

Biology Major Field Test Practice (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. In codominance, how do the alleles interact in the phenotype?**
 - A. One allele completely masks the other**
 - B. Both alleles are fully expressed**
 - C. Only the recessive allele manifests**
 - D. There is no expression of either allele**

- 2. Which of the following describes small circular pieces of extrachromosomal DNA that contain few genes?**
 - A. Chromosomes**
 - B. Plasmids**
 - C. Chromatids**
 - D. Ribosomes**

- 3. What do exons represent in a sequence of DNA?**
 - A. Coding sequences of DNA**
 - B. Non-coding sequences of DNA**
 - C. Regulatory sequences of DNA**
 - D. Backup copies of DNA**

- 4. Which feature is NOT associated with ruminant digestive systems?**
 - A. Presence of multiple stomach chambers**
 - B. Long alimentary canal for prolonged digestion**
 - C. Specialized teeth for tearing meat**
 - D. Capacities for microbial fermentation**

- 5. What is the primary role of microtubules within a cell?**
 - A. Signal transmission**
 - B. Cellular structure maintenance**
 - C. Cellular conveyor belts**
 - D. Energy production**

- 6. What is the function of helicase in DNA replication?**
- A. It regulates supercoiling of DNA**
 - B. It unwinds DNA strands**
 - C. It connects Okazaki fragments**
 - D. It destroys bacterial cell walls**
- 7. Phosphatases facilitate which type of biochemical reaction?**
- A. Formation of polymers**
 - B. Hydrolysis reactions**
 - C. Digestion of carbohydrates**
 - D. Reduction reactions**
- 8. According to the Hardy-Weinberg Theorem, which condition does NOT contribute to constant gene frequencies?**
- A. Large population size**
 - B. No net mutations**
 - C. Random mating**
 - D. Natural selection**
- 9. Which of the following is NOT a phase of mitosis?**
- A. Prophase**
 - B. Metaphase**
 - C. Telophase**
 - D. Interphase**
- 10. Which macronutrient is primarily involved in the structural components of proteins and nucleic acids?**
- A. Sodium**
 - B. Carbon**
 - C. Potassium**
 - D. Iron**

Answers

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

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Explanations

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1. In codominance, how do the alleles interact in the phenotype?

- A. One allele completely masks the other**
- B. Both alleles are fully expressed**
- C. Only the recessive allele manifests**
- D. There is no expression of either allele**

In codominance, both alleles contribute to the phenotype in a way that they are both fully expressed simultaneously. This means that neither allele is dominant over the other, leading to an organism displaying characteristics of both alleles without blending. A common example of codominance is seen in the ABO blood group system in humans, where individuals with type AB blood have both A and B antigens on the surface of their red blood cells, showcasing the traits imparted by both alleles distinctly. This characteristic of codominance allows for the expression of traits from both alleles in a straightforward manner, rather than one overshadowing the other or blending together.

2. Which of the following describes small circular pieces of extrachromosomal DNA that contain few genes?

- A. Chromosomes**
- B. Plasmids**
- C. Chromatids**
- D. Ribosomes**

Plasmids are small, circular pieces of extrachromosomal DNA that are distinct from chromosomal DNA. They typically contain a limited number of genes, often related to functions such as antibiotic resistance or the production of specific proteins, which can be advantageous for the cell. Plasmids are naturally found in bacteria and can replicate independently of chromosomal DNA, allowing for their transfer between bacteria through processes like conjugation. This characteristic enables genetic diversity and adaptability among bacterial populations. In contrast, chromosomes are larger structures that contain the genetic blueprint of the organism and are organized into linear or circular forms, depending on whether the organism is eukaryotic or prokaryotic. Chromatids refer to the identical halves of a replicated chromosome, which are involved in cell division, and do not function as independent pieces of DNA. Ribosomes are not DNA; they are the cellular machinery responsible for protein synthesis, composed of RNA and proteins. These distinctions clarify why plasmids are accurately described by the given definition in the question.

