

ACT SCIENCE PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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THE FULL VERSION STUDY GUIDE

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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 the significance of a neutral pH for certain microorganisms?**
 - A. It promotes rapid reproduction.
 - B. It is detrimental to their survival.
 - C. It enhances metabolic processes.
 - D. It has no effect on them.
- 2. What does peer review help ensure in scientific research?**
 - A. It confirms the publication date
 - B. It validates the integrity and quality of the research
 - C. It increases the number of citations
 - D. It guarantees total accuracy
- 3. What type of data is essential for measuring the outcomes of an experiment?**
 - A. Qualitative data exclusively
 - B. Quantitative data
 - C. Only observational data
 - D. Theoretical data only
- 4. What is the purpose of conducting experiments with replicates?**
 - A. To confirm existing theories
 - B. To reduce variability and enhance the reliability of results
 - C. To increase the complexity of data
 - D. To provide entertainment
- 5. In the complete combustion of 44.0 grams of propane, how many grams of water are formed?**
 - A. 4.50g
 - B. 18.0g
 - C. 72.0g
 - D. 176g

6. What can be concluded if the net electric force on a known positive charge at point P is zero?
- A. Both charges are positive
 - B. Both charges are negative
 - C. Charges have opposite signs
 - D. One charge's magnitude is greater
7. What role do control groups play in experimental design?
- A. They provide entertainment value for the research team
 - B. They allow for comparison against the experimental group
 - C. They eliminate any ethical concerns in experiments
 - D. They are used only for observational studies
8. At which point will an electron feel a force directed upward toward a point charge?
- A. Point A
 - B. Point C
 - C. Point D
 - D. Point E
9. What is the typical concentration trend of carbon dioxide (CO₂) in sediments as depth increases?
- A. Consistent throughout sediment depths
 - B. Increases significantly with depth
 - C. Decreases as depth increases
 - D. Fluctuates with sediment types
10. In balancing the reaction involving BCl₃ and H₂, what is the coefficient for HCl in lowest terms?
- A. 1
 - B. 2
 - C. 3
 - D. 6

Answers

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

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Explanations

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1. What is the significance of a neutral pH for certain microorganisms?

- A. It promotes rapid reproduction.
- B. It is detrimental to their survival.
- C. It enhances metabolic processes.**
- D. It has no effect on them.

A neutral pH, typically around 7, is significant for certain microorganisms because it creates an optimal environment for their metabolic processes. Many microorganisms, especially bacteria and fungi, have evolved to thrive best in conditions that closely resemble neutral pH. This neutrality helps maintain the stability of their cellular structures and enzymatic functions, which are crucial for metabolism. When pH levels fluctuate significantly from neutral, it can lead to adverse effects on enzyme activity and cellular integrity. Enzymes that drive metabolic reactions are often sensitive to pH changes; deviations from their ideal pH can reduce their efficiency or inactivate them altogether. Therefore, a neutral pH facilitates proper enzyme function, nutrient absorption, and overall cellular health, allowing for enhanced metabolic processes in these organisms. This is particularly important in natural environments and in various applications, such as food production and microbiology, where maintaining specific pH levels can optimize microbial activity.

2. What does peer review help ensure in scientific research?

- A. It confirms the publication date
- B. It validates the integrity and quality of the research**
- C. It increases the number of citations
- D. It guarantees total accuracy

Peer review is a crucial process in scientific research that serves to validate the integrity and quality of the research being assessed. Through this process, experts in the field evaluate the study's methodology, data analysis, and conclusions. This critical assessment helps identify any potential flaws, biases, or methodological issues in the research, ensuring that only studies meeting rigorous scientific standards are published. While peer review enhances the credibility of scientific findings and helps maintain high-quality standards, it does not guarantee absolute accuracy. Research is often subject to revisions and updates as new evidence emerges, and peer review focuses on the overall validity rather than absolute perfection. Overall, the peer review process is essential for maintaining the integrity of scientific literature and advancing knowledge in the field.

