

# SACE Stage 2 Physics 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 does the threshold frequency represent?**
  - A. The maximum energy needed to discharge electrons**
  - B. The minimum light frequency necessary to eject an electron from a given metal**
  - C. The frequency at which atoms absorb maximum energy**
  - D. The frequency of light that results in ionization**
  
- 2. What is diffraction in the context of wave behavior?**
  - A. The reflection of waves from surfaces**
  - B. The bending of waves around obstacles or through openings**
  - C. The scattering of waves in different directions**
  - D. The absorption of waves by a medium**
  
- 3. In what direction do electric field lines point with respect to positive and negative charges?**
  - A. Away from positive charges and towards negative charges**
  - B. Towards positive charges and away from negative charges**
  - C. In all directions equally**
  - D. Towards the center of positive charges**
  
- 4. What is the work function in relation to electrons and materials?**
  - A. The maximum energy an electron can possess**
  - B. The minimum amount of energy needed to dislodge an electron from the surface of a material**
  - C. The frequency of light that can fully ionize an atom**
  - D. The energy required to keep electrons bound to an atom**
  
- 5. Why is incandescent light not monochromatic or coherent?**
  - A. The filament produces light at a single frequency**
  - B. The heating causes a range of frequencies to be generated**
  - C. The light is absorbed completely by the material**
  - D. It only emits coherent light waves**

**6. What type of spectrum is produced when photons are absorbed by hydrogen atoms that match specific energy differences?**

- A. Emission spectrum**
- B. Reflection spectrum**
- C. Discontinuous spectrum**
- D. Line absorption spectrum**

**7. Which of the following is true about the Lorentz factor?**

- A. It is always equal to 1**
- B. It approaches zero as speed increases**
- C. It accounts for changes in time and length at relativistic speeds**
- D. It remains constant regardless of velocity**

**8. What effect does air resistance have on the optimum angle for range?**

- A. It increases the optimum angle**
- B. It decreases the optimum angle below 45 degrees**
- C. It has no effect on the angle**
- D. It makes the optimum angle 90 degrees**

**9. What is centripetal acceleration?**

- A. The acceleration of an object moving in a straight line**
- B. The change in velocity of an object moving in uniform motion**
- C. The acceleration experienced by an object in circular motion**
- D. The force that opposes gravity**

**10. What plays a crucial role in allowing cars to negotiate turns on a banked curve?**

- A. The combination of increased friction and normal force**
- B. The tilt of the banking which introduces a horizontal component**
- C. The weight of the car decreasing due to banking**
- D. The speed at which the car enters the curve**

## **Answers**

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

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## **Explanations**

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## 1. What does the threshold frequency represent?

- A. The maximum energy needed to discharge electrons
- B. The minimum light frequency necessary to eject an electron from a given metal**
- C. The frequency at which atoms absorb maximum energy
- D. The frequency of light that results in ionization

The threshold frequency represents the minimum light frequency necessary to eject an electron from a given metal. This concept is a fundamental aspect of the photoelectric effect, where light of a certain frequency can provide enough energy to overcome the work function (the energy needed to remove an electron from the surface of a metal). When light with a frequency above the threshold frequency is incident on the metal, photons interact with electrons, transferring energy to them. If the energy of the incoming photons (which is proportional to the frequency of the light) meets or exceeds the work function of the metal, electrons can be ejected. If the frequency is lower than the threshold frequency, no electrons will be ejected regardless of the intensity of the light, because the energy of the photons is insufficient to overcome the binding energy of the electrons. The other options do not accurately describe the threshold frequency. The maximum energy needed to discharge electrons (the first choice) is related to the work function but does not define the threshold frequency itself. The frequency at which atoms absorb maximum energy (the third choice) is more related to resonance effects and absorption spectra, rather than the minimum energy requirement for photoemission. The frequency of light that results in ionization (the fourth choice) involves more energy than

## 2. What is diffraction in the context of wave behavior?

- A. The reflection of waves from surfaces
- B. The bending of waves around obstacles or through openings**
- C. The scattering of waves in different directions
- D. The absorption of waves by a medium

Diffraction is described as the bending of waves around obstacles or through openings. This phenomenon can be observed with all types of waves, including sound waves and light waves, indicating that wave behavior is not confined solely to travel in straight lines. When a wave encounters an obstacle or passes through a narrow aperture, it spreads out rather than simply continuing on its original path. This is why diffraction is particularly pronounced when the size of the obstacle or the width of the opening is comparable to the wavelength of the wave. In the context of light, for example, when a beam hits the edge of a barrier or goes through a slit, it spreads out instead of just forming a shadow. This behavior is crucial in various applications, such as determining the wave nature of light in diffraction patterns observed in experiments like the double-slit experiment. Each of the other concepts listed describes different wave phenomena. Reflection involves waves bouncing off surfaces, scattering refers to a wave being dispersed in various directions, and absorption means that energy from the wave is taken in by the medium, causing a decrease in intensity. While all of these interactions are important in the study of waves, none capture the essence of diffraction quite like bending around obstacles or through openings does.

