

Ohio Assessments for Educators (OAE) Middle Grades Science (OAE 029) 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 is glycolysis primarily responsible for breaking down?

- A. Proteins**
- B. Fats**
- C. Carbohydrates and sugars**
- D. Nucleic acids**

2. What does SDS stand for in a laboratory context?

- A. Safety Data Sheets**
- B. Standard Data Sheets**
- C. System Data Specification**
- D. Scientific Data Sheets**

3. Which technique is used to separate mixtures of molecules in the laboratory?

- A. Electrophoresis**
- B. Chromatography**
- C. Centrifugation**
- D. Distillation**

4. Flatworms are a characteristic of which phylum?

- A. Platyhelminthes**
- B. Nematoda**
- C. Echinodermata**
- D. Porifera**

5. What is the purpose of using chromatography in a laboratory?

- A. To separate or analyze a mixture of compounds**
- B. To visualize cells under a microscope**
- C. To measure electrical conductivity**
- D. To cool samples effectively**

6. Which greenhouse gas is primarily emitted by landfills?

- A. Carbon Dioxide**
- B. Methane**
- C. Nitrous Oxide**
- D. Ozone**

7. What is a nucleotide?

- A. A type of monomer for proteins**
- B. A building block of DNA or RNA**
- C. A type of fat molecule**
- D. An organelle involved in energy production**

8. What does a karyotype display?

- A. A sequence of nucleotides in DNA**
- B. A picture of chromosomes based on a sample of blood or skin**
- C. The biochemical pathways in a cell**
- D. The expression patterns of specific genes**

9. What is the formula to convert Fahrenheit to Celsius?

- A. $C = 5/9 (F - 32)$**
- B. $C = 9/5 (F + 32)$**
- C. $C = F + 32$**
- D. $C = 32 - 5/9 (F)$**

10. What is the primary function of a centrifuge?

- A. To measure light absorption**
- B. To separate components of a heterogeneous mixture**
- C. To analyze chemical reactions**
- D. To perform chromatography**

Answers

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

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Explanations

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1. What is glycolysis primarily responsible for breaking down?

- A. Proteins**
- B. Fats**
- C. Carbohydrates and sugars**
- D. Nucleic acids**

Glycolysis is a metabolic pathway that primarily breaks down carbohydrates and sugars to produce energy for the cell. This process occurs in the cytoplasm of cells and involves the conversion of glucose, a simple sugar, into pyruvate, while generating a small amount of ATP (adenosine triphosphate) and NADH (nicotinamide adenine dinucleotide).

Glycolysis is the first step in cellular respiration and is crucial for organisms, as it provides the necessary energy for various cellular processes. The focus on carbohydrates and sugars highlights the essential role glycolysis plays in energy production, especially in scenarios where oxygen is limited or absent, allowing cells to extract energy efficiently from these macronutrients.

2. What does SDS stand for in a laboratory context?

- A. Safety Data Sheets**
- B. Standard Data Sheets**
- C. System Data Specification**
- D. Scientific Data Sheets**

In a laboratory context, SDS stands for Safety Data Sheets. These documents play a critical role in ensuring workplace safety by providing detailed information about hazardous substances, including their properties, dangers, handling practices, and emergency response measures. Safety Data Sheets are essential for complying with safety regulations and ensuring that all personnel are informed about the chemicals they may encounter in the workplace. They are formatted consistently to enable easy access to vital safety information, helping to prevent accidents and promote safe practices in laboratories and other environments where chemicals are used.

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3. Which technique is used to separate mixtures of molecules in the laboratory?

- A. Electrophoresis**
- B. Chromatography**
- C. Centrifugation**
- D. Distillation**

The technique of chromatography is used to separate mixtures of molecules based on their different affinities for a stationary phase and a mobile phase. In chromatography, a sample mixture is placed on a medium that serves as the stationary phase, such as paper, silica, or a gel. A solvent, which acts as the mobile phase, is then passed over the stationary phase. As the solvent moves, the different components of the mixture interact with the stationary phase to varying degrees, causing them to move at different rates. This results in the separation of the components as they travel along the stationary phase. Chromatography is widely used in various fields, including chemistry, biology, and environmental science, for tasks like analyzing compounds, purifying substances, and separating colors in dyes or pigments. In comparison, the other techniques mentioned also separate mixtures but do so based on different principles. Electrophoresis separates molecules based on their charge and size when an electric field is applied. Centrifugation separates components based on density by spinning samples at high speeds, causing heavier particles to move to the bottom. Distillation separates liquids based on differences in boiling points. While each method is effective for specific types of mixtures, chromatography is uniquely suitable for separating a wide range of molecular mixtures.

4. Flatworms are a characteristic of which phylum?

- A. Platyhelminthes**
- B. Nematoda**
- C. Echinodermata**
- D. Porifera**

Flatworms belong to the phylum Platyhelminthes. This group is characterized by their flattened body structure, which is a key feature that distinguishes them from other invertebrates. Members of this phylum can be free-living or parasitic and include notable examples such as planarians, flukes, and tapeworms. Platyhelminthes are known for having bilateral symmetry and a relatively simple body plan, lacking coelomic body cavities and a complete digestive system in many species. This structural adaptation allows for various ecological roles and life strategies, including complex life cycles in some parasitic flatworms. Understanding the distinct characteristics of flatworms and their classification within Platyhelminthes is crucial in the study of biology and helps to differentiate them from other phyla like Nematoda (roundworms), Echinodermata (like starfish and sea urchins), and Porifera (sponges), which have entirely different body structures and biological functions.

5. What is the purpose of using chromatography in a laboratory?

- A. To separate or analyze a mixture of compounds**
- B. To visualize cells under a microscope**
- C. To measure electrical conductivity**
- D. To cool samples effectively**

Using chromatography in a laboratory serves the primary purpose of separating or analyzing a mixture of compounds. This technique allows scientists to separate different components within a mixture based on their differing affinities for a stationary phase and a mobile phase. Depending on the type of chromatography being used, such as paper chromatography or high-performance liquid chromatography (HPLC), various interactions help to isolate specific substances from complex mixtures. This separation is crucial in many fields, such as chemistry, biology, and environmental science, because it enables scientists to identify and quantify substances accurately. For instance, in environmental testing, chromatography can be used to detect pollutants in water or air samples, and in pharmaceutical research, it can help in purifying compounds for drug development. The other options do not apply to chromatography. Visualizing cells under a microscope is a different fundamental technique in biology, measuring electrical conductivity relates to electrical properties of materials, and cooling samples effectively does not pertain to the functions of chromatography, which are focused on analysis and separation rather than temperature management.

6. Which greenhouse gas is primarily emitted by landfills?

- A. Carbon Dioxide**
- B. Methane**
- C. Nitrous Oxide**
- D. Ozone**

The primary greenhouse gas emitted by landfills is methane. When organic waste, such as food scraps and yard waste, decomposes anaerobically (in the absence of oxygen), it produces methane as a byproduct. This process occurs in the deeper layers of a landfill, where there is insufficient oxygen to fully oxidize the organic material into carbon dioxide. Methane is significantly more potent as a greenhouse gas compared to carbon dioxide, having a much higher global warming potential over a short time frame. Due to this strong greenhouse effect, the management of methane emissions from landfills is a critical aspect of climate change mitigation efforts. Understanding this mechanism is essential for addressing greenhouse gas emissions and implementing more sustainable waste management practices. In contrast, while carbon dioxide, nitrous oxide, and ozone are also greenhouse gases, they are generated through different processes and are not primarily linked to landfill waste decomposition.

7. What is a nucleotide?

- A. A type of monomer for proteins
- B. A building block of DNA or RNA**
- C. A type of fat molecule
- D. An organelle involved in energy production

A nucleotide is a fundamental building block of DNA and RNA, which are essential molecules in the storage and transmission of genetic information in living organisms. Each nucleotide consists of three components: a nitrogenous base, a five-carbon sugar (ribose in RNA and deoxyribose in DNA), and one or more phosphate groups. In the structure of DNA and RNA, nucleotides join together to form long chains, allowing for the combination of sequences that code for proteins and other biological functions. The specific sequence of these nucleotides encodes the genetic information that dictates an organism's traits and functions. Understanding the role of nucleotides is crucial in genetics, molecular biology, and biochemistry, as they are vital for processes such as DNA replication, transcription, and translation.

8. What does a karyotype display?

- A. A sequence of nucleotides in DNA
- B. A picture of chromosomes based on a sample of blood or skin**
- C. The biochemical pathways in a cell
- D. The expression patterns of specific genes

A karyotype is a visual representation of an organism's complete set of chromosomes, typically obtained from a sample of blood or skin. This process involves staining the chromosomes to produce a distinct pattern, allowing for the examination of their number, size, and shape. Karyotyping is primarily used to diagnose chromosomal abnormalities, such as Down syndrome or Turner syndrome, by comparing the observed karyotype to the normal chromosomal count and structure expected for a species. The focus of a karyotype is on the chromosomal makeup rather than the genetic sequences, biochemical pathways, or gene expression patterns that other options mention. Thus, the provided answer accurately captures the essence of what a karyotype represents in genetics.

9. What is the formula to convert Fahrenheit to Celsius?

- A. $C = 5/9 (F - 32)$**
- B. $C = 9/5 (F + 32)$
- C. $C = F + 32$
- D. $C = 32 - 5/9 (F)$

The correct formula to convert Fahrenheit to Celsius is based on the relationship between the two temperature scales. The formula is expressed as $C = 5/9 (F - 32)$. This equation works by first subtracting 32 from the Fahrenheit temperature, which accounts for the offset between the two scales. The resulting value is then multiplied by the fraction 5/9, which adjusts for the different scales' increments. This conversion reflects that a change of 1 degree Celsius is equal to a change of 1.8 degrees Fahrenheit, and thus the conversion factor is derived from the ratio of these changes. Understanding this formula is essential for accurately converting temperatures in scientific contexts, as precise measurements can influence outcomes in experiments and practical applications.

10. What is the primary function of a centrifuge?

- A. To measure light absorption**
- B. To separate components of a heterogeneous mixture**
- C. To analyze chemical reactions**
- D. To perform chromatography**

The primary function of a centrifuge is to separate components of a heterogeneous mixture based on their different densities. When a mixture is placed in the centrifuge and spun at high speeds, the centrifugal force causes the denser materials to move outward to the bottom of the tube, while the less dense materials rise toward the top. This process enables scientists and researchers to effectively isolate specific components, such as cells from blood or precipitates from a liquid, making centrifugation a crucial technique in many scientific fields including biology and chemistry. In the context of the other choices, measuring light absorption involves using spectrophotometers, which assess how much light a substance absorbs at specific wavelengths but does not involve separation processes. Analyzing chemical reactions involves techniques like titration or spectroscopy but does not relate to the physical separation of materials. Chromatography is a separate method used to separate mixtures based on differential affinities of various components to stationary and mobile phases, which is distinct from the separation mechanism employed by a centrifuge.

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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://oaemiddlegradesscience-uae029.examzify.com>

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

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