3. What type of data is essential for measuring the outcomes of an experiment?

- A. Qualitative data exclusively
- B. Quantitative data**
- C. Only observational data
- D. Theoretical data only

The essence of measuring outcomes in an experiment lies in quantitative data, which involves numerical values that allow for objective analysis and comparison. This type of data is crucial because it provides precise measurements, enabling researchers to assess the effects of variables with mathematical clarity. For instance, in experiments measuring plant growth under varying light conditions, quantitative data like height (in centimeters) or mass (in grams) provides clear criteria to evaluate growth rates and establish statistical significance. While qualitative data—descriptive data that characterizes but does not quantify—can complement an experiment by providing context or subjective insights, it does not allow for the rigorous statistical analysis often required to validate experimental outcomes. Similarly, observational and theoretical data serve important roles in science but do not inherently offer the measurable results that quantitative data do. Observational data can be subjective and lacks the numerical precision necessary for consistent comparison, while theoretical data relies on hypotheses and models rather than actual experimentation. In summary, quantitative data is essential for effectively measuring and interpreting the outcomes of an experiment, making it the most appropriate and reliable choice among the options provided.

4. What is the purpose of conducting experiments with replicates?

- A. To confirm existing theories
- B. To reduce variability and enhance the reliability of results**
- C. To increase the complexity of data
- D. To provide entertainment

Conducting experiments with replicates serves a critical purpose in scientific research: it reduces variability and enhances the reliability of results. When experiments are replicated, they are repeated under the same conditions, allowing scientists to assess the consistency of their findings. This process helps to identify any anomalies or outliers in the data that may skew the results, ultimately leading to a more accurate and robust interpretation of the experiment. By minimizing random errors and ensuring that the results are not due to chance, replicates contribute to the overall validity of a study. Reliable results can then be used to support or refute hypotheses, leading to a better understanding of the underlying scientific questions being investigated. In this way, replicates are fundamental in establishing the credibility of scientific claims and ensuring that conclusions drawn from the data are dependable and reproducible.

5. In the complete combustion of 44.0 grams of propane, how many grams of water are formed?

- A. 4.50g
- B. 18.0g
- C. 72.0g
- D. 176g

To determine how many grams of water are formed from the complete combustion of propane (C_3H_8), we need to first examine the balanced chemical equation for this reaction. The combustion of propane can be represented as follows: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$ From the balanced equation, we can see that one mole of propane produces four moles of water. Next, we need to calculate the moles of propane in 44.0 grams. The molar mass of propane (C_3H_8) is approximately 44.1 g/mol (calculating from the atomic masses of carbon and hydrogen, i.e., 12.01 g/mol for carbon and 1.008 g/mol for hydrogen). Thus, for 44.0 grams of propane: $\text{Moles of propane} = \frac{44.0 \text{ g}}{44.1 \text{ g/mol}} \approx 1.0 \text{ mol}$ According to the stoichiometry from the balanced equation,

6. What can be concluded if the net electric force on a known positive charge at point P is zero?

- A. Both charges are positive
- B. Both charges are negative
- C. Charges have opposite signs
- D. One charge's magnitude is greater

When the net electric force on a positive charge at point P is zero, it indicates that the forces exerted by the surrounding charges are balanced. This means that for the positive charge, there are likely different other charges present that are exerting forces on it, and those forces must cancel each other out precisely. If both surrounding charges are the same type, such as both being positive or both being negative, they would exert forces that would not cancel out. Instead, like charges repel each other, leading to a net force that cannot be zero. Therefore, the correct condition for achieving a net electric force of zero on a positive charge is that there must be charges of opposite signs present that are influencing it. In this case, if the charges around point P have opposite signs, the positive charge experiences attractive forces from negative charges and, under certain magnitudes, these can cancel out the repelling forces effectively. The conclusion regarding the magnitudes of the charges is relevant because if one charge has a significantly larger magnitude than the other, it could potentially exert a larger force that could still result in a net zero force at a specific point, depending on the distances and arrangement of the charges. Hence, while it could be imagined that equal magnitudes of forces

