

NYSTCE 160 – BIOLOGY 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. To which human system do motor neurons belong?**
 - A. Central Nervous System
 - B. Immune System
 - C. Peripheral Nervous System
 - D. Endocrine System

- 2. Which theory describes the evolution of eukaryotic cells from prokaryotic cells through the invagination of a large prokaryote?**
 - A. Cell Theory
 - B. Endosymbiotic Model
 - C. Gene Theory
 - D. Evolutionary Theory

- 3. From which two areas of the heart do electrical signals originate to create cardiac contractions?**
 - A. Ventricular nodes
 - B. Sinoatrial node and atrioventricular node
 - C. Coronary arteries and veins
 - D. Right and left atrium

- 4. Which of the following best describes a characteristic of apoptosis?**
 - A. It is a passive process resulting in cell swelling.
 - B. It is a controlled process of cell death.
 - C. It promotes inflammation and tissue damage.
 - D. It primarily occurs in response to environmental stress.

- 5. Which type of fertilization do reptiles typically undergo?**
 - A. External fertilization
 - B. Internal fertilization
 - C. Both external and internal fertilization
 - D. Asexual reproduction

- 6. What is the best approach to investigate biological phenomena in living organisms?**
- A. Observing them in a lab setting
 - B. Purifying each chemical separately
 - C. Conducting interviews with subjects
 - D. Using computer simulations
- 7. Which model is associated with an increase in the quantity of free energy?**
- A. Equilibrium model
 - B. Transition-state model
 - C. Dynamic equilibrium model
 - D. Closed system model
- 8. What components form outside the DNA helix?**
- A. Amino acids and peptides
 - B. Deoxyribose and phosphate groups
 - C. Nucleotides and ribose
 - D. Single-stranded RNA
- 9. What is the chemical compound name of the Hydroxyl group?**
- A. Aldehyde
 - B. Alcohol
 - C. Ester
 - D. Ketone
- 10. What is mesophyll in plants?**
- A. Outer layer of the leaf
 - B. Green tissue in the interior of the leaf
 - C. Root tissue
 - D. Stomatal openings

Answers

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

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Explanations

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1. To which human system do motor neurons belong?

- A. Central Nervous System
- B. Immune System
- C. Peripheral Nervous System**
- D. Endocrine System

Motor neurons are specialized neurons that transmit signals from the central nervous system to muscles, facilitating movement. These neurons are part of the peripheral nervous system (PNS), which includes all the nerves that branch out from the brain and spinal cord to the rest of the body. The PNS is responsible for relaying information between the CNS and limbs or organs, thus playing a crucial role in voluntary and involuntary functions. The central nervous system, which comprises the brain and spinal cord, is responsible for processing information and making decisions, but it does not include the motor neurons themselves, which extend into the periphery. The immune system and endocrine system, while essential for body function and regulation, do not involve the transmission of signals related to muscle movement. Therefore, identifying the correct association of motor neurons with the peripheral nervous system highlights their role as conduits for motor functions in the body.

2. Which theory describes the evolution of eukaryotic cells from prokaryotic cells through the invagination of a large prokaryote?

- A. Cell Theory
- B. Endosymbiotic Model**
- C. Gene Theory
- D. Evolutionary Theory

The Endosymbiotic Model is the correct answer because it specifically addresses the origin of eukaryotic cells through the process of endosymbiosis. This model suggests that larger prokaryotic cells engulfed smaller prokaryotic cells, which then became symbiotic within the larger cells. Over time, these engulfed cells evolved into organelles, such as mitochondria and chloroplasts, essential to eukaryotic cell function. This concept is supported by several lines of evidence, including the similarities between mitochondria/chloroplasts and prokaryotic cells in terms of size, shape, and genetic material. In essence, the Endosymbiotic Model explains a significant evolutionary transition, illustrating how complex eukaryotic cells originated from simpler prokaryotic ancestors through a mutually beneficial relationship between different organisms. The other theories mentioned—Cell Theory, Gene Theory, and Evolutionary Theory—do not specifically explain the transition from prokaryotic to eukaryotic cells in the same way. Cell Theory focuses on the basic properties of cells, Gene Theory deals with the molecular mechanisms of heredity, and Evolutionary Theory encompasses a broad range of mechanisms explaining the diversity of life, but none of them detail

