

HESI A2 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

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- 1. How are amino acids linked together?**
 - A. By hydrogen bonds**
 - B. By peptide bonds**
 - C. By ionic bonds**
 - D. By disulfide bonds**

- 2. What type of RNA carries instructions for protein synthesis from the nucleus to the ribosome?**
 - A. rRNA**
 - B. tRNA**
 - C. mRNA**
 - D. snRNA**

- 3. What is true regarding organisms that are described as autotrophs?**
 - A. They must consume other organisms for energy**
 - B. They can only be found in aquatic environments**
 - C. They are capable of photosynthesis or chemosynthesis**
 - D. They rely entirely on heterotrophs for energy**

- 4. Which macromolecule can be classified as a polymer of sugars?**
 - A. Proteins**
 - B. Nucleic acids**
 - C. Carbohydrates**
 - D. Lipids**

- 5. What is the function of chlorophyll in photosynthesis?**
 - A. To absorb light energy**
 - B. To produce glucose**
 - C. To release oxygen**
 - D. To transport water**

- 6. What structure helps to protect the cell and maintain its shape?**
- A. Cell wall**
 - B. Cell membrane**
 - C. Nucleus**
 - D. Cytoplasm**
- 7. Which component of the cell membrane is crucial for maintaining its fluidity?**
- A. Cholesterol**
 - B. Proteins**
 - C. Phospholipids**
 - D. Carbohydrates**
- 8. What process describes the division of one bacterium into two identical cells?**
- A. Mitosis**
 - B. Binary fission**
 - C. Meiosis**
 - D. Cell fusion**
- 9. Which factor contributes to the rate of photosynthesis by affecting the rate of biochemical reactions?**
- A. Water**
 - B. Chlorophyll concentration**
 - C. Temperature**
 - D. All of the above**
- 10. In aerobic cellular respiration, what role does oxygen play?**
- A. Reducing agent**
 - B. Energy source**
 - C. Oxidizing agent**
 - D. Fermenting agent**

Answers

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

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Explanations

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1. How are amino acids linked together?

- A. By hydrogen bonds
- B. By peptide bonds**
- C. By ionic bonds
- D. By disulfide bonds

Amino acids are linked together primarily through peptide bonds. A peptide bond forms between the carboxyl group of one amino acid and the amino group of another, resulting in the release of a water molecule—this reaction is known as a dehydration synthesis or condensation reaction. This bond is a covalent chemical bond, meaning that it is strong and holds the amino acids together in a linear chain, which subsequently folds into specific three-dimensional structures to form proteins. The formation of peptide bonds is crucial to protein synthesis and plays a vital role in determining the structure and function of proteins in biological systems. Overall, understanding peptide bonds is essential for grasping how proteins are built from individual amino acids and how they interact in biological pathways.

2. What type of RNA carries instructions for protein synthesis from the nucleus to the ribosome?

- A. rRNA
- B. tRNA
- C. mRNA**
- D. snRNA

Messenger RNA (mRNA) is responsible for carrying genetic instructions from the nucleus to the ribosome, where proteins are synthesized. It is synthesized during the transcription process, wherein the DNA sequence of a gene is copied to produce a complementary RNA strand. After mRNA is formed, it exits the nucleus through nuclear pores and travels to the ribosome in the cytoplasm, where it serves as a template for protein synthesis during translation. Ribosomal RNA (rRNA) is a component of ribosomes, providing structural support and playing a role in the catalytic activity of the ribosome but does not carry genetic instructions. Transfer RNA (tRNA) is involved in the actual process of translation by bringing the appropriate amino acids to the ribosome, matching them to the codons on the mRNA, but it does not carry instructions from the nucleus. Small nuclear RNA (snRNA) is primarily involved in the processing of pre-mRNA in the nucleus, such as splicing introns from the RNA transcript, rather than in transporting instructions for protein synthesis. Thus, mRNA is the correct answer as it uniquely fulfills the function of transmitting the genetic blueprint from DNA in the nucleus to the sites of protein synthesis, the ribosomes.

3. What is true regarding organisms that are described as autotrophs?

A. They must consume other organisms for energy

B. They can only be found in aquatic environments

C. They are capable of photosynthesis or chemosynthesis

D. They rely entirely on heterotrophs for energy

Organisms referred to as autotrophs are unique in their ability to produce their own food using one of two primary methods: photosynthesis or chemosynthesis. Photosynthetic autotrophs, such as plants, algae, and certain bacteria, utilize sunlight to convert carbon dioxide and water into glucose and oxygen, while chemosynthetic autotrophs, such as some bacteria found in hydrothermal vents, derive energy from chemical reactions, often involving inorganic molecules. This ability to synthesize their own food is what differentiates autotrophs from heterotrophs, which must obtain energy by consuming other organisms, either directly or indirectly. The other options imply restrictions or inaccuracies about the nature of autotrophs, such as their dependency on other organisms or limiting their environment, which do not reflect their fundamental capabilities as energy producers in diverse ecosystems.

4. Which macromolecule can be classified as a polymer of sugars?

A. Proteins

B. Nucleic acids

C. Carbohydrates

D. Lipids

Carbohydrates are indeed classified as polymers of sugars. They are formed by the bonding together of monosaccharides, which are simple sugars, through glycosidic linkages. This process creates disaccharides (such as sucrose and lactose) and polysaccharides (such as starch, glycogen, and cellulose). The repeating units of these polymers are the sugar molecules, which can vary in type and structure, but essentially all carbohydrates derive from these basic sugar units. In contrast, proteins are polymers made up of amino acids, nucleic acids are polymers of nucleotides, and lipids are not polymers; rather, they are a diverse group of hydrophobic molecules that include fats and oils. Therefore, carbohydrates stand out as the macromolecules specifically classified as polymers of sugars.

