

HESI A2 SCIENCE 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. What is the definition of a virus?**
 - A. A living organism that reproduces independently**
 - B. A small infectious agent that requires a living host to multiply**
 - C. A type of bacteria that causes disease**
 - D. An antibiotic that fights infections**
- 2. Which type of genetic inheritance is characterized by a trait expressed with just one allele copy?**
 - A. Recessive inheritance**
 - B. Codominant inheritance**
 - C. Dominant inheritance**
 - D. Incomplete dominance**
- 3. Which cranial nerve is designated as cranial nerve #1?**
 - A. Olfactory**
 - B. Optic**
 - C. Vagus**
 - D. Trigeminal**
- 4. At what point during mitosis do the chromosomes (chromatids) separate?**
 - A. Prophase**
 - B. Metaphase**
 - C. Anaphase**
 - D. Telophase**
- 5. What type of reaction achieves a state of chemical equilibrium where the products have used almost all the reactants?**
 - A. Reversible reaction**
 - B. Irreversible reaction**
 - C. Endergonic reaction**
 - D. Exergonic reaction**

- 6. What is the primary role of the immune system?**
- A. To filter blood and produce urine**
 - B. To protect the body against pathogens and foreign substances**
 - C. To facilitate the exchange of gases in the lungs**
 - D. To regulate bodily functions through hormones**
- 7. What type of skeleton do starfish possess?**
- A. Endoskeleton**
 - B. Exoskeleton**
 - C. Hydrostatic skeleton**
 - D. Cartilaginous skeleton**
- 8. The atomic number of an element is determined by the number of which particle in the nucleus?**
- A. Neutrons**
 - B. Electrons**
 - C. Protons**
 - D. Nuclei**
- 9. What mechanism is applied when skeletal muscle contracts?**
- A. Sliding-filament mechanism**
 - B. Cross-bridge cycle**
 - C. Muscle spindle reflex**
 - D. Motor unit recruitment**
- 10. What occurs during the S phase of the cell cycle?**
- A. Cell growth and protein synthesis**
 - B. DNA replication takes place**
 - C. Cell division begins**
 - D. Chromosomes condense**

Answers

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

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Explanations

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1. What is the definition of a virus?

- A. A living organism that reproduces independently
- B. A small infectious agent that requires a living host to multiply**
- C. A type of bacteria that causes disease
- D. An antibiotic that fights infections

The definition of a virus as a small infectious agent that requires a living host to multiply is accurate because viruses cannot reproduce or carry out metabolic processes on their own. Unlike living organisms, viruses lack the cellular machinery needed for independent reproduction; instead, they invade the cells of a host organism. Once inside a host, a virus can take over the host's cellular mechanisms to produce copies of itself, leading to infection. The characteristics that define viruses as obligate intracellular parasites highlight their dependence on living hosts for propagation. This contrasts with bacteria, which are single-celled organisms capable of independent life and reproduction. Moreover, the statement is not applicable to antibiotics, which are used to treat bacterial infections rather than viral ones. Thus, option B effectively encapsulates the unique nature of viruses in a biological context.

2. Which type of genetic inheritance is characterized by a trait expressed with just one allele copy?

- A. Recessive inheritance
- B. Codominant inheritance
- C. Dominant inheritance**
- D. Incomplete dominance

The type of genetic inheritance characterized by a trait being expressed with just one allele copy is known as dominant inheritance. In this mode of inheritance, if an individual has at least one dominant allele for a specific trait, that trait will be expressed phenotypically, regardless of the presence of a second allele. For instance, in a scenario where a dominant allele is present alongside a recessive allele, the dominant trait will overshadow the recessive trait, and only the dominant trait will be observable in the organism. In contrast, recessive inheritance requires two copies of the recessive allele for the trait to present; thus, the presence of even one dominant allele would prevent the expression of a recessive trait. Codominant inheritance results in both alleles being fully expressed in a heterozygous individual, leading to traits that are a mix of both alleles rather than one masking the other. Incomplete dominance produces a blended phenotype, which arises when the alleles combine to produce a third phenotype that is distinct from both parent alleles. Understanding these types of inheritance patterns is crucial for predicting how traits might be passed on in genetic studies.