3. From which two areas of the heart do electrical signals originate to create cardiac contractions?

- A. Ventricular nodes
- B. Sinoatrial node and atrioventricular node**
- C. Coronary arteries and veins
- D. Right and left atrium

The sinoatrial (SA) node and the atrioventricular (AV) node are crucial components in the heart's electrical conduction system that generate and regulate electrical signals for cardiac contractions. The SA node, located in the right atrium, serves as the primary pacemaker of the heart, initiating electrical impulses that spread through the atria, causing them to contract and push blood into the ventricles. Following this, the AV node, situated between the atria and ventricles, receives the impulses from the SA node and briefly delays them before sending them through the bundle of His and into the ventricles. This ensures that the atria have enough time to fully contract before the ventricles contract, creating a coordinated heartbeat. The other choices do not play a direct role in generating electrical signals for contractions. Ventricular nodes are not recognized entities in the conduction system, the coronary arteries and veins are involved in blood supply rather than electrical signaling, and while the right and left atria are important anatomical structures, they do not independently initiate electrical signals; this responsibility lies with the SA and AV nodes.

4. Which of the following best describes a characteristic of apoptosis?

- A. It is a passive process resulting in cell swelling.
- B. It is a controlled process of cell death.**
- C. It promotes inflammation and tissue damage.
- D. It primarily occurs in response to environmental stress.

Apoptosis is best described as a controlled process of cell death. This process is essential for maintaining homeostasis in multicellular organisms and is characterized by a series of well-regulated steps, which include cell shrinkage, chromatin condensation, and DNA fragmentation. Unlike necrosis, which is an uncontrolled form of cell death often resulting in inflammation and damage to surrounding tissues, apoptosis is a neatly regulated system that allows cells to die in a manner that minimizes impact on neighboring cells. This is crucial during development and in regulating cell populations in tissues. The controlled nature of apoptosis ensures that damaged or unnecessary cells are eliminated without provoking significant inflammatory responses, thereby promoting overall tissue health and function.

5. Which type of fertilization do reptiles typically undergo?

- A. External fertilization
- B. Internal fertilization**
- C. Both external and internal fertilization
- D. Asexual reproduction

Reptiles typically undergo internal fertilization, which is a reproductive process where fertilization occurs within the female's body. This method offers several advantages, such as providing a more controlled environment for the developing embryo, improving the likelihood of successful fertilization, and safeguarding fertilized eggs from external predators and environmental challenges. In internal fertilization, the male reptile transfers sperm directly into the female's reproductive tract during mating. This process is facilitated by specialized structures such as cloacas or, in some species, intromittent organs. The ability to utilize internal fertilization is beneficial for reptiles, particularly since many species inhabit terrestrial environments where external fertilization would be less effective. This reproductive strategy contributes to the diversity seen among reptiles, with many laying eggs (oviparous) and some giving birth to live young (viviparous), which further demonstrates the adaptability of reptiles in various ecological niches.

6. What is the best approach to investigate biological phenomena in living organisms?

- A. Observing them in a lab setting
- B. Purifying each chemical separately**
- C. Conducting interviews with subjects
- D. Using computer simulations

The best approach to investigate biological phenomena in living organisms is to observe them in their natural or controlled environments, a method that generally aligns with laboratory observations. Conducting research directly in a lab allows scientists to control variables and maintain consistency, leading to more reliable data regarding behavior, interactions, and responses of organisms. Purifying each chemical separately may provide insights into biochemical processes, but it does not directly lead to an understanding of the biological phenomena as they occur in living organisms. Conducting interviews with subjects is more applicable in fields like psychology or sociology and provides qualitative data, which may not sufficiently capture biological processes. Using computer simulations can be useful for modeling scenarios and predicting outcomes, but it does not replace the need for real-world observations and experiments. While simulations can complement research, they often rely on existing biological knowledge, which must be garnered from direct study of living organisms. Consequently, the most effective way to understand biological phenomena is through direct observation, ideally in both natural settings and the laboratory.

