

Ohio Assessment for Educators (OAE) Integrated Science (024) Practice Exam (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. What phase precedes the metaphase stage in mitosis?
 - A. Telophase
 - B. Anaphase
 - C. Prophase
 - D. Interphase

2. Which of the following connects muscle to bone?
 - A. Fascia
 - B. Cartilage
 - C. Ligament
 - D. Tendon

3. What atomic model is associated with John Dalton?
 - A. Rutherford model
 - B. Plum pudding model
 - C. Billiard ball model
 - D. Quantum model

4. What does heat of fusion refer to?
 - A. Energy required to change a solid to a gas
 - B. Energy required to keep a substance at a constant temperature
 - C. Energy required to change a substance from the solid phase to the liquid phase
 - D. Energy required for a substance to evaporate

5. Which phenomenon is driven primarily by the temperature difference between land and water?
 - A. Sea breeze
 - B. Chinook winds
 - C. Monsoon winds
 - D. Santa Ana winds

6. What type of weather is typically associated with low pressure systems?
- A. Clear skies and calm winds
 - B. Stormy weather and high winds
 - C. Dry heat and low humidity
 - D. Cool air and no precipitation
7. Who is known for their contributions to the understanding of DNA structure through X-ray diffraction?
- A. James Watson
 - B. Francis Crick
 - C. Rosalind Franklin
 - D. Linus Pauling
8. How does the radius of a solenoid affect its magnetic field strength?
- A. It has no effect on the field strength
 - B. A larger radius increases the field strength
 - C. A smaller radius increases the field strength
 - D. It only affects the direction of the field
9. What characterizes Huntington's disease in humans?
- A. Uncontrolled body movements
 - B. Loss of vision
 - C. Developmental delay
 - D. Skin disorders
10. What do kinetic molecular theory principles suggest about gas particles?
- A. Their volume is significant
 - B. Their interactions are negligible
 - C. They are all identical
 - D. They are not affected by temperature

Answers

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

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Explanations

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1. What phase precedes the metaphase stage in mitosis?

- A. Telophase
- B. Anaphase
- C. Prophase
- D. Interphase

The phase that comes before metaphase in mitosis is prophase. During prophase, several important processes occur. The chromatin condenses into distinct chromosomes, which are visible under a microscope. Each chromosome consists of two sister chromatids joined at a point called the centromere. The nuclear envelope begins to break down, and the mitotic spindle starts to form from the centrosomes, which move to opposite poles of the cell. This preparation is crucial because it ensures that, during metaphase, chromosomes can line up correctly at the cell's equatorial plane, allowing for proper separation during the subsequent anaphase. The actions taken during prophase set the stage for the alignment and eventual division of chromosomes, emphasizing the importance of this phase in the overall process of mitosis. Each phase of mitosis has a specific role, and the sequence must be followed correctly to ensure successful cell division.

2. Which of the following connects muscle to bone?

- A. Fascia
- B. Cartilage
- C. Ligament
- D. Tendon

The correct choice is tendon, as tendons are the fibrous connective tissues that specifically attach muscles to bones. This connection allows for the transfer of force generated by the muscles to the bones, enabling movement at the joints. Tendons are crucial for the functioning of the musculoskeletal system, as they provide the necessary support and strength for physical activities. Fascia refers to the connective tissue that surrounds muscles, groups of muscles, and other structures, but it does not directly attach muscles to bones. Cartilage is a flexible connective tissue found in various parts of the body, such as joints and the ear, but it serves different functions, such as cushioning and supporting structures rather than connecting muscles to bones. Ligaments connect bone to bone, providing stability to joints rather than linking muscles to bones. Thus, the role of tendons is unique in the context of muscular movement and skeletal connections.

3. What atomic model is associated with John Dalton?

- A. Rutherford model
- B. Plum pudding model
- C. Billiard ball model
- D. Quantum model

The atomic model associated with John Dalton is known as the billiard ball model. This concept, introduced in the early 19th century, suggests that atoms are solid, indivisible spheres, akin to billiard balls, that combine in specific ratios to form compounds. Dalton's model emphasized the idea that each element consists of unique atoms that differ in mass and size, and it laid the groundwork for modern atomic theory by providing a systematic way to understand chemical reactions in terms of how atoms interact with one another. In Dalton's view, atoms are distinct and represent the fundamental building blocks of matter, leading to a better understanding of chemical combinations and the law of multiple proportions. This straightforward, macroscopic view of atomic structure was essential in bridging the gap between classical chemistry and the more complex atomic theories that followed later.

4. What does heat of fusion refer to?

- A. Energy required to change a solid to a gas
- B. Energy required to keep a substance at a constant temperature
- C. Energy required to change a substance from the solid phase to the liquid phase
- D. Energy required for a substance to evaporate

Heat of fusion refers to the amount of energy required to change a substance from the solid phase to the liquid phase at its melting point, without a change in temperature. This process involves breaking the intermolecular forces that hold the molecules together in a solid state, allowing them to move freely and form a liquid. In this phase transition, the temperature remains constant until all of the solid has melted. Understanding the heat of fusion is crucial in various scientific and practical contexts, such as calculating energy requirements in phase changes during heating and cooling processes, or in various industrial applications where substances change states.

5. Which phenomenon is driven primarily by the temperature difference between land and water?

- A. Sea breeze
- B. Chinook winds
- C. Monsoon winds
- D. Santa Ana winds

The phenomenon primarily driven by the temperature difference between land and water is the sea breeze. This occurs when the sun heats the land more quickly than it heats the water. During the day, the warm air over the land rises, creating an area of low pressure. Meanwhile, the cooler air over the water, which is denser, moves in to replace the rising warm air, resulting in a breeze from the sea toward the land. This temperature differential is the key factor in generating a sea breeze. Other phenomena, such as Chinook winds, monsoon winds, and Santa Ana winds, are influenced by different meteorological factors, such as orographic lifting (Chinook winds), seasonal changes in wind patterns (monsoon winds), or high-pressure systems related to local geography (Santa Ana winds). While these winds may also be affected by temperature differences in broader contexts, they are not primarily driven by the direct temperature distinctions between land and water, which is what characterizes the sea breeze.

6. What type of weather is typically associated with low pressure systems?

- A. Clear skies and calm winds
- B. Stormy weather and high winds
- C. Dry heat and low humidity
- D. Cool air and no precipitation

Low pressure systems are generally associated with stormy weather and high winds due to the way they influence atmospheric conditions. In a low pressure area, the air is rising, which leads to the formation of clouds and precipitation as the moisture in the air condenses. This process can create storms, including rain, thunderstorms, and potentially severe weather conditions, depending on the intensity of the low pressure system. The rising air creates a vacuum effect, drawing in surrounding air to replace it; this contributes to increased wind speeds. As a result, low pressure systems are often characterized by active weather patterns that include strong winds and the potential for storms, making the association with stormy weather and high winds accurate. Understanding this relationship is essential for forecasting weather patterns and recognizing how atmospheric pressure can impact local and regional climates.

7. Who is known for their contributions to the understanding of DNA structure through X-ray diffraction?

- A. James Watson
- B. Francis Crick
- C. Rosalind Franklin
- D. Linus Pauling

Rosalind Franklin is recognized for her pivotal contributions to the understanding of DNA structure through her work with X-ray diffraction. Her meticulous experiments produced critical X-ray photographs of DNA, notably Photo 51, which revealed the helical structure of the molecule. This distinctive diffraction pattern provided essential insights into the dimensions and helical nature of DNA, which were instrumental in the eventual formulation of the double helix model by Watson and Crick. Her pioneering use of X-ray crystallography in biology laid the groundwork for biochemistry and genetics, making her contributions foundational to our comprehension of genetic material.

8. How does the radius of a solenoid affect its magnetic field strength?

- A. It has no effect on the field strength
- B. A larger radius increases the field strength
- C. A smaller radius increases the field strength
- D. It only affects the direction of the field

The relationship between the radius of a solenoid and its magnetic field strength can be understood through the principles of electromagnetism. The magnetic field inside a long solenoid is defined primarily by the number of turns of wire per unit length and the current flowing through the wire, according to the formula $(B = \mu_0 \cdot \frac{N}{L} \cdot I)$, where (B) is the magnetic field strength, (μ_0) is the permeability of free space, (N) is the number of turns, (L) is the length of the solenoid, and (I) is the current. When considering the radius of the solenoid, while the formula does not explicitly include the radius, the geometry affects the uniformity and distribution of the magnetic field. A larger radius tends to distribute the magnetic lines of force over a larger area, leading to a more spread-out field that can sometimes give the impression that the field strength decreases on a per unit area basis at any particular point if viewed superficially. However, the effective magnetic field strength inside the solenoid tends to be more uniform and can be perceived as being stronger because the total area affected by the magnetic field

9. What characterizes Huntington's disease in humans?

- A. Uncontrolled body movements
- B. Loss of vision
- C. Developmental delay
- D. Skin disorders

Huntington's disease is characterized primarily by the presence of uncontrolled body movements, known as chorea. This neurological disorder is caused by a genetic mutation leading to progressive degeneration of nerve cells in the brain. The uncontrolled movements can manifest as jerky, dance-like motions affecting various parts of the body, and they usually become more pronounced as the disease progresses. While Huntington's disease can lead to various symptoms over time, including cognitive decline and emotional disturbances, the hallmark feature that distinguishes it is indeed these involuntary movements. The other options, such as loss of vision, developmental delay, and skin disorders, are not typical characteristics associated with Huntington's disease, making the first option the clear and accurate identification of its primary symptom.

10. What do kinetic molecular theory principles suggest about gas particles?

- A. Their volume is significant
- B. Their interactions are negligible
- C. They are all identical
- D. They are not affected by temperature

The principles of kinetic molecular theory (KMT) emphasize that gas particles are in constant random motion and that they occupy a relatively large volume compared to the size of the particles themselves. One of the critical aspects of KMT is the assertion that the interactions between gas particles are negligible, especially when the gas is ideal or at low pressures. This means that gas particles do not exert significant forces on one another, and their behavior can be effectively analyzed without considering intermolecular forces. This principle is crucial for understanding gas laws and their behaviors under various conditions. In an ideal gas, the particles move freely without any substantial attraction or repulsion, facilitating their distribution throughout a given volume, which allows them to fill containers uniformly. In the context of the other options, gas particles do not have significant volume relative to the container they occupy, which makes discussing their volume as significant inaccurate. While gases can be treated as identical in behavior under certain conditions, KMT does not imply that gas particles are all identical in terms of mass or velocity; rather, they can vary. Additionally, temperature has a direct impact on the kinetic energy of gas particles, affecting their velocity and behavior, contrary to the idea that they are not affected by temperature.

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://oae-integratedscience-024.examzify.com>

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

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