

OSAT PHYSICAL SCIENCE PRACTICE TEST (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. How is the thermodynamic state of a substance determined?

- A. By its molecular structure alone
- B. By its physical properties
- C. Through its electronic properties
- D. By its chemical reactivity

2. What does the unit Joule represent?

- A. The energy required to exert a force of one kilonewton for a distance of one meter
- B. A derived unit that reflects the work done or energy required to exert a force of one newton for a distance of one meter
- C. The energy required to lift a one-ton object to a height of one meter
- D. The energy needed to accelerate a one-kilogram mass by one meter per second squared

3. What is another term used to describe the first law of thermodynamics?

- A. The conservation of mass
- B. The law of energy conservation
- C. The law of increasing entropy
- D. The principle of equilibrium

4. Which effect describes the principle on which thermocouples operate?

- A. Frictional heating
- B. Peltier Seebeck effect
- C. Thermal conductivity
- D. Caloric theory

5. What does chemical synthesis specifically aim to achieve?

- A. Analyze previous chemical reactions
- B. Produce specific chemical products
- C. Break down existing compounds
- D. Mix different chemical substances

- 6. Where can nonmetals be found on the periodic table?**
- A. At the center
 - B. On the left end
 - C. On the right end
 - D. At the top
- 7. What state of matter is NOT typically associated with electrical conductivity?**
- A. Solids
 - B. Liquids
 - C. Gases
 - D. Plasma
- 8. What is the definition of radiation?**
- A. Heat transferred through direct contact
 - B. Heat transferred by electromagnetic waves
 - C. Heat that requires a medium for transfer
 - D. Heat that solely relies on conduction
- 9. What byproducts are formed from gasoline after combustion?**
- A. Water and Carbon Dioxide
 - B. Ozone and Nitrogen
 - C. Hydrogen and Oxygen
 - D. Methane and Sulfur Dioxide
- 10. What is work the product of?**
- A. The total weight of an object.
 - B. The velocity of an object and time.
 - C. The parallel component of force multiplied by the displacement.
 - D. The mass and acceleration of an object.

Answers

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

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Explanations

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1. How is the thermodynamic state of a substance determined?

- A. By its molecular structure alone
- B. By its physical properties**
- C. Through its electronic properties
- D. By its chemical reactivity

The thermodynamic state of a substance is primarily determined by its physical properties, which include temperature, pressure, volume, and internal energy. These properties provide crucial information about the system and help define its state in the context of thermodynamics. For instance, when you know the temperature and pressure of a gas, you can determine its internal energy and behavior based on the Ideal Gas Law or other relevant equations of state. These physical properties interact to describe how the substance will respond to changes in its environment, such as heat transfer or work done on it. Other factors like molecular structure, electronic properties, and chemical reactivity play important roles in understanding the substance's behavior and characteristics, but they are not the direct measures used to define the thermodynamic state. Physical properties are directly observable and measurable, providing a straightforward way to establish the state of a system in thermodynamics.

2. What does the unit Joule represent?

- A. The energy required to exert a force of one kilonewton for a distance of one meter
- B. A derived unit that reflects the work done or energy required to exert a force of one newton for a distance of one meter**
- C. The energy required to lift a one-ton object to a height of one meter
- D. The energy needed to accelerate a one-kilogram mass by one meter per second squared

The unit Joule is defined as the amount of work done when a force of one newton is exerted over a distance of one meter. This means that when a force of one newton moves an object one meter in the direction of the force, one Joule of energy has been expended or converted. This definition aligns well with the fundamental concepts of work and energy in physics, where work is calculated as the product of force and distance. Understanding the Joule as a derived unit emphasizes its foundational role in measuring energy and work. This characterization is crucial in the context of various physical phenomena where energy transfer occurs, whether it be in mechanical systems, electrical systems, or thermal processes. The other options, while related to energy and force, do not accurately define the Joule. For instance, the first choice refers to a kilonewton, which is one thousand newtons, and thus does not align with the definition that specifically involves one newton. The third choice addresses lifting a one-ton object, which involves a different weight measurement and height but does not express the core definition of a Joule. Lastly, the fourth choice describes a force and acceleration relationship, which relates to Newton's second law rather than the concept of work or energy.