7. What role do control groups play in experimental design?

- A. They provide entertainment value for the research team
- B. They allow for comparison against the experimental group**
- C. They eliminate any ethical concerns in experiments
- D. They are used only for observational studies

Control groups play a critical role in experimental design by serving as a baseline for comparison against the experimental group. The experimental group is exposed to a variable being tested, while the control group does not receive this exposure. This setup allows researchers to isolate the effects of the variable being studied and determine if any observed changes in the experimental group can be directly attributed to that variable rather than other factors. By comparing results from the control group with those from the experimental group, scientists can assess the impact and significance of the treatment or manipulation applied to the experimental group. This comparison is essential for drawing valid conclusions about the effectiveness or influence of the independent variable in question. Without a control group, it would be challenging to infer whether the outcomes were caused by the test conditions or occurred due to random variation or other external influences.

8. At which point will an electron feel a force directed upward toward a point charge?

- A. Point A
- B. Point C
- C. Point D
- D. Point E**

To determine the point where an electron will feel an upward force toward a point charge, it's important to understand the nature of electric forces acting on charged particles. An electron, which has a negative charge, will experience a force due to the electric field created by a positive point charge directed toward the charge itself. The electric field around a positive point charge radiates outward. Therefore, at locations where the electric field direction points upward, a negatively charged electron will feel a force in the opposite direction, which is upward toward the positive charge. In this context, Point E must be located in the region where the direction of the electric field is upward due to the presence of the positive point charge. This upward direction on the field means that the force acting on the electron will also be upward. Choosing Point D indicates it is situated in a way that does not align with the condition of feeling an upward force, making it inappropriate for the question regarding the force on the electron toward the charge. Thus, Point E is where the electric field's direction will cause the upward force on the electron, leading to the correct identification of where the electron will feel that force.

9. What is the typical concentration trend of carbon dioxide (CO₂) in sediments as depth increases?

- A. Consistent throughout sediment depths
- B. Increases significantly with depth
- C. Decreases as depth increases
- D. Fluctuates with sediment types

Carbon dioxide (CO₂) in sediment typically exhibits a concentration trend that decreases as depth increases. This is primarily due to the biological processes occurring at or near the sediment surface. In shallow layers, organic matter decomposes, resulting in the release of CO₂. However, as you move deeper into the sediment, the availability of organic material diminishes, which leads to lower rates of microbial activity and, consequently, lower concentrations of CO₂. Additionally, deeper sediment layers are often more compact and may experience different geochemical processes that can further contribute to the reduction of CO₂ levels. Therefore, the observed trend is a decrease in CO₂ concentration with increasing sediment depth, reflecting the relationship between biological activity, organic matter decomposition, and sedimentary processes.

10. In balancing the reaction involving BCl₃ and H₂, what is the coefficient for HCl in lowest terms?

- A. 1
- B. 2
- C. 3
- D. 6

To determine the correct coefficient for HCl in the balanced chemical reaction involving BCl₃ and H₂, we first need to write out the balanced equation. The reaction can be represented as follows: $\text{BCl}_3 + \text{H}_2 \rightarrow \text{B} + \text{HCl}$ In this reaction, boron trichloride (BCl₃) reacts with hydrogen gas (H₂) to produce boron (B) and hydrochloric acid (HCl). For balancing the reaction, we note that BCl₃ has three chlorine atoms. Each HCl molecule contains one chlorine atom, so to balance the chlorines from BCl₃, we will need three HCl molecules. The hydrogen in HCl must also be balanced. Since we have two hydrogen atoms in H₂ and we need to produce three hydrogen atoms (one for each molecule of HCl), we need a total of three H₂ molecules for the stoichiometry to match. Thus, the balanced equation becomes: $\text{BCl}_3 + 3\text{H}_2 \rightarrow \text{B} + 3\text{HCl}$ In terms

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://actscience.examzify.com>

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

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