3. Which cranial nerve is designated as cranial nerve #1?

- A. Olfactory**
- B. Optic**
- C. Vagus**
- D. Trigeminal**

The cranial nerve designated as cranial nerve #1 is the olfactory nerve. This nerve is primarily responsible for the sense of smell. It is unique compared to other cranial nerves because it is essentially located in the forebrain and consists of sensory nerve fibers that transmit information from the nasal cavity to the olfactory bulb, allowing for the perception of odors. The olfactory nerve plays a critical role in the sensory experience of flavors, as the sense of smell is closely linked to taste. While the optic nerve, vagus nerve, and trigeminal nerve also serve important functions in sensory or motor pathways, they are not designated as cranial nerve #1. The optic nerve is crucial for vision, the vagus nerve is involved in autonomic functions, and the trigeminal nerve is responsible for sensation in the face and motor functions such as biting and chewing. Each of these nerves has a distinct pathway and function, but they are not associated with the sense of smell, which is the primary role of the olfactory nerve.

4. At what point during mitosis do the chromosomes (chromatids) separate?

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

During mitosis, the separation of the chromosomes, which are duplicated and held together at their centromeres, occurs during anaphase. In this phase, the centromeres split, allowing the sister chromatids to move toward opposite poles of the cell. This action is facilitated by the spindle fibers that pull the chromatids apart. Anaphase is the crucial stage in ensuring that each daughter cell will receive an identical set of chromosomes, making the distribution of genetic material accurate as the cell prepares to divide. The earlier phases, such as prophase and metaphase, are focused on the organization and alignment of chromosomes without actual separation, while telophase marks the end of nuclear division and the return to de-condensed chromatin, following the complete separation of the chromatids.

5. What type of reaction achieves a state of chemical equilibrium where the products have used almost all the reactants?

- A. Reversible reaction**
- B. Irreversible reaction**
- C. Endergonic reaction**
- D. Exergonic reaction**

In a chemical equilibrium context, an irreversible reaction is characterized by the reactants converting into products to nearly completion, resulting in the formation of products that do not readily revert back to reactants under normal conditions. In such reactions, the forward reaction proceeds to a point where the reactants are mostly consumed. This leads to a significant predominance of products, achieving a state of near-complete conversion. This contrasts with reversible reactions, where both reactants and products can convert back and forth, resulting in a balance between them. Endergonic and exergonic refer to the energy changes associated with the reactions but do not specifically address the completeness of reactant conversion to products or the nature of equilibrium. In summary, an irreversible reaction effectively utilizes almost all of the reactants, aligning perfectly with the question's premise regarding a state of chemical equilibrium.

6. What is the primary role of the immune system?

- A. To filter blood and produce urine**
- B. To protect the body against pathogens and foreign substances**
- C. To facilitate the exchange of gases in the lungs**
- D. To regulate bodily functions through hormones**

The primary role of the immune system is to protect the body against pathogens and foreign substances. The immune system achieves this through a complex network of cells, tissues, and organs that work together to identify and neutralize harmful invaders such as bacteria, viruses, and parasites. Key components of the immune system include white blood cells, antibodies, and lymphatic tissues, all of which play vital roles in detecting and responding to infections. When a pathogen enters the body, the immune system activates various responses, including the production of antibodies that specifically target the invader and the mobilization of immune cells that can directly attack and destroy it. This defense not only helps to eliminate current infections but also contributes to long-term immunity against future infections by remembering specific pathogens. The other choices represent different bodily functions. Filtration of blood and urine production is mainly the role of the kidneys, while facilitating gas exchange in the lungs involves the respiratory system. Regulating bodily functions through hormones pertains to the endocrine system. Each of these systems plays crucial roles, but they do not encompass the protective functions provided by the immune system.

7. What type of skeleton do starfish possess?

- A. Endoskeleton
- B. Exoskeleton
- C. Hydrostatic skeleton**
- D. Cartilaginous skeleton

Starfish, or sea stars, possess a hydrostatic skeleton, which is a type of support system that relies on the pressure of internal fluids. In starfish, the body is supported by a fleshy, water-filled coelom (the body cavity). This hydrostatic environment allows for movement and structural support, giving the starfish its unique ability to navigate its surroundings and extend or retract its arms. The hydrostatic skeleton works by using water pressure to help maintain the rigidity and shape of the organism. When muscles contract, they create a change in pressure within the fluid, affecting how the limbs move. This is particularly important for starfish, as they rely on this system to operate their tube feet, which they use for locomotion and feeding. In contrast, an endoskeleton is an internal support structure found in vertebrates and some invertebrates, while an exoskeleton refers to an external hard structure, typical of arthropods like insects and crustaceans. A cartilaginous skeleton, primarily made of cartilage rather than bone, is characteristic of certain fish like sharks and rays. Each of these options highlights different types of biological structures, with the hydrostatic skeleton being the correct choice for starfish due to their unique physiological traits.

8. The atomic number of an element is determined by the number of which particle in the nucleus?

- A. Neutrons
- B. Electrons
- C. Protons**
- D. Nuclei

The atomic number of an element is defined by the number of protons present in the nucleus of an atom. This is a fundamental property of an element that determines its identity; for example, hydrogen has an atomic number of 1 because it has one proton, while carbon has an atomic number of 6 due to having six protons. The atomic number plays a crucial role in the periodic table, as elements are arranged in order of increasing atomic number. This also influences the chemical behavior and properties of the element, as the number of protons affects the number of electrons in a neutral atom, which in turn influences how the element interacts with others. The other particles mentioned do not determine the atomic number: neutrons do not affect this measurement as they are neutral; electrons are involved in chemical bonding and charge neutrality but not in defining the atomic number; and the term "nuclei" refers to the plural form of nucleus or centers of atoms containing protons and neutrons, rather than a specific particle. Thus, the correct determination of atomic number points directly to the protons in the nucleus.

9. What mechanism is applied when skeletal muscle contracts?

A. Sliding-filament mechanism

B. Cross-bridge cycle

C. Muscle spindle reflex

D. Motor unit recruitment

The sliding-filament mechanism is the correct description of how skeletal muscle contracts. In this process, the actin and myosin filaments within the muscle fibers slide past one another, leading to contraction. When a muscle is stimulated by a nerve impulse, the myosin heads attach to specific binding sites on the actin filaments, forming cross-bridges. The myosin heads then pivot, pulling the actin filaments towards the center of the sarcomere, which is the basic contractile unit of muscle fibers. This action shortens the muscle, generating force and movement. The sliding-filament mechanism is crucial for muscle contraction, as it simplifies the understanding of how muscles can produce force and change length during various types of contraction—whether that's lifting a weight or performing athletic movements. Other options relate to different aspects of muscle function or regulation. For example, the cross-bridge cycle specifically refers to the series of events during the contraction process when the myosin heads bind, pivot, and release from actin; it is part of the broader sliding-filament mechanism. Meanwhile, the muscle spindle reflex pertains to the sensory mechanism that helps maintain muscle tone and protect muscles from injury, and motor unit recruitment involves the activation of additional motor units to increase

10. What occurs during the S phase of the cell cycle?

A. Cell growth and protein synthesis

B. DNA replication takes place

C. Cell division begins

D. Chromosomes condense

During the S phase of the cell cycle, DNA replication takes place. This phase is crucial because the primary purpose of the S phase is to duplicate the cell's genetic material, ensuring that each daughter cell will receive an identical set of chromosomes following cell division. The replication process involves unwinding the double helix structure of DNA and synthesizing complementary strands, a task carried out by various enzymes, including DNA polymerase. The importance of the S phase cannot be overstated, as it sets the foundation for the subsequent phases of the cell cycle. Without proper DNA replication during the S phase, the resulting daughter cells would not have the correct amount of genetic material, leading to potential cellular dysfunction or disease. This phase is distinct from other parts of the cell cycle, such as the G1 phase, where cell growth and protein synthesis occur, the M phase, which is dedicated to cell division, and the G2 phase, where cells prepare for division beyond just DNA replication. Thus, understanding the role of the S phase in DNA replication is essential for grasping how cells multiply and maintain genetic integrity.

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://hesia2science.examzify.com>

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