3. What do exons represent in a sequence of DNA?

- A. Coding sequences of DNA**
- B. Non-coding sequences of DNA**
- C. Regulatory sequences of DNA**
- D. Backup copies of DNA**

Exons represent the coding sequences of DNA that are transcribed into messenger RNA (mRNA) and ultimately translated into proteins. In eukaryotic organisms, genes are often composed of both exons and introns, with exons being the segments that contain the actual information for protein synthesis. During the process of RNA splicing, introns (which do not code for proteins) are removed, leaving only the exons to be assembled into a final mRNA product. This distinction is crucial for understanding gene expression, as exons are directly responsible for the amino acid sequences in proteins, whereas introns are eliminated and do not play a role in this process. Regulatory sequences, on the other hand, are involved in the control of gene expression rather than coding for proteins. Backup copies of DNA are not a recognized feature of DNA structure or function.

4. Which feature is NOT associated with ruminant digestive systems?

- A. Presence of multiple stomach chambers**
- B. Long alimentary canal for prolonged digestion**
- C. Specialized teeth for tearing meat**
- D. Capacities for microbial fermentation**

The presence of specialized teeth for tearing meat is not associated with ruminant digestive systems. Ruminants, such as cows, sheep, and deer, are herbivores that primarily consume plant material. Their digestive systems are uniquely adapted for breaking down cellulose from plants, and this is achieved through several features. Ruminants possess multiple stomach chambers, which allow for the fermentation of their plant-based diet by specialized microorganisms. These chambers include the rumen, reticulum, omasum, and abomasum, each playing a crucial role in the digestion process. A long alimentary canal is also a characteristic of ruminants, as it facilitates prolonged digestion and absorption of nutrients from fibrous plant material. Additionally, ruminants have flat, ridged teeth that are well-suited for grinding and chewing vegetation, rather than sharp teeth designed for tearing meat. The unique adaptations of ruminants provide them with a highly efficient digestive system that has evolved to process the tough plant material they consume.

5. What is the primary role of microtubules within a cell?

- A. Signal transmission
- B. Cellular structure maintenance**
- C. Cellular conveyor belts
- D. Energy production

Microtubules play a crucial role in maintaining the structure of the cell by providing mechanical support and shape. They are part of the cytoskeleton, which is a network of protein fibers that help to maintain the cell's integrity and organization. Microtubules are dynamic structures that can rapidly grow and shrink, allowing them to adapt to the needs of the cell, such as during cell division when they form the mitotic spindle to separate chromosomes. While microtubules can contribute to cell signaling indirectly by organizing signaling complexes at specific cellular sites, their primary function is not signal transmission. They also facilitate intracellular transport by serving as tracks for motor proteins that carry cellular cargo, which gives the impression of functioning like conveyor belts; however, this is a secondary role. Lastly, microtubules are not involved in energy production; that function is primarily carried out by mitochondria in the form of ATP synthesis. Thus, maintaining cellular structure is the primary and most essential role of microtubules.

6. What is the function of helicase in DNA replication?

- A. It regulates supercoiling of DNA
- B. It unwinds DNA strands**
- C. It connects Okazaki fragments
- D. It destroys bacterial cell walls

Helicase plays a crucial role in DNA replication by unwinding the double-stranded DNA. During the replication process, the two strands of DNA must separate to allow the replication machinery to access each strand as a template for synthesizing new complementary strands. Helicase accomplishes this by breaking the hydrogen bonds between the nucleotide base pairs, effectively separating the two strands while moving along the DNA molecule. This unwinding action is vital for the initiation of replication, enabling other enzymes like DNA polymerase to synthesize new DNA strands. The other functions mentioned do not pertain to helicase. For example, while supercoiling is an important aspect of DNA structure and function, it is managed by other enzymes such as topoisomerases. The connection of Okazaki fragments, which are short sequences of DNA synthesized discontinuously on the lagging strand during replication, is performed by ligase, not helicase. The destruction of bacterial cell walls is irrelevant to DNA replication and describes a function related to antibiotics rather than DNA processes. Thus, the unwinding of DNA strands by helicase is essential for enabling the replication process to occur correctly.