3. What is another term used to describe the first law of thermodynamics?

- A. The conservation of mass
- B. The law of energy conservation**
- C. The law of increasing entropy
- D. The principle of equilibrium

The first law of thermodynamics is fundamentally about the conservation of energy, which means that energy cannot be created or destroyed but can only be transformed from one form to another. This law underscores the principle that the total energy in a closed system remains constant over time. Referring to the law of energy conservation as another term for the first law of thermodynamics emphasizes this exact idea. It highlights that while energy can change forms—such as from kinetic to potential energy or from thermal energy to mechanical energy—the total amount of energy within that closed system will not change. This principle is crucial in various scientific fields, particularly physics and engineering, as it governs how energy systems operate, ensuring that the input and the output energy quantities can always be accounted for. The other terms listed do not accurately reflect the concept of the first law of thermodynamics: conservation of mass pertains to mass not being created or destroyed, the law of increasing entropy relates more to the second law of thermodynamics, and the principle of equilibrium addresses a state where forces or changes are balanced, rather than energy conservation directly.

4. Which effect describes the principle on which thermocouples operate?

- A. Frictional heating
- B. Peltier Seebeck effect**
- C. Thermal conductivity
- D. Caloric theory

The principle on which thermocouples operate is known as the Peltier-Seebeck effect. This effect arises from the interaction between temperature differences and electric potential in a circuit made of two different metals. When there is a temperature difference between the junctions of these two metals, it creates a voltage, allowing thermocouples to convert thermal energy into electrical energy. This phenomenon is fundamental to the functioning of thermocouples, which are widely used for temperature measurement. In contrast, frictional heating pertains to heat generated due to the friction between surfaces in motion, which is not relevant to the operation of thermocouples. Thermal conductivity deals with the ability of a material to conduct heat, and while it's an essential property in various thermal systems, it does not explain how thermocouples work. Caloric theory, an outdated concept, suggests that heat is a fluid-like substance called caloric, which is not applicable in explaining the principles of thermoelectric devices like thermocouples. Thus, the Peltier-Seebeck effect directly describes the mechanism behind thermocouples, making it the correct choice.

5. What does chemical synthesis specifically aim to achieve?

- A. Analyze previous chemical reactions
- B. Produce specific chemical products**
- C. Break down existing compounds
- D. Mix different chemical substances

Chemical synthesis specifically aims to produce specific chemical products by combining different reactants in controlled conditions. This process involves designing and executing a series of chemical reactions to build complex molecules from simpler ones. The end goal is often to create materials with desired properties or functions, ranging from pharmaceuticals to industrial chemicals. In the realm of chemical synthesis, the ability to produce particular products is essential due to the vast variety of applications that require precise molecular structures. This can include the development of new drugs, the creation of functional materials, and the manufacture of specialty chemicals. The synthesis pathway is meticulously planned to ensure that the desired product is obtained in the required yield and purity. While analyzing previous chemical reactions, breaking down existing compounds, and mixing different substances play roles in chemistry, they do not capture the primary focus of chemical synthesis, which is the creation of specific compounds through defined chemical processes.

6. Where can nonmetals be found on the periodic table?

- A. At the center
- B. On the left end
- C. On the right end**
- D. At the top

Nonmetals are primarily located on the right side of the periodic table. This area includes elements such as oxygen, nitrogen, carbon, and halogens. Nonmetals generally possess properties that are quite different from metals, including being poor conductors of heat and electricity, and they tend to have higher ionization energies and electronegativities. The placement of nonmetals on the right side is significant because it reflects their chemical behavior. For instance, nonmetals readily gain electrons to form anions during chemical reactions, whereas metals, found on the left side, tend to lose electrons to form cations. The right-end position also aligns with the periodic table's organization, where nonmetals stir contrasting characteristics compared to the metals located on the left and towards the center of the table. While other areas of the periodic table are dominated by metals and metalloids, the right end is primarily occupied by nonmetals, making it the best answer to the question about their location.

