

ARIZONA STATE UNIVERSITY (ASU) PHY 101 INTRODUCTION TO PHYSICS EXAM 1 PRACTICE (SAMPLE) STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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. Ignoring air resistance, how does the acceleration of two objects of different mass dropped from the same height compare?**
 - A. Heavier objects accelerate faster.
 - B. Lighter objects accelerate faster.
 - C. They accelerate at the same rate.
 - D. Acceleration depends on the object's shape.
- 2. Which of the following is a vector quantity?**
 - A. Speed
 - B. Mass
 - C. Time
 - D. Velocity
- 3. Which statement best differentiates average speed from average velocity, and when can they differ?**
 - A. Average speed uses total distance divided by total time; average velocity uses displacement divided by time; they differ when motion turns around or retraces.
 - B. Average speed uses instantaneous speed; average velocity uses instantaneous velocity; They are always equal.
 - C. Average speed uses momentum; average velocity uses force; They never relate.
 - D. Average speed equals final speed minus initial speed; They differ when acceleration is nonzero.
- 4. What is the direction and characteristic of gravity's acceleration on a projectile's vertical motion?**
 - A. Upward acceleration of magnitude g
 - B. Downward acceleration of magnitude g
 - C. Zero acceleration
 - D. Horizontal acceleration only
- 5. Two objects are dropped from heights of 2 meters and 1 meter respectively, neglecting drag. Which hits the ground first?**
 - A. The object dropped from 2 meters reaches the ground first.
 - B. The object dropped from 1 meter reaches the ground first.
 - C. They reach ground at the same time.
 - D. Depends on mass.

6. Which statement best describes the difference between precision and accuracy in measurements?
- A. Precision is how close repeated measurements are to each other; accuracy is how close measurements are to the true value.
 - B. Precision is closeness to the true value; accuracy is closeness between repeated measurements.
 - C. They are the same concept.
 - D. Accuracy is how close repeated measurements are to each other; precision is how close measurements are to the true value.
7. In pinhole imaging, which principle is demonstrated by the tiny light spots under the tree?
- A. Lenses focus light
 - B. Refraction by air
 - C. Pinhole camera principle
 - D. Shadow formation
8. What is the momentum just before impact for a 0.5 kg ball hitting the ground with speed 6.26 m/s?
- A. 3.13 kg m/s
 - B. 6.26 kg m/s
 - C. 1.57 kg m/s
 - D. 9.81 kg m/s
9. Define weight and normal force. For a block on an incline of angle θ with no friction, what is the normal force?
- A. $N = m g \sin \theta$
 - B. $N = m g$
 - C. $N = m g \cos \theta$
 - D. $N = m g \tan \theta$
10. If the drop height is halved to 1.0 m, what is the speed just before impact (ignoring air resistance)?
- A. 6.26 m/s
 - B. 2.21 m/s
 - C. 8.00 m/s
 - D. 4.43 m/s

Answers

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

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Explanations

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1. Ignoring air resistance, how does the acceleration of two objects of different mass dropped from the same height compare?

- A. Heavier objects accelerate faster.
- B. Lighter objects accelerate faster.
- C. They accelerate at the same rate.**
- D. Acceleration depends on the object's shape.

When air resistance is ignored, gravity pulls on every mass with a force proportional to its weight, $F = mg$. Newton's second law says $a = F/m$, so $a = (mg)/m = g$. The mass cancels out, so the acceleration is the same for all objects, regardless of how heavy they are. Heavier and lighter objects thus share the same downward acceleration and would hit the ground at the same time from the same height in a vacuum. The real-world difference only appears when air resistance is present, which can affect lighter or differently shaped objects differently.

2. Which of the following is a vector quantity?

- A. Speed
- B. Mass
- C. Time
- D. Velocity**

A vector quantity has both magnitude and direction. Velocity fits that description because it tells you how fast something is moving and in what direction. Speed, while it tells how fast something is moving, has no direction and is therefore a scalar. Mass measures how much matter is in an object and is independent of direction, so it's also a scalar. Time is a duration and has only magnitude, not direction, so it's a scalar as well. Velocity can be thought of as the rate of change of position (displacement per unit time), which naturally includes direction, making it the vector among these options.

3. Which statement best differentiates average speed from average velocity, and when can they differ?

- A. Average speed uses total distance divided by total time; average velocity uses displacement divided by time; they differ when motion turns around or retraces.**
- B. Average speed uses instantaneous speed; average velocity uses instantaneous velocity; They are always equal.
- C. Average speed uses momentum; average velocity uses force; They never relate.
- D. Average speed equals final speed minus initial speed; They differ when acceleration is nonzero.

Average speed is the total distance you travel divided by the total time, while average velocity is the net displacement from start to finish divided by the same total time. The key is that distance counts every bit of path you cover, but displacement only cares about how far you ended up from where you started (in a particular direction). They can differ whenever you don't move in a single straight line: for example, if you go forward and then turn around and come back toward the start, the distance you've covered is the sum of both legs, but the displacement could be small or even zero. In such cases, the average speed will be greater than the magnitude of the average velocity. They become the same only when the motion is along one straight path with no reversals, so distance equals displacement.

4. What is the direction and characteristic of gravity's acceleration on a projectile's vertical motion?

- A. Upward acceleration of magnitude g
- B. Downward acceleration of magnitude g**
- C. Zero acceleration
- D. Horizontal acceleration only

Gravity gives a constