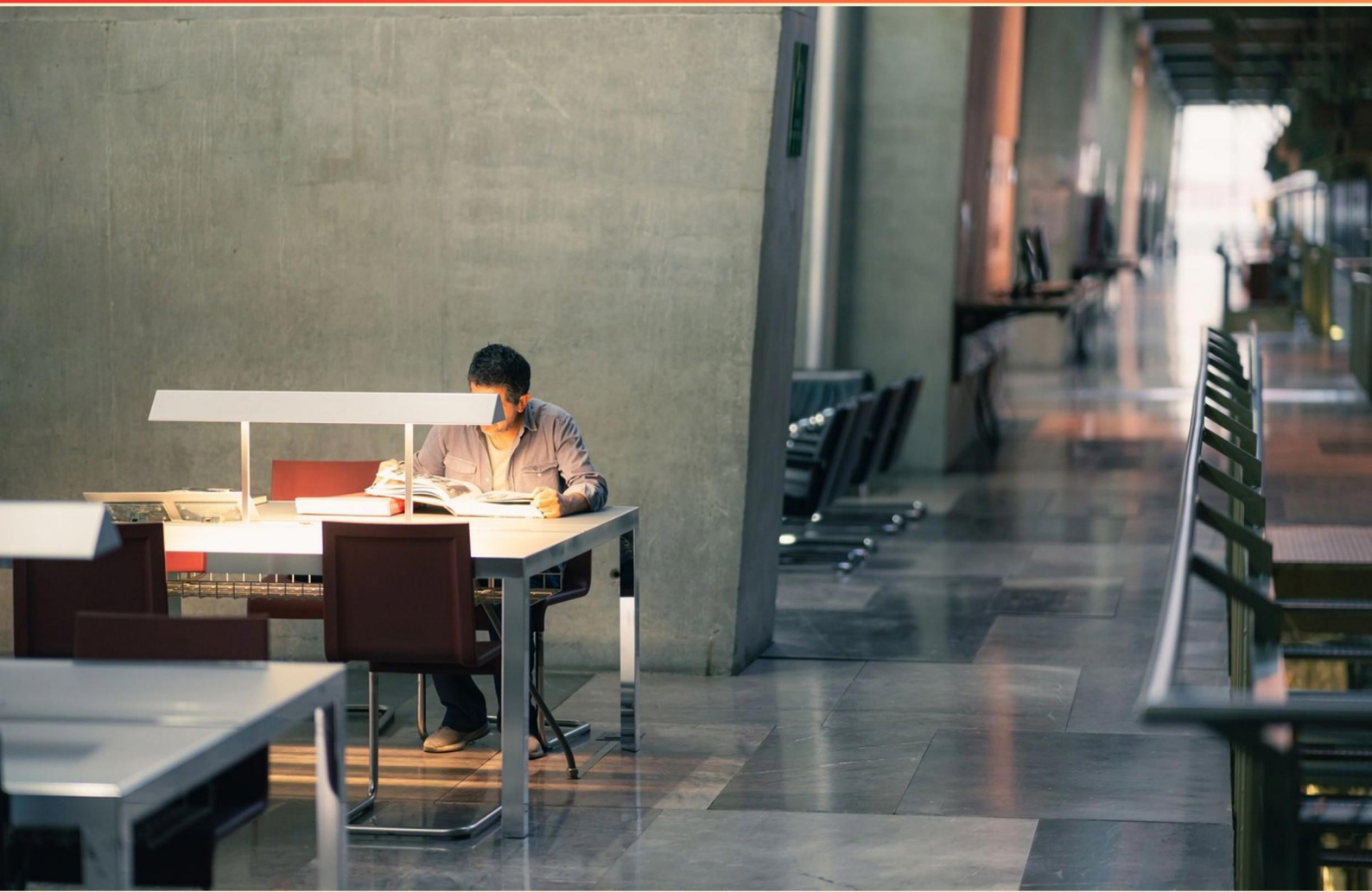


MEDICAL COLLEGE ADMISSION TEST (MCAT) PRACTICE EXAM (SAMPLE)

STUDY GUIDE



**SAMPLE STUDY GUIDE
WITH LIMITED QUESTIONS**

**VISIT US ONLINE FOR
THE FULL VERSION STUDY GUIDE**

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Table of Contents

Copyright	1
Table of Contents	2
Introduction	3
How to Use This Guide	4
Questions	5
Answers	8
Explanations	10
Next Steps	16

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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 physiological change occurs upon exhalation in mammals?**
 - A. Volume decrease and pressure increase
 - B. Volume increase and pressure decrease
 - C. Static lung volume
 - D. Constant internal pressure
- 2. What types of solute-solvent interactions are best for forming solutions?**
 - A. Solute-solute interactions only
 - B. Solvent-solvent interactions only
 - C. Similar solute-solute, solvent-solvent, and solute-solvent interactions
 - D. Highly dissimilar interactions
- 3. Which type of selection leads to the production of multiple phenotypes?**
 - A. Stabilizing selection
 - B. Disruptive selection
 - C. Directional selection
 - D. Artificial selection
- 4. What two substances contribute to the hydrophobic properties of surfactants?**
 - A. Fatty acids and glycerol
 - B. Phospholipids and proteins
 - C. Sugars and amino acids
 - D. Proteins and nucleic acids
- 5. A log graph translates to what shape on log scales?**
 - A. Curved line with zero slope
 - B. Straight line with non-zero slope if there is variation
 - C. Flat line indicating no variation
 - D. Exponential curve

- 6. What is the primary consequence of a neurotransmitter like acetylcholine binding to a receptor?**
- A. Inhibition of muscle contraction
 - B. Increase in muscle twitch frequency
 - C. Decrease in synaptic activity
 - D. Modification of neurotransmitter release
- 7. Where is a step-up transformer typically located in a power distribution system?**
- A. After the transformers
 - B. Before the transformers
 - C. In the middle of the circuit
 - D. At ground level
- 8. How does removing the second resistor from a series circuit affect the current drawn from the battery?**
- A. It decreases it
 - B. It remains the same
 - C. It increases it
 - D. It fluctuates
- 9. What formula can be used to calculate delta G?**
- A. $\Delta G = \Delta H + T(\Delta S)$
 - B. $\Delta G = \Delta H - T(\Delta S)$
 - C. $\Delta G = \Delta H / T(\Delta S)$
 - D. $\Delta G = \Delta H + S$
- 10. The Michaelis-Menten kinetics model is based on what key principle?**
- A. Multiple active sites available
 - B. Competitive inhibition of substrates
 - C. A single active site can bind substrate
 - D. Enzyme catalysis without substrates

Answers

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

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Explanations

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1. What physiological change occurs upon exhalation in mammals?

- A. Volume decrease and pressure increase**
- B. Volume increase and pressure decrease
- C. Static lung volume
- D. Constant internal pressure

Upon exhalation in mammals, the diaphragm and intercostal muscles relax, leading to a decrease in the volume of the thoracic cavity. As the volume of the thoracic cavity decreases, the pressure within the lungs increases due to Boyle's Law, which states that pressure and volume are inversely related in a closed system. Consequently, this increase in pressure drives air out of the lungs and into the environment until pressures equalize. The choice concerning volume decrease and pressure increase accurately reflects this physiological process. The lungs themselves expel air as a result of the higher intra-thoracic pressure compared to the atmospheric pressure, which facilitates the movement of air out of the lungs. In contrast, the option regarding volume increase and pressure decrease does not align with the mechanics of exhalation. During exhalation, the lung volume does not increase; rather, it decreases. The selection about static lung volume and constant internal pressure misrepresents the dynamic changes occurring during breathing. Lungs do not remain static during breathing cycles, as they continually fluctuate in volume and pressure in response to inhalation and exhalation.

2. What types of solute-solvent interactions are best for forming solutions?

- A. Solute-solute interactions only
- B. Solvent-solvent interactions only
- C. Similar solute-solute, solvent-solvent, and solute-solvent interactions**
- D. Highly dissimilar interactions

The formation of solutions relies heavily on the interactions between solute and solvent particles. For a solution to form effectively, it is crucial that the interactions between solute-solvent particles are comparable in strength to the interactions present between solute-solute and solvent-solvent particles. When solute-solvent interactions are similar in strength to solute-solute and solvent-solvent interactions, this creates a favorable environment for solution formation because it allows for a balance that promotes mixing and dissolution. For instance, when salt (solute) is dissolved in water (solvent), the ionic interactions of salt with water molecules (solute-solvent interactions) must be strong enough to overcome the ionic bonds holding the salt together (solute-solute interactions) and the hydrogen bonds between water molecules (solvent-solvent interactions). The presence of similar interactions across these types helps to ensure that the components can dissolve and remain mixed, leading to a successful and stable solution. This concept is often summarized by the phrase "like dissolves like," indicating that polar solvents generally dissolve polar solutes, and nonpolar solvents dissolve nonpolar solutes, highlighting the importance of similar interactions in solution formation.

3. Which type of selection leads to the production of multiple phenotypes?

- A. Stabilizing selection
- B. Disruptive selection**
- C. Directional selection
- D. Artificial selection

Disruptive selection is a type of natural selection that promotes the existence of multiple phenotypes within a population. In this process, individuals at both extremes of a trait distribution have a selective advantage over intermediate phenotypes. As a result, the population may diverge, leading to an increase in the variety of phenotypes that are present. For instance, consider a scenario where a particular trait, such as beak size in birds, is advantageous for both small and large seeds, while those with intermediate beak sizes are less efficient in obtaining food. This selection pressure favors the extreme phenotypes, leading to a greater diversity of traits. In contrast, stabilizing selection works to eliminate extremes and favor intermediate phenotypes, thus reducing variation within a population. Directional selection shifts the population trait distribution toward one extreme, leading to a predominance of a single phenotype over time. Artificial selection is a process driven by human intervention to selectively breed individuals with desired traits, which can also reduce genetic diversity rather than promote it. Therefore, disruptive selection is the mechanism that specifically enhances the presence of multiple phenotypes in a population, fostering diversity and adaptation.

4. What two substances contribute to the hydrophobic properties of surfactants?

- A. Fatty acids and glycerol
- B. Phospholipids and proteins**
- C. Sugars and amino acids
- D. Proteins and nucleic acids

Surfactants are compounds that lower the surface tension between two liquids or between a liquid and a solid. They possess both hydrophobic (water-repelling) and hydrophilic (water-attracting) properties, which allows them to interact with both water and oily substances effectively. The hydrophobic properties of surfactants are primarily attributed to their structure, which typically includes long hydrocarbon chains or fatty acid tails that are nonpolar. Phospholipids, for instance, have a hydrophilic "head" that is attracted to water and hydrophobic "tails" that repel water. This amphipathic nature is essential for surfactants to minimize surface tension and stabilize emulsions or foams. In contrast, fatty acids alone do contribute hydrophobic characteristics, but glycerol primarily provides hydrophilic properties when associated with phospholipids, forming the backbone of lipid structures as part of cell membranes. Sugars and amino acids primarily introduce hydrophilic interactions, while proteins and nucleic acids may contribute to various functions but do not directly enhance hydrophobic properties in the context of surfactants. Therefore, phospholipids, with their inherent amphipathic nature, are key players in providing the hydrophobic characteristics that

5. A log graph translates to what shape on log scales?

- A. Curved line with zero slope
- B. Straight line with non-zero slope if there is variation**
- C. Flat line indicating no variation
- D. Exponential curve

When a relationship is plotted on a log-log scale, it transforms any power law relationship into a linear representation. This means that if the original data reflects variation, the plotted graph will appear as a straight line rather than a curve. The slope of this line corresponds to the exponent of the power law relationship. Therefore, a straight line with a non-zero slope is indicative of a relationship where the variables involved are related by a power function, demonstrating that there is indeed variation in the data. In contrast, if the variation were to be absent, the graph would show a flat line, signifying no change irrespective of the values on the axes. Additionally, if there were a relationship involving exponential growth, it would not appear as a straight line on a log-log plot, but rather as a curve that implies a differing type of relationship than a linear association. Thus, the chosen answer accurately reflects the behavior of data on log scales when variation is present.

6. What is the primary consequence of a neurotransmitter like acetylcholine binding to a receptor?

- A. Inhibition of muscle contraction
- B. Increase in muscle twitch frequency**
- C. Decrease in synaptic activity
- D. Modification of neurotransmitter release

When acetylcholine binds to its receptors, particularly in the context of the neuromuscular junction, the primary consequence is the stimulation of muscle contraction. When acetylcholine is released from the nerve endings, it acts on the nicotinic acetylcholine receptors located on the motor end plate of muscle fibers. The binding triggers a series of events that leads to depolarization of the muscle cell membrane, ultimately resulting in an action potential that initiates muscle contraction. Increased muscle twitch frequency occurs as muscle fibers respond to the multiple stimuli provided by acetylcholine. The more acetylcholine that binds to its receptors, the greater the likelihood of generating action potentials in muscle cells, leading to rapid, successive muscle contractions. Therefore, the association of acetylcholine with its receptors is fundamentally tied to muscle activation and twitching behavior. This is why the selection of increased muscle twitch frequency as a consequence of acetylcholine binding is appropriate, reflecting its role in facilitating muscle contraction when appropriately stimulated.

7. Where is a step-up transformer typically located in a power distribution system?

- A. After the transformers
- B. Before the transformers**
- C. In the middle of the circuit
- D. At ground level

A step-up transformer is specifically designed to increase the voltage level of electrical power for efficient transmission over long distances. In a typical power distribution system, these transformers are placed before the transmission lines to elevate the voltage from the generation level to a higher voltage level suitable for transmission. The reason for this arrangement is largely due to the principle that higher voltages allow for lower current levels for the same amount of power, which reduces losses due to resistance in the transmission lines. By stepping up the voltage, the overall efficiency of the power distribution is improved, allowing for energy to be transmitted over longer distances without significant energy losses. Placing the transformer after the transmission lines would not be effective, as power would already have been transmitted at a lower voltage level, negating the benefits of stepping up the voltage for efficient transmission. Thus, positioning the step-up transformer before the transmission lines is essential for optimizing the power distribution system.

8. How does removing the second resistor from a series circuit affect the current drawn from the battery?

- A. It decreases it
- B. It remains the same
- C. It increases it**
- D. It fluctuates

In a series circuit, the total resistance is the sum of the individual resistances of all components. When the second resistor is removed from the circuit, the overall resistance decreases since there is now one less resistor contributing to the total resistance. According to Ohm's law, which states that current (I) is equal to voltage (V) divided by resistance (R), a decrease in resistance, while keeping the voltage from the battery constant, results in an increase in the current drawn from the battery. Since the voltage remains unchanged and resistance has decreased, the current in the circuit will increase as a result. Thus, the removal of the second resistor decreases the resistance and leads to an increase in current drawn from the battery, making this the correct answer.

9. What formula can be used to calculate delta G?

- A. $\Delta G = \Delta H + T(\Delta S)$
- B. $\Delta G = \Delta H - T(\Delta S)$**
- C. $\Delta G = \Delta H / T(\Delta S)$
- D. $\Delta G = \Delta H + S$

The correct formula to calculate delta G, which represents the change in Gibbs free energy, is given by the equation $\Delta G = \Delta H - T(\Delta S)$. In this formula: - Delta G (ΔG) signifies the change in Gibbs free energy, providing insight into the spontaneity of a reaction. - Delta H (ΔH) indicates the change in enthalpy, reflecting the total heat content of a system. - T stands for absolute temperature measured in Kelvin, which is critical in thermodynamic calculations as it represents the thermal energy affecting reactions. - Delta S (ΔS) represents the change in entropy, reflecting the degree of disorder or randomness in a system. This relationship highlights that the spontaneity of a process is influenced both by the heat exchange (enthalpy) and the degree of disorder (entropy) in a system. A negative ΔG suggests that a reaction is spontaneous in the forward direction, while a positive ΔG indicates non-spontaneity. The term $T(\Delta S)$ denotes the product of temperature and the entropy change, which plays a significant role in determining whether a reaction can proceed under given conditions. Using this formula allows chemists and biologists to predict how changes in enthalpy and entropy affect the feasibility

10. The Michaelis-Menten kinetics model is based on what key principle?

- A. Multiple active sites available
- B. Competitive inhibition of substrates
- C. A single active site can bind substrate**
- D. Enzyme catalysis without substrates

The Michaelis-Menten kinetics model focuses on the concept that an enzyme has a single active site that can bind to a substrate. This interaction leads to the formation of an enzyme-substrate complex, which is a crucial step in the enzymatic reaction. The model describes how the rate of enzymatic reactions depends on the concentration of the substrate and helps to explain the behavior of enzymes under different substrate concentrations. The premise of a single active site highlights the efficiency and specificity of enzymes in catalyzing reactions because it allows for a straightforward relationship between the amount of substrate and the reaction rate. As substrate concentration increases, the reaction rate increases until it reaches a maximum velocity (V_{max}), at which point all active sites are saturated with substrate. Understanding this principle is fundamental in biochemistry since it lays the groundwork for concepts such as enzyme efficiency and the impact of various factors on enzyme activity. This model is particularly important when considering enzyme kinetics, as it provides insights into both the catalytic mechanisms and the regulation of enzyme activity in biological systems.

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:

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

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