

OSAT BIOLOGICAL SCIENCES (110) PRACTICE EXAM (SAMPLE)

STUDY GUIDE



Prepare with structure. Pass with confidence



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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. Which statement best describes a scientific law?**
 - A. A theory that has been disproven
 - B. A statement describing what scientists expect under a set of conditions
 - C. A conclusion based on a single observation
 - D. A detailed explanation of a phenomenon
- 2. Which trophic level directly consumes producers?**
 - A. Secondary consumers
 - B. Tertiary consumers
 - C. Primary consumers
 - D. Top predators
- 3. Which type of mutation results from the deletion of one or more nucleotides from a specific sequence?**
 - A. Substitution mutation
 - B. Deletion mutation
 - C. Insertion mutation
 - D. Missense mutation
- 4. Which type of speciation occurs when new species form in populations that inhabit the same geographic area?**
 - A. Peripatric speciation
 - B. Allopatric speciation
 - C. Sympatric speciation
 - D. Parapatric speciation
- 5. What is the initial cell called that results from the fertilization of an egg by a sperm?**
 - A. Zygote
 - B. Blastocyst
 - C. Embryo
 - D. Gamete

- 6. What describes the functional relationship between an enzyme and a substrate during feedback inhibition?**
- A. Competitive inhibition
 - B. Non-competitive inhibition
 - C. Allosteric inhibition
 - D. Substrate saturation
- 7. Which of the following is a contributing factor to desertification?**
- A. Heavy rainfall
 - B. Arid climate
 - C. Prolonged freezing temperatures
 - D. Increased biodiversity
- 8. What is the primary focus of scientific inquiry?**
- A. To develop personal opinions
 - B. To question established facts
 - C. To make evidence-based conclusions
 - D. To conduct experiments for entertainment
- 9. In which type of mutation is the total amount of DNA in a chromosome reduced?**
- A. Deletion mutation
 - B. Insertion mutation
 - C. Point mutation
 - D. Inversion mutation
- 10. What defines totipotent stem cells in terms of differentiation potential?**
- A. Can only form embryonic tissues
 - B. Can develop into any cell type
 - C. Can develop into several but not all cell types
 - D. Can form adult stem cells only

Answers

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

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Explanations

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1. Which statement best describes a scientific law?

- A. A theory that has been disproven
- B. A statement describing what scientists expect under a set of conditions**
- C. A conclusion based on a single observation
- D. A detailed explanation of a phenomenon

The statement that best describes a scientific law is one that focuses on predicting outcomes based on given conditions. A scientific law summarizes a consistent pattern observed in nature, often expressed mathematically, and is based on repeated experimental evidence. For example, the law of gravity describes the behavior of objects under the influence of gravitational forces, providing clear expectations about their motion. In contrast to theories, which offer comprehensive explanations for phenomena and can encompass many laws, a scientific law is more focused and is often limited to describing what will happen in specific circumstances. The other choices do not accurately capture the essence of a scientific law; they either misrepresent it as a theory that has been disproven, suggest it is derived from a single observation, or incorrectly describe it as a detailed explanation rather than a succinct statement of empirical observations.

2. Which trophic level directly consumes producers?

- A. Secondary consumers
- B. Tertiary consumers
- C. Primary consumers**
- D. Top predators

The primary consumers are the trophic level that directly consumes producers, which are typically plants or algae. In ecological terms, producers are organisms that can create their own energy through photosynthesis or chemosynthesis, serving as a foundational source of energy within an ecosystem. Primary consumers, often herbivores, feed on these producers to obtain energy. This relationship establishes a direct link between the lowest trophic level (producers) and the next level (primary consumers) in the food web. In contrast, secondary consumers feed on primary consumers, and tertiary consumers further consume secondary consumers, highlighting a more complex food chain structure where energy is transferred up the levels. Top predators are at the highest trophic level and do not directly consume producers but rather rely on the existence of all lower levels in the food chain for their energy and sustenance. Thus, the primary consumers play a crucial role in bridging the gap between producers and higher trophic levels.

3. Which type of mutation results from the deletion of one or more nucleotides from a specific sequence?

- A. Substitution mutation
- B. Deletion mutation**
- C. Insertion mutation
- D. Missense mutation

A deletion mutation occurs when one or more nucleotides are removed from a DNA sequence. This type of mutation can have significant effects on the resulting protein, particularly if it takes place within a coding region of a gene. The deletion can shift the reading frame during the process of translation (called a frameshift mutation), resulting in a completely different sequence of amino acids downstream from the point of deletion. This can lead to nonfunctional proteins or truncated proteins if the deletion causes a premature stop codon. By contrast, a substitution mutation involves altering a single nucleotide without changing the reading frame, while an insertion mutation adds one or more nucleotides to the sequence, which can also lead to frameshifts if not in multiples of three. A missense mutation specifically alters one amino acid in a protein sequence due to a single nucleotide change but does not necessarily involve the deletion of nucleotides. Thus, the definition and consequences of a deletion make it distinct and illustrate why it is considered a specific type of mutation involving the loss of nucleotides.

4. Which type of speciation occurs when new species form in populations that inhabit the same geographic area?

- A. Peripatric speciation
- B. Allopatric speciation
- C. Sympatric speciation**
- D. Parapatric speciation

Sympatric speciation is the correct answer because it describes the process by which new species evolve from a single ancestral species while inhabiting the same geographic area. This type of speciation occurs without the physical separation of populations and is often driven by factors such as reproductive isolation due to behavioral changes, ecological niche differentiation, or polyploidy in plants. In sympatric speciation, members of the same population can become genetically distinct as a result of changes in their mating preferences, feeding behaviors, or habitat use. This can ultimately lead to a divergence into separate species even though they occupy the same environment and are capable of interbreeding. The other types of speciation involve physical barriers or distinct habitats that lead to genetic divergence. In peripatric speciation, a small population becomes isolated at the edge of a larger population's range. Allopatric speciation occurs when populations become geographically separated, leading to the development of distinct species due to isolation. Parapatric speciation happens when two populations are separated by a gradient or slightly different environments but still partially interbreed. In contrast to these, sympatric speciation illustrates how species can emerge and evolve in a shared geographic space through mechanisms other than geographic separation.

5. What is the initial cell called that results from the fertilization of an egg by a sperm?

- A. Zygote**
- B. Blastocyst
- C. Embryo
- D. Gamete

The initial cell that results from the fertilization of an egg by a sperm is known as a zygote. This single-cell entity forms immediately after the male sperm successfully penetrates the female ovum, leading to the fusion of their genetic material. The zygote subsequently undergoes a series of mitotic divisions, known as cleavage, as it begins its development into a multi-cellular organism. During this process, it eventually transforms into a blastocyst, which marks a later stage in development when the embryo is ready to implant into the uterine wall. Before reaching the zygote stage, the sperm and egg are referred to as gametes; however, they are not classified as a single entity until fertilization occurs. The term embryo refers to the developing organism after it has progressed beyond the zygote and is often used after implantation occurs. Therefore, the correct identification of the initial fertilized cell as a zygote is essential in understanding the early stages of human development.

6. What describes the functional relationship between an enzyme and a substrate during feedback inhibition?

- A. Competitive inhibition
- B. Non-competitive inhibition
- C. Allosteric inhibition**
- D. Substrate saturation

The functional relationship between an enzyme and a substrate during feedback inhibition is primarily described by allosteric inhibition. In this process, an end product of a metabolic pathway can bind to an allosteric site on an enzyme that catalyzes an earlier step in the pathway. This binding changes the shape or activity of the enzyme, inhibiting its function. Allosteric inhibition serves as a regulatory mechanism to prevent the overproduction of the end product. This ensures that the cell maintains homeostasis and uses energy efficiently by stopping the pathway when there is sufficient product. Although competitive and non-competitive inhibition are relevant forms of enzyme regulation, they do not specifically describe the feedback inhibition mechanism where the end product itself plays a direct role in regulating the enzyme's activity. Substrate saturation refers to the scenario where all active sites on the enzyme are occupied by substrates, leading to a maximum reaction rate, but it does not involve the feedback mechanism described in the question. Therefore, allosteric inhibition accurately captures the essence of feedback inhibition involving the functional relationship between an enzyme and a substrate.

7. Which of the following is a contributing factor to desertification?

- A. Heavy rainfall
- B. Arid climate**
- C. Prolonged freezing temperatures
- D. Increased biodiversity

Desertification is primarily related to the degradation of dryland ecosystems, and an arid climate is a significant contributing factor. In arid regions, where rainfall is naturally low and evaporation rates are high, the land is more susceptible to degradation and can quickly evolve into a desert environment if not managed properly. Conditions such as droughts, land misuse, deforestation, and overgrazing can exacerbate the effects of an arid climate, leading to a loss of vegetation and soil quality, which are critical for maintaining healthy ecosystems. Heavy rainfall, prolonged freezing temperatures, and increased biodiversity do not contribute to desertification. In fact, heavy rainfall can promote vegetation growth, prolonged freezing temperatures are typically associated with different ecosystems, and increased biodiversity is generally indicative of a healthy ecosystem rather than a factor leading to desertification. Thus, an arid climate stands out as a key condition that makes regions more vulnerable to the processes that drive desertification.

8. What is the primary focus of scientific inquiry?

- A. To develop personal opinions
- B. To question established facts
- C. To make evidence-based conclusions**
- D. To conduct experiments for entertainment

The primary focus of scientific inquiry is to make evidence-based conclusions. This process involves systematically gathering and analyzing data through observation and experimentation to understand natural phenomena. Scientists seek to develop theories and models that can accurately explain and predict behaviors in the natural world. By basing conclusions on empirical evidence, scientific inquiry ensures that findings are reliable and valid, allowing researchers to build on one another's work and advance knowledge in various fields. Focusing on evidence allows scientists to move beyond subjective opinions and beliefs, leading to more concrete outcomes in research. While questioning established facts is a part of scientific inquiry, especially in re-evaluating theories in light of new evidence, the ultimate aim is to foster understanding through data-driven conclusions. Conducting experiments for entertainment does not align with the serious and methodical approach required in scientific research, as it disregards the foundational goal of seeking knowledge and understanding in a systematic way.

9. In which type of mutation is the total amount of DNA in a chromosome reduced?

- A. Deletion mutation**
- B. Insertion mutation
- C. Point mutation
- D. Inversion mutation

A deletion mutation involves the loss of a segment of DNA from a chromosome, resulting in a reduction in the total amount of DNA present. This can occur when a part of the chromosome is removed or erased, which can lead to various effects depending on the genes that are affected by the loss. Such mutations can have a significant impact on an organism's phenotype, potentially leading to loss of function in genes or altered genetic regulation. In contrast, insertion mutations involve the addition of DNA, which increases the total amount of DNA in a chromosome. Point mutations are small-scale changes where a single nucleotide is altered, and while they can affect the function of a gene, they do not change the overall length of the DNA. Inversion mutations involve the reversal of a segment of DNA within a chromosome but do not result in a loss of DNA. Therefore, the correct answer is indeed the deletion mutation, as it directly leads to a decrease in the overall amount of DNA in a chromosome.

10. What defines totipotent stem cells in terms of differentiation potential?

- A. Can only form embryonic tissues
- B. Can develop into any cell type**
- C. Can develop into several but not all cell types
- D. Can form adult stem cells only

Totipotent stem cells are unique in their ability to differentiate into any cell type within an organism. This includes not only all of the cell types that make up the various tissues of an organism, such as muscle, nerve, and skin cells, but also the extraembryonic tissues such as the placenta. This remarkable capability allows them to give rise to a complete, living organism. This distinguishes totipotent stem cells from pluripotent and multipotent stem cells, which have more limited differentiation potential. Pluripotent cells can develop into almost all cell types but not the extraembryonic tissues, while multipotent cells are restricted to a narrower range of cell types within a specific lineage or tissue type. Thus, the defining characteristic of totipotent stem cells is their unmatched versatility in forming any cell type necessary for developing a complete organism.

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:

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

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