### 3. In what direction do electric field lines point with respect to positive and negative charges?

- A. Away from positive charges and towards negative charges**
- B. Towards positive charges and away from negative charges**
- C. In all directions equally**
- D. Towards the center of positive charges**

Electric field lines are used to represent the strength and direction of the electric field produced by charges. They always originate from positive charges and terminate at negative charges. This representation is based on the nature of electric force; a positive charge experiences a force that moves it away from other positive charges (hence the lines point away from positive charges) and towards negative charges, which exert an attractive force. The pattern of these lines provides a visual understanding of how electric fields operate. The greater the density of the lines, the stronger the electric field in that region. Since electric fields are defined by their influence on charged particles, a positive charge moves away from other positives due to repulsion and is attracted to negatives. This concept highlights that the lines emanate from positive and converge towards negative charges, clearly illustrating the interaction between different types of charge. The correct understanding of electric field lines is fundamental in analyzing electrical interactions, and recognizing that they flow away from positive charges and towards negative charges is a key principle of electrostatics.

### 4. What is the work function in relation to electrons and materials?

- A. The maximum energy an electron can possess**
- B. The minimum amount of energy needed to dislodge an electron from the surface of a material**
- C. The frequency of light that can fully ionize an atom**
- D. The energy required to keep electrons bound to an atom**

The work function refers to the minimum amount of energy required to remove an electron from the surface of a material, particularly in the context of photoelectric effect phenomena. This energy is specific to each material and is a critical factor in determining how easily electrons can be emitted when the material is exposed to light or other sources of energy. When photons of light strike the surface of a material, they can transfer their energy to electrons. If the energy of the incoming photons exceeds the work function of the material, the electrons can be ejected from the surface. The work function essentially sets the threshold for this emission process, allowing us to understand how different materials react to various wavelengths of light. Other options do not correctly define the work function. For instance, the maximum energy an electron can possess relates to its kinetic energy potentially after being ejected, while the frequency of light that can fully ionize an atom is related to electronic transitions rather than the work function itself. Moreover, the energy required to keep electrons bound to an atom pertains more to atomic structure and binding energy than the specific concept of the work function in relation to surface electron emission.

## 5. Why is incandescent light not monochromatic or coherent?

- A. The filament produces light at a single frequency
- B. The heating causes a range of frequencies to be generated**
- C. The light is absorbed completely by the material
- D. It only emits coherent light waves

Incandescent light is not monochromatic or coherent primarily because the heating of the filament generates a wide range of frequencies. When the filament is heated to high temperatures, it emits light across a spectrum rather than at a single wavelength. This is due to the thermal radiation emitted by the hot filament, which produces light that includes many different wavelengths corresponding to different colors. Monochromatic light consists of a single wavelength and corresponds to a single color, while coherent light refers to waves that maintain a constant phase relationship. Since incandescent light results from a range of thermal emissions, it contains multiple wavelengths simultaneously, leading to the conclusion that it is neither monochromatic nor coherent. The broad spectrum produced means that the light waves do not have the same frequency or phase relationship required for coherence.

## 6. What type of spectrum is produced when photons are absorbed by hydrogen atoms that match specific energy differences?

- A. Emission spectrum
- B. Reflection spectrum
- C. Discontinuous spectrum
- D. Line absorption spectrum**

When photons are absorbed by hydrogen atoms, they cause transitions between specific energy levels within the atoms. This process results in a line absorption spectrum, which is characterized by the absorption of particular wavelengths of light corresponding to the energy needed to elevate electrons from one energy level to another. In a line absorption spectrum, distinct dark lines appear against a continuous background of light. Each line represents a specific wavelength that has been absorbed by hydrogen atoms as they interact with photons. The width and position of these lines are indicative of the energy differences between the quantized energy levels in hydrogen. This phenomenon can be observed in laboratory settings where hydrogen gas is subjected to a continuous light source such as a white light bulb; the resulting spectrum can be analyzed to identify these specific absorbed frequencies. This is distinct from other spectrum types. For example, an emission spectrum would show bright lines rather than dark ones, and a reflection spectrum involves light being reflected rather than absorbed. A discontinuous spectrum typically refers to a spectrum that does not present a smooth variation and is not specifically related to the absorption process of individual atoms such as in the case of hydrogen. Thus, the line absorption spectrum is the most appropriate choice when discussing the absorption of photons by hydrogen atoms at specific energy differences.

**7. Which of the following is true about the Lorentz factor?**

- A. It is always equal to 1**
- B. It approaches zero as speed increases**
- C. It accounts for changes in time and length at relativistic speeds**
- D. It remains constant regardless of velocity**

The Lorentz factor, often denoted as  $\gamma$ , is a crucial component of the theory of relativity, especially when analyzing the effects of traveling at speeds close to the speed of light. The Lorentz factor is defined by the equation:  $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$  where  $v$  is the velocity of an object and  $c$  is the speed of light in a vacuum. As an object's speed increases toward the speed of light, the value of the Lorentz factor increases significantly. This factor indeed accounts for the changes in time (time dilation) and length (length contraction) experienced by objects moving at relativistic speeds. In the context of the choices provided, the accuracy of answer C lies in the fact that the Lorentz factor quantifies how much time and space are perceived differently between an observer and a moving object. For instance, a stationary observer will measure different times and lengths compared to an observer moving at a high fraction of the speed of light. Thus, answer C accurately represents the role of the Lorentz factor in relativity. The other options do not accurately describe the nature of the Lorentz factor.

**8. What effect does air resistance have on the optimum angle for range?**

- A. It increases the optimum angle**
- B. It decreases the optimum angle below 45 degrees**
- C. It has no effect on the angle**
- D. It makes the optimum angle 90 degrees**

The optimum angle for achieving maximum range when projectile motion is analyzed in a vacuum, where air resistance is not a factor, is typically 45 degrees. However, when air resistance is accounted for, the dynamics of the projectile change significantly. Air resistance opposes the motion of the projectile, leading to a decrease in both its horizontal and vertical velocity components. As a result, the projectile experiences a shorter flight time and reduced horizontal distance for any given launch angle. To compensate for the effect of air drag and to achieve maximum range, the launch angle must be lowered. Consequently, the optimum angle for maximum range becomes less than 45 degrees. This adjustment ensures that the projectile maintains a better balance between horizontal velocity and the effects of gravity and air resistance, optimizing the distance it travels before landing. Therefore, when considering real-world conditions with air resistance, the optimum angle for range is decreased below 45 degrees, making it the correct answer.

## 9. What is centripetal acceleration?

- A. The acceleration of an object moving in a straight line
- B. The change in velocity of an object moving in uniform motion
- C. The acceleration experienced by an object in circular motion**
- D. The force that opposes gravity

Centripetal acceleration refers to the acceleration experienced by an object that is moving along a circular path. This acceleration is directed towards the center of the circular path, allowing the object to maintain its curved trajectory rather than moving off in a straight line due to inertia. When an object travels in a circle, its velocity is constantly changing, even though its speed may remain constant. This change in direction is what generates centripetal acceleration. The formula for centripetal acceleration is given by  $a_c = v^2/r$ , where  $v$  is the speed of the object and  $r$  is the radius of the circular path. This equation shows that the acceleration is dependent on both the speed of the object and the radius of the circle it travels in. Understanding centripetal acceleration is critical in various applications, such as in calculating the forces acting on vehicles turning around curves, satellites orbiting a planet, or any object requiring a centripetal force to stay in circular motion.

## 10. What plays a crucial role in allowing cars to negotiate turns on a banked curve?

- A. The combination of increased friction and normal force
- B. The tilt of the banking which introduces a horizontal component**
- C. The weight of the car decreasing due to banking
- D. The speed at which the car enters the curve

The tilt of the banking introduces a horizontal component of the normal force that is essential for a car negotiating a turn on a banked curve. When a road is banked, the slope of the road surface helps shift the force acting on the vehicle. Instead of relying solely on friction to provide the necessary centripetal force for the car to make the turn, the banking angle enables a component of the normal force to act horizontally toward the center of the circular path. This horizontal component helps to counteract the inertia of the car as it attempts to travel straight due to its velocity. The greater the angle of the banking, the more effective this component becomes, allowing the vehicle to maintain control without excessive reliance on friction. This design is particularly advantageous in high-speed scenarios, where the risk of skidding increases. In summary, the critical aspect of a banked curve is how the angle alters the distribution of forces acting on the car, leading to a horizontal force necessary for maintaining circular motion.

# 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](mailto:hello@examzify.com).**

**Or visit your dedicated course page for more study tools and resources:**

**<https://sacestage2physics.examzify.com>**

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

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