7. What state of matter is NOT typically associated with electrical conductivity?

- A. Solids
- B. Liquids
- C. Gases**
- D. Plasma

Gases are not typically associated with electrical conductivity due to their molecular structure and behavior. In solids and liquids, atoms or molecules are generally in closer proximity, which allows the movement of charged particles, such as electrons or ions, facilitating conductivity. In contrast, the molecules in gases are far apart, and while some gases can conduct electricity under certain conditions (like ionized gases), most gases do not have free charge carriers available to support significant conductivity. Plasma, on the other hand, is an ionized state of matter that consists of free electrons and ions, making it highly conductive. Therefore, while some exceptions exist, gases, in general, do not exhibit significant electrical conductivity compared to solids, liquids, and plasmas, making this the correct answer.

8. What is the definition of radiation?

- A. Heat transferred through direct contact
- B. Heat transferred by electromagnetic waves**
- C. Heat that requires a medium for transfer
- D. Heat that solely relies on conduction

Radiation is defined as the transfer of energy through electromagnetic waves. This process does not require a medium, allowing thermal energy to travel through a vacuum, such as space. Unlike conduction, which relies on direct contact between materials, and convection, which involves the movement of fluid currents, radiation can occur in empty spaces. This is the principle behind how the Sun's energy reaches the Earth. The electromagnetic waves involved can include visible light, infrared, and other forms of radiation, all contributing to energy transfer without any need for physical contact or a medium. Understanding this definition is crucial for grasping concepts in thermodynamics and energy transfer mechanisms.

9. What byproducts are formed from gasoline after combustion?

- A. Water and Carbon Dioxide**
- B. Ozone and Nitrogen
- C. Hydrogen and Oxygen
- D. Methane and Sulfur Dioxide

When gasoline undergoes combustion, it reacts with oxygen to produce energy, primarily in the form of heat. The chemical reaction involves the hydrocarbon compounds in gasoline reacting with oxygen molecules, resulting in the production of carbon dioxide and water as primary byproducts. During complete combustion, all the carbon in the gasoline is converted to carbon dioxide, and all the hydrogen is converted to water. This represents a situation where the fuel is burned efficiently, and sufficient oxygen is present to ensure that the carbon and hydrogen are fully oxidized. In contrast, the other options involve incorrect products. Ozone and nitrogen can be involved in various atmospheric reactions but are not direct byproducts of gasoline combustion. Hydrogen and oxygen alone do not represent the outcome of complete combustion; instead, they are reactants in various other chemical processes. Finally, methane and sulfur dioxide are not typical byproducts of gasoline combustion; instead, sulfur compounds would require a different source, such as the presence of sulfur in the fuel or additives. Thus, the formation of water and carbon dioxide as byproducts from the combustion of gasoline aligns with the fundamental principles of combustion chemistry, reflecting the typical outcomes of hydrocarbon fuel reactions with oxygen.

10. What is work the product of?

- A. The total weight of an object.
- B. The velocity of an object and time.
- C. The parallel component of force multiplied by the displacement.**
- D. The mass and acceleration of an object.

Work is defined in physics as the product of the parallel component of force exerted on an object and the displacement of that object in the direction of the force. Mathematically, this can be represented as: $\text{Work} = F \cdot d \cdot \cos(\theta)$ where F is the force applied, d is the displacement, and θ is the angle between the force and the direction of displacement. When the force is applied in the same direction as the displacement, θ is zero, and the cosine term equals one, simplifying the calculation to $\text{Work} = F \cdot d$. This highlights that work is a measure of energy transfer that occurs when an object is moved by a force. The other options do not accurately describe the definition of work. The total weight of an object does not relate directly to work unless a height change is involved. Velocity and time relate more closely to concepts of motion, not work. Lastly, mass and acceleration pertain to Newton's second law, $F = ma$, and do not specifically address how force and displacement contribute to work. Thus, the correct answer centers

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://osatphysicalscience.examzify.com>

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

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