7. Phosphatases facilitate which type of biochemical reaction?

- A. Formation of polymers
- B. Hydrolysis reactions**
- C. Digestion of carbohydrates
- D. Reduction reactions

Phosphatases are enzymes that catalyze the removal of phosphate groups from various molecules, a process known as dephosphorylation. This action is a type of hydrolysis reaction, where water is used to cleave chemical bonds. Hydrolysis reactions are fundamental in many biological processes, including the regulation of metabolic pathways and signal transduction. By facilitating the removal of phosphate groups, phosphatases play a crucial role in modulating the activity of proteins and other molecules, influencing cell function and communication. The formation of polymers refers to the process of joining monomers together, typically through dehydration synthesis, which is the opposite of what phosphatases do. The digestion of carbohydrates primarily involves enzymes such as amylases that break down polysaccharides into simpler sugars, rather than the action of phosphatases. Reduction reactions involve the gain of electrons or hydrogen, which is a different type of chemical transformation that is not associated with the function of phosphatases.

8. According to the Hardy-Weinberg Theorem, which condition does NOT contribute to constant gene frequencies?

- A. Large population size
- B. No net mutations
- C. Random mating
- D. Natural selection**

The Hardy-Weinberg Theorem is a principle that provides a framework for understanding how allele frequencies are maintained in a population under certain ideal conditions. The theorem outlines five key conditions that must be met for a population to remain in equilibrium, meaning the gene frequencies will not change over time. These conditions include a large population size, no net mutations, random mating, no migration, and no natural selection. Natural selection is the process by which certain traits become more favorable and thus more common in a population over generations because they contribute to increased survival or reproductive success. This mechanism leads to changes in allele frequencies as advantageous traits are passed on more frequently than less advantageous ones. Therefore, natural selection disrupts the equilibrium and gene frequencies are not constant under its influence. In contrast, a large population size minimizes the effects of genetic drift (random changes in allele frequencies), while the absence of mutations ensures that the existing alleles are not altered or replaced. Random mating ensures that allele combinations are produced randomly, maintaining the existing allele frequencies. Thus, each of these conditions contributes to the stability of gene frequencies, except for natural selection, which is inherently a driving force of change.

9. Which of the following is NOT a phase of mitosis?

- A. Prophase**
- B. Metaphase**
- C. Telophase**
- D. Interphase**

Mitosis is the process by which a eukaryotic cell divides its nucleus and its genetic material, resulting in two daughter cells. The phases of mitosis include prophase, metaphase, anaphase, and telophase. Each of these phases plays a crucial role in facilitating the accurate segregation of chromosomes. Interphase, on the other hand, is the phase of the cell cycle that occurs before mitosis begins. It is during interphase that the cell undergoes growth, replicates its DNA, and prepares for the mitotic phase. Interphase encompasses several stages: G1 (first gap), S (synthesis), and G2 (second gap). Although it is a critical part of the overall cell cycle, interphase does not involve the division of chromosomes or the physical processes of mitosis itself, which is why it is accurately identified as not being one of the phases of mitosis.

10. Which macronutrient is primarily involved in the structural components of proteins and nucleic acids?

- A. Sodium**
- B. Carbon**
- C. Potassium**
- D. Iron**

The correct answer is carbon, as it serves as a fundamental building block for both proteins and nucleic acids. Proteins are composed of amino acids, which contain carbon atoms as part of their structure. Similarly, nucleic acids, such as DNA and RNA, are made up of nucleotides that also include carbon. Carbon's ability to form stable covalent bonds with other elements, including hydrogen, oxygen, nitrogen, and phosphorus, allows it to create a diverse range of complex organic molecules, essential for life. In contrast, while sodium, potassium, and iron play critical roles in biological systems—such as in enzyme function, ion balance, and oxygen transport—they do not serve as primary structural components of proteins and nucleic acids like carbon does.

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://biomajorfield.examzify.com>

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

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