7. Which model is associated with an increase in the quantity of free energy?

- A. Equilibrium model
- B. Transition-state model**
- C. Dynamic equilibrium model
- D. Closed system model

The transition-state model is associated with an increase in the quantity of free energy because it describes the state during a chemical reaction where reactants are transformed into products. In this model, the transition state represents a high-energy state that is reached during the reaction process. Essentially, this high-energy intermediate decreases the activation energy for the reaction to proceed, allowing the system to move from reactants to products. As reactants are converted to products, free energy changes occur, which reflect the energy stored in the molecular bonds of the chemicals involved. The transition-state model highlights the importance of the energy barrier that must be overcome for a reaction to occur. Thus, the model is crucial for understanding how the energy profile of a reaction can lead to an overall change in free energy as reactants transition through various states. The concept of equilibrium does not apply here as it refers to a state where the forward and reverse reaction rates are equal, and there is no net change in free energy. Similarly, the dynamic equilibrium model emphasizes stability rather than free energy changes, and a closed system model does not specifically account for the free energy associated with reaction dynamics.

8. What components form outside the DNA helix?

- A. Amino acids and peptides
- B. Deoxyribose and phosphate groups**
- C. Nucleotides and ribose
- D. Single-stranded RNA

The components that form outside the DNA helix are deoxyribose and phosphate groups. In the structure of DNA, the backbone consists of deoxyribose sugars linked by phosphate groups. This structural design plays a crucial role in the stability of the DNA molecule and in protecting the genetic information encoded within the base pairs that lie inside the helix. Deoxyribose sugar forms part of the nucleotide structure, which is the building block of DNA. Each nucleotide is made up of a phosphate group, a deoxyribose sugar, and a nitrogenous base. The phosphate group connects to the 5' carbon of one deoxyribose and the 3' carbon of another, creating a strong phosphodiester bond that links the nucleotides together in a linear chain. This arrangement forms the strong, stable outer structure of the DNA molecule, while the nitrogenous bases (adenine, thymine, cytosine, and guanine) align in the center, forming base pairs through hydrogen bonding. This key structural insight highlights the importance of deoxyribose and phosphate groups in maintaining the integrity and function of DNA.

9. What is the chemical compound name of the Hydroxyl group?

- A. Aldehyde
- B. Alcohol**
- C. Ester
- D. Ketone

The hydroxyl group consists of an oxygen atom bonded to a hydrogen atom ($-OH$). Compounds that contain one or more hydroxyl groups are classified as alcohols. Alcohols can be simple, with just one hydroxyl group attached to a carbon chain, or complex, with multiple hydroxyl groups. This functional group is pivotal in organic chemistry and contributes to the properties of many substances, affecting their reactivity, solubility, and boiling points. In contrast, the other terms mentioned refer to different functional groups. Aldehydes contain a carbonyl group ($-C(=O)-$) at the end of a carbon chain, esters are formed from the reaction of an alcohol and a carboxylic acid, and ketones have a carbonyl group located within the carbon chain. Each of these compounds has distinct properties and reactivity that differ significantly from those of alcohols. Hence, recognizing that the presence of a hydroxyl group directly correlates with the classification of alcohols provides clarity in identifying these compounds.

10. What is mesophyll in plants?

- A. Outer layer of the leaf
- B. Green tissue in the interior of the leaf**
- C. Root tissue
- D. Stomatal openings

Mesophyll refers to the green tissue found in the interior of the leaf, primarily responsible for photosynthesis. This tissue is located between the upper epidermis and the lower epidermis of the leaf and comprises two main types of cells: palisade mesophyll and spongy mesophyll. The palisade mesophyll contains tightly packed cells that contain a high concentration of chloroplasts, making it particularly effective in capturing sunlight for photosynthesis. The spongy mesophyll, on the other hand, has more air spaces that facilitate the exchange of gases, such as carbon dioxide and oxygen, which are essential for the photosynthetic process. This structure allows for efficient light absorption, gas exchange, and support for the leaf's overall function in plant metabolism.

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://nystce160.examzify.com>

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

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