5. What is the function of chlorophyll in photosynthesis?

- A. To absorb light energy**
- B. To produce glucose**
- C. To release oxygen**
- D. To transport water**

Chlorophyll plays a critical role in photosynthesis primarily by absorbing light energy. This pigment is found in the chloroplasts of plant cells and captures sunlight, which is essential for the photosynthetic process. The absorbed light energy is then used to convert carbon dioxide and water into glucose, providing energy for the plant. While it's true that photosynthesis results in the production of glucose and the release of oxygen, these processes are indirect functions of chlorophyll. Chlorophyll itself does not produce glucose or release oxygen; rather, it is the light energy that it absorbs that drives these reactions forward. Similarly, transporting water is not a function of chlorophyll; instead, this is managed by the plant's root system and vascular tissues. Therefore, chlorophyll's primary function is indeed the absorption of light energy, making it indispensable for the process of photosynthesis.

6. What structure helps to protect the cell and maintain its shape?

- A. Cell wall**
- B. Cell membrane**
- C. Nucleus**
- D. Cytoplasm**

The cell wall is the correct answer because it provides structural support and protection to a plant cell, bacteria, fungi, and some protists. Composed mainly of cellulose in plants, the cell wall acts as a rigid outer layer that maintains the cell's shape and prevents excessive water uptake, which could lead to bursting. This protective layer also serves as a barrier against physical injury and pathogens, contributing significantly to the overall integrity of the cell. In contrast, the cell membrane, while crucial for maintaining homeostasis by regulating the entry and exit of substances, does not provide the same level of rigidity and support as the cell wall. The nucleus is primarily responsible for housing genetic material and regulating cellular activities but does not directly influence cell shape or provide structural protection. The cytoplasm encompasses the cell's interior, allowing organelles to function, but it lacks the structural properties that the cell wall possesses to protect and maintain the shape of the cell.

7. Which component of the cell membrane is crucial for maintaining its fluidity?

- A. Cholesterol**
- B. Proteins**
- C. Phospholipids**
- D. Carbohydrates**

The component of the cell membrane that is crucial for maintaining its fluidity is cholesterol. Cholesterol molecules are interspersed within the phospholipid bilayer of the membrane. This unique positioning helps to stabilize the membrane's structure across a range of temperatures. At higher temperatures, cholesterol helps prevent the phospholipids from becoming too fluid and losing their structural integrity. Conversely, at lower temperatures, cholesterol prevents the lipids from packing too closely together, which would make the membrane too rigid. While phospholipids form the fundamental structure of the cell membrane, it is cholesterol that directly influences the fluidity, allowing for proper cellular function, including mobility of proteins within the membrane and the movement of materials in and out of the cell. Thus, cholesterol plays a key role in maintaining the essential fluid characteristic of the membrane that supports cellular processes.

8. What process describes the division of one bacterium into two identical cells?

- A. Mitosis**
- B. Binary fission**
- C. Meiosis**
- D. Cell fusion**

The process that describes the division of one bacterium into two identical cells is binary fission. This is a form of asexual reproduction commonly seen in prokaryotic organisms such as bacteria. In binary fission, a bacterium grows to a certain size, replicates its genetic material, and then divides into two equal parts, resulting in two genetically identical daughter cells. During binary fission, the cell's DNA is copied, and as the cell prepares to divide, the two DNA molecules are separated, followed by the constriction of the cell membrane and cell wall. This results in two cells that are clones of the original, each containing identical genetic information. This method of reproduction allows for rapid population growth under favorable conditions, as a single bacterium can divide several times in a short period, exponentially increasing the number of bacteria.

9. Which factor contributes to the rate of photosynthesis by affecting the rate of biochemical reactions?

- A. Water**
- B. Chlorophyll concentration**
- C. Temperature**
- D. All of the above**

The rate of photosynthesis is influenced by multiple factors, and one significant aspect is the temperature of the environment. Temperature affects the kinetic energy of molecules, which in turn influences the speed of biochemical reactions that occur during photosynthesis. Higher temperatures generally increase the rate of these reactions up to a certain optimal point, beyond which the enzymes involved may denature and become ineffective. Additionally, water is essential for photosynthesis, as it not only provides the necessary hydrogen ions but also participates in the light-dependent reactions where it is split to release oxygen. Adequate water availability can enhance the photosynthetic process. Chlorophyll concentration is also crucial, as it is the pigment that captures light energy. A higher concentration of chlorophyll increases the plant's ability to absorb light, facilitating the light-dependent reactions that are fundamental to photosynthesis. Since all these factors—temperature, water, and chlorophyll concentration—work together to influence the biochemical reactions that drive photosynthesis, it's accurate to state that they collectively contribute to the overall rate of photosynthesis.

10. In aerobic cellular respiration, what role does oxygen play?

- A. Reducing agent**
- B. Energy source**
- C. Oxidizing agent**
- D. Fermenting agent**

In aerobic cellular respiration, oxygen serves as an oxidizing agent. This means that it accepts electrons during the electron transport chain, a critical stage of the respiration process. When glucose is metabolized, it gets oxidized, releasing energy in the form of ATP. Oxygen's role is vital because, at the end of the electron transport chain, it combines with these electrons and protons to form water, thereby facilitating the continuation of the chain reaction that generates more ATP. The significance of oxygen as an oxidizing agent lies in its ability to drive the process of ATP production efficiently. Without it, the entire aerobic process would halt, and the cells would be forced to rely on less efficient anaerobic pathways for energy, which produce far fewer ATP molecules per molecule of glucose. This demonstrates why oxygen is essential for maximizing energy production in aerobic organisms.

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://hesia2biology.examzify.com>

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

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