DNA Biology 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

1. **How many different amino acids are used to build proteins in living organisms?**

   A. 4

   B. 20

   C. 64

   D. 21

2. **Which statement about X chromosome dosage in mammals is true?**

   A. It balances gene dosage by activating both X chromosomes

   B. It only affects autosomal genes

   C. It equalizes gene dosage between males and females

   D. It increases gene dosage in females

3. **Where does the assembly of transcription factors begin?**

   A. Downstream from the transcription start site

   B. Upstream from the transcription start site

   C. At the terminator

   D. Within the coding region

4. **Which statement about the Xist gene is true?**

   A. It is located in the Xic region of the X chromosome and it encodes an RNA that coats an X chromosome to promote compaction

   B. It is located on the Y chromosome and encodes a protein involved in sex determination

   C. It encodes a tRNA involved in translation

   D. It is not involved in X inactivation

5. **Which molecule binds to the operator to prevent transcription when lactose is absent?**

   A. Lactose

   B. Repressor

   C. Promoter

   D. RNA polymerase

6. The Hershey-Chase experiment concluded that genetic material is composed of DNA because the radiolabel found inside the bacterial cells was associated with:

A. Protein from the phage coat

B. Phospholipid membrane components

C. RNA synthesized by the host

D. DNA from the phage

7. Where is the outgoing tRNA recycled to pick up another amino acid to take to the ribosome?

A. Nucleus

B. Cytoplasm

C. Mitochondrion

D. Golgi apparatus

8. Is it true that the codon of tRNA is complementary to the anticodon of mRNA?

A. True

B. False

C. Sometimes

D. Always

9. Which statement best describes the scope of regulation in eukaryotic gene expression?

A. All genes are expressed at a constant rate in eukaryotes

B. Protein synthesis is the only level of gene expression control

C. Regulation can occur at transcription, mRNA stability, export, and translation

D. Post-translational modifications are not involved in regulation

10. New _____ position themselves along the parent strands through _____ base pairing.

A. Nucleotides; complementary

B. Nucleotides; identical

C. Nucleotides; random

D. Nucleotides; noncomplementary

Answers

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

Explanations

1. How many different amino acids are used to build proteins in living organisms?

A. 4

B. 20

C. 64

D. 21

Proteins are built from amino acids, and the standard set used across most living organisms is twenty. The genetic code translates codons—triplets of nucleotides in mRNA—into these amino acids. There are 64 possible codons, but they map to just twenty amino acids plus stop signals, with different codons sometimes coding for the same amino acid. While there are rare cases where additional, nonstandard amino acids like selenocysteine are incorporated in specific contexts, the typical building blocks for proteins are twenty.

2. Which statement about X chromosome dosage in mammals is true?

A. It balances gene dosage by activating both X chromosomes

B. It only affects autosomal genes

C. It equalizes gene dosage between males and females

D. It increases gene dosage in females

X chromosome dosage in mammals is equalized through X-chromosome inactivation, where one of the two X chromosomes in female cells is largely silenced. This means that most X-linked genes are expressed from a single active X, bringing female gene expression from the X in line with males, who have only one X. If both X chromosomes remained active, females would have higher levels of X-linked gene products. The story centers on X-linked genes, not autosomal ones, and while some genes can escape inactivation and be expressed from both Xs, the overall effect is to balance dosage between the sexes. So the true statement is that X chromosome dosage is equalized between males and females.

3. Where does the assembly of transcription factors begin?

A. Downstream from the transcription start site

B. Upstream from the transcription start site

C. At the terminator

D. Within the coding region

Initiation of transcription relies on assembling transcription factors at the promoter, which sits on the DNA just upstream of where RNA synthesis begins. The promoter contains specific DNA elements that transcription factors recognize, and this assembly forms the pre-initiation complex with RNA polymerase II ready to start. Because transcription starts at the transcription start site, the machinery must bind on the DNA immediately before that site—upstream of it. Downstream regions like the coding sequence or the terminator are part of the transcribed gene or signal termination, not the starting point for assembly.

4. Which statement about the Xist gene is true?

A. It is located in the Xic region of the X chromosome and it encodes an RNA that coats an X chromosome to promote compaction

B. It is located on the Y chromosome and encodes a protein involved in sex determination

C. It encodes a tRNA involved in translation

D. It is not involved in X inactivation

X inactivation in female mammals is driven by Xist, a long noncoding RNA produced from the X chromosome's X-inactivation center (Xic). Once transcribed, Xist RNA spreads along the chromosome from which it is expressed, coating that X in cis and recruiting chromatin-modifying complexes that convert it into a compact, transcriptionally silent form. This coating and remodeling lead to the silencing of most genes on that chromosome, effectively inactivating one X copy in each cell. The Xist gene itself does not code for a protein and is located on the X chromosome, not the Y. It is also not a tRNA. Therefore, the statement describing it as located in the Xic region and producing an RNA that coats an X chromosome to promote compaction is the correct one.

5. Which molecule binds to the operator to prevent transcription when lactose is absent?

A. Lactose

B. Repressor

C. Promoter

D. RNA polymerase

In the lac operon, transcription is turned off when lactose is absent by a repressor protein that binds to the operator. This binding physically blocks RNA polymerase from accessing the promoter, so the enzymes needed to metabolize lactose aren't produced. When lactose is present, it's converted to allolactose, which binds the repressor and changes its shape, causing it to release from the operator. With the operator no longer blocked, RNA polymerase can bind the promoter and transcribe the lac genes. Lactose acts as the inducer, not the binder to the operator; the promoter is just the DNA site where transcription begins; RNA polymerase is the enzyme that carries out transcription.

6. The Hershey-Chase experiment concluded that genetic material is composed of DNA because the radiolabel found inside the bacterial cells was associated with:

A. Protein from the phage coat

B. Phospholipid membrane components

C. RNA synthesized by the host

D. DNA from the phage

The main idea being tested is which part of a virus actually carries the genetic instructions into a host cell. Hershey and Chase used two radioactive labels: one that marks DNA (phosphorus) and one that marks protein (sulfur). After allowing infection, they blended away the outer coats and looked to see where the radioactivity ended up. The radioactivity inside the bacterial cells matched the label for DNA, not the label for protein, meaning the genetic material that enters the cell is the phage DNA. This is why the experiment concluded that DNA is the genetic material.

7. Where is the outgoing tRNA recycled to pick up another amino acid to take to the ribosome?

A. Nucleus

B. Cytoplasm

C. Mitochondrion

D. Golgi apparatus

tRNA is recharged in the cytoplasm. After delivering its amino acid to the growing polypeptide at the ribosome, the tRNA is uncharged and is recharged by aminoacyl-tRNA synthetases in the cytoplasm, giving it a fresh amino acid to take to the ribosome again. The nucleus houses tRNA transcription and processing, not the charging step; mitochondria have their own translation system, but the recycling of the tRNA used in cytosolic protein synthesis happens in the cytoplasm; the Golgi apparatus is involved in protein modification and trafficking, not tRNA charging.

8. Is it true that the codon of tRNA is complementary to the anticodon of mRNA?

A. True

B. False

C. Sometimes

D. Always

In translation, the anticodon on the tRNA pairs with the codon on the mRNA. There isn't a codon on tRNA; the tRNA carries an anticodon that is complementary to the mRNA codon to ensure the correct amino acid is added. For example, an mRNA codon 5'-AUG-3' pairs with a tRNA anticodon 3'-UAC-5'. Wobble at the third position adds some flexibility, but the essential relationship is anticodon-to-codon, not codon-to-anticodon on mRNA. So the statement is not accurate.

9. Which statement best describes the scope of regulation in eukaryotic gene expression?

A. All genes are expressed at a constant rate in eukaryotes

B. Protein synthesis is the only level of gene expression control

C. Regulation can occur at transcription, mRNA stability, export, and translation

D. Post-translational modifications are not involved in regulation

In eukaryotes, regulation of gene expression happens at several different stages, not just one. A gene's activity can be controlled at the level of transcription, where many factors decide whether the RNA polymerase should start making the transcript. After transcription, the stability of the mRNA influences how long the message persists; transcripts can be quickly degraded or stabilized by RNA-binding proteins and microRNAs, affecting how much protein is produced. The cell can also regulate whether an mRNA is exported from the nucleus to the cytoplasm, so only transcripts that are properly processed and allowed to exit can be translated. Finally, translation itself is controlled: initiation and efficiency of ribosome binding determine how much protein is synthesized from a given mRNA. This option correctly highlights regulation across transcription, mRNA stability, export, and translation, which together cover the major control points used by cells to fine-tune gene expression. It's understood that additional layers exist—such as post-translational modifications that modify protein activity after synthesis—but the statement still best describes the wide range of regulatory steps available in eukaryotes. The other choices are incorrect because genes are not expressed at a constant rate, regulation extends beyond translation, and post-translational modifications do play regulatory roles.

10. New _____ position themselves along the parent strands through _____ base pairing.

A. Nucleotides; complementary

B. Nucleotides; identical

C. Nucleotides; random

D. Nucleotides; noncomplementary

The main idea here is how DNA is copied with fidelity. During replication, new nucleotides align along each exposed parental strand by complementary base pairing. That means each base on the template strand binds its partner: A with T and C with G. So the new strand that is formed is complementary to its template and, together with the template, creates a correct, identical copy of the double helix information. If the added nucleotides were identical to the template, random, or noncomplementary, the hydrogen bonding wouldn't hold properly and the genetic information wouldn't be copied accurately. This complementary pairing is what makes DNA replication reliable and is central to the semi-conservative model, where each daughter molecule contains one old strand and one newly synthesized complementary strand.

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://dnabiology.examzify.com

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