples the base pairs in DNA.

10. Which mutation can occur without changing the amino acid due to codon redundancy?

A. Silent Mutation

B. Substitution Mutation

C. Inversion Chromosomal Mutation

D. Translocation Chromosomal Mutation

Codon redundancy in the genetic code means that several codons can specify the same amino acid. A mutation that changes one codon to another synonymous codon leaves the amino acid sequence unchanged, so the protein is the same even though the DNA sequence differs. For example, glycine is encoded by GGU, GGC, GGA, and GGG; changing GGU to GGC keeps glycine in place, so there's no change in the protein. Other types involve changes that can alter the amino acid or disrupt gene structure: a substitution mutation can lead to a different amino acid or a stop codon, while inversions and translocations rearrange larger chromosome segments and often disrupt gene order or dosage. Therefore, the silent mutation is the one that can occur without changing the amino acid due to codon redundancy.

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://dnarnaproteinmutations.examzify.com

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