DNA and Biotechnology 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. Which statement best differentiates biotechnology from genetic engineering?

A. Biotechnology is the broader field that uses living organisms to modify products; genetic engineering is a specific technique that manipulates genetic material.

B. Genetic engineering is the broader field that uses living organisms to modify products; biotechnology is a specific technique that manipulates genetic material.

C. They are the same thing.

D. Biotechnology and genetic engineering are unrelated.

2. Which statement best defines a GMO?

A. Clones

B. Hybrids of species

C. Non-modified organisms

D. Transgenic organisms created for commercial purposes

3. What best describes base pairing in DNA?

A. The process of producing proteins from RNA

B. The specific pairing of bases A with T and C with G

C. The unwinding of the DNA double helix

D. Enzymatic replication of DNA

4. Okazaki fragments are best described as:

A. The continuous segments on the leading strand

B. The RNA primers on the lagging strand

C. The enzymes that unwind DNA

D. Discontinuous DNA segments on the lagging strand

5. A major benefit of transgenic organisms is the ability to harvest medicines from bacteria; such as insulin production. Which option best describes this benefit?

A. Ability to harvest medicines from bacteria; insulin production

B. Increased crop resistance to drought

C. Naturally occurring crossbreeding

D. Decreased health risks

6. Which of the following is a medical use of transgenic organisms?

A. Producing human insulin in bacteria

B. Producing yogurt

C. Producing plastics

D. Producing biodiesel

7. What is a transgenic organism?

A. Organisms that contain functional recombinant DNA from a different organism

B. Organisms with no genetic modification

C. Organisms produced by natural selection

D. Organisms with only point mutations

8. What is the role of primase in DNA replication?

A. It unwinds the DNA double helix

B. It proofreads newly synthesized DNA

C. It elongates the DNA strand

D. It synthesizes RNA primer on both strands which helps DNA polymerase know where to bind

9. Which product is produced by the transgenic goats?

A. Insulin

B. Human antithrombin

C. Growth hormone

D. Enzymes for digestion

10. What type of bonds hold the nitrogenous bases together across the two DNA strands?

A. Hydrogen bonds

B. Covalent bonds

C. Ionic bonds

D. Peptide bonds

Answers

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

Explanations

1. Which statement best differentiates biotechnology from genetic engineering?

A. Biotechnology is the broader field that uses living organisms to modify products; genetic engineering is a specific technique that manipulates genetic material.

B. Genetic engineering is the broader field that uses living organisms to modify products; biotechnology is a specific technique that manipulates genetic material.

C. They are the same thing.

D. Biotechnology and genetic engineering are unrelated.

Biotechnology is the broad field that uses living organisms or their systems to modify products, processes, or technologies. Within that broad field, genetic engineering is a specific technique that directly manipulates genetic material—DNA sequences—to achieve a desired trait or outcome. Because biotechnology covers many approaches beyond gene manipulation, while genetic engineering focuses specifically on altering genes, the statement correctly identifies biotechnology as the wider discipline and genetic engineering as the particular method within it. For example, producing insulin in bacteria using recombinant DNA is an instance of genetic engineering, whereas processes like fermentation to make cheese or yogurt illustrate biotechnology in action without necessarily involving gene editing. This relationship—biotechnology as the broad field and genetic engineering as a targeted genetic manipulation technique—best captures their distinction.

2. Which statement best defines a GMO?

A. Clones

B. Hybrids of species

C. Non-modified organisms

D. Transgenic organisms created for commercial purposes

Genetic modification involves altering an organism's DNA with engineered changes to introduce new traits. The statement that best captures what a GMO is describes transgenic organisms created for commercial purposes. Transgenic means a gene from another species is inserted into the genome, producing traits not achievable by traditional breeding, and many GMOs are developed specifically for agricultural or industrial use with commercial goals. Cloning refers to making genetically identical copies of an organism, which can happen with or without genetic modification, so it isn't the defining feature of GMOs. Hybrids result from crossing species and often rely on traditional breeding rather than engineered DNA changes, so they're not necessarily GMOs. Non-modified organisms have not undergone genetic engineering, so they don't fit the GMO definition.

3. What best describes base pairing in DNA?

A. The process of producing proteins from RNA

B. The specific pairing of bases A with T and C with G

C. The unwinding of the DNA double helix

D. Enzymatic replication of DNA

Base pairing is the specific pairing of complementary bases across the two DNA strands, A with T and C with G. This rule ensures the two strands fit together with a consistent width, since purines pair with pyrimidines. Hydrogen bonds stabilize these pairs—A-T forms two bonds and C-G forms three—giving the DNA double helix its stability. This complementary pairing underpins accurate DNA replication, because each strand can serve as a template for creating a new partner strand with the correct base on every position. It also aligns with Chargaff's rules, which state that A equals T and C equals G across the molecule. The other descriptions refer to different processes: producing proteins from RNA describes translation, unwinding the helix refers to helicase activity, and replication is the broader process that includes base pairing but is not itself the pairing rule.

4. Okazaki fragments are best described as:

A. The continuous segments on the leading strand

B. The RNA primers on the lagging strand

C. The enzymes that unwind DNA

D. Discontinuous DNA segments on the lagging strand

Okazaki fragments show how the lagging strand is synthesized in short, discontinuous segments. During DNA replication, the two strands are made in opposite directions; the leading strand is built continuously toward the fork, while the lagging strand is synthesized in small pieces called Okazaki fragments. Each fragment starts with an RNA primer, but the fragment itself is DNA, and the RNA primers are later removed and replaced with DNA and the fragments joined by DNA ligase to form a continuous strand. So this concept is best described as discontinuous DNA segments on the lagging strand, rather than continuous segments on the leading strand, RNA primers themselves, or enzymes that unwind DNA.

5. A major benefit of transgenic organisms is the ability to harvest medicines from bacteria; such as insulin production. Which option best describes this benefit?

A. Ability to harvest medicines from bacteria; insulin production

B. Increased crop resistance to drought

C. Naturally occurring crossbreeding

D. Decreased health risks

Transgenic organisms act as production factories for medicines by putting human or other genes into a host organism. A key example is insulin production in bacteria: once the human insulin gene is inserted, the bacteria manufacture insulin protein that can be purified for medical use. This demonstrates the big advantage of the approach—creating scalable, cost-effective production of therapeutic proteins compared to harvesting them from animal sources or human donors. The option that describes harvesting medicines from bacteria and insulin production best captures this benefit because it directly ties genetic engineering to a concrete, impactful medical application. Other choices describe traits or concepts that aren't central to producing medicines in bacteria—drought resistance is an agricultural trait, crossbreeding is traditional breeding rather than genetic engineering, and decreased health risks isn't a guaranteed outcome of producing medicines this way.

6. Which of the following is a medical use of transgenic organisms?

A. Producing human insulin in bacteria

B. Producing yogurt

C. Producing plastics

D. Producing biodiesel

Using transgenic organisms for medicine means producing human therapeutic proteins in microorganisms. A classic example is making human insulin in bacteria. By inserting the human insulin gene into bacterial DNA, the bacteria can produce insulin that is then purified and used to treat diabetes. This application directly provides a medical treatment, which is why it's considered a medical use of transgenic organisms. The other options involve applications that are not medical therapies: yogurt production is food fermentation, plastics production is for making polymer materials, and biodiesel is a fuel source. So, producing human insulin in bacteria best represents a medical use of transgenic organisms.

7. What is a transgenic organism?

A. Organisms that contain functional recombinant DNA from a different organism

B. Organisms with no genetic modification

C. Organisms produced by natural selection

D. Organisms with only point mutations

Transgenic organisms are defined by carrying functional recombinant DNA that originated in a different species, inserted into their genome so it can be expressed. This means a gene from one organism is combined with regulatory elements and integrated into the host, producing a new trait that the host can pass on to offspring. The key idea is the introduction of foreign DNA and its functional expression in the recipient organism. That's why this choice best fits: it describes an organism that contains recombinant DNA from another organism that is capable of functioning in the host. In contrast, an organism with no genetic modification isn't altered, natural selection-produced organisms aren't engineered, and organisms with only point mutations involve changes within the same genome without introducing foreign DNA.

8. What is the role of primase in DNA replication?

A. It unwinds the DNA double helix

B. It proofreads newly synthesized DNA

C. It elongates the DNA strand

D. It synthesizes RNA primer on both strands which helps DNA polymerase know where to bind

Primase's job is to lay down short RNA primers that start DNA synthesis. DNA polymerases can't begin a new strand from scratch; they need a 3′-OH end to add nucleotides onto. Primase, a RNA polymerase, provides exactly that starting point on both strands. On the leading strand, one primer suffices for continuous synthesis; on the lagging strand, primers are made repeatedly to create Okazaki fragments that are later extended and joined. These primers give DNA polymerase the spot to begin adding DNA nucleotides. The other options describe different enzymes or activities: unwinding the DNA is done by helicase, proofreading is done by exonuclease activity, and elongating the DNA strand is the job of DNA polymerase itself.

9. Which product is produced by the transgenic goats?

A. Insulin

B. Human antithrombin

C. Growth hormone

D. Enzymes for digestion

Transgenic animals can be engineered to produce human proteins in their milk, turning the animal into a living factory for therapeutic proteins. In this context, goats have been created to secrete human antithrombin in their milk, which is then purified as a medicine. Antithrombin helps regulate blood clotting, so supplying a human version from goat milk provides a treatment for individuals with a deficiency of this protein. Other options are typically produced by different systems, such as bacteria, yeast, or mammalian cell cultures, rather than directly from goat milk in transgenic animals. This is why human antithrombin is the best answer here.

10. What type of bonds hold the nitrogenous bases together across the two DNA strands?

A. Hydrogen bonds

B. Covalent bonds

C. Ionic bonds

D. Peptide bonds

Hydrogen bonds hold the nitrogenous bases across the two DNA strands. A pairs with T through two hydrogen bonds, and G pairs with C through three hydrogen bonds, providing specific and relatively weak but sufficient attraction between the strands. This weaker bonding enables the double helix to open during replication and transcription. In contrast, the backbone of each strand is formed by strong covalent bonds linking sugars and phosphates (phosphodiester bonds). Ionic bonds aren't used for base pairing, and peptide bonds connect amino acids in proteins, not DNA bases.

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://dnabiotechnology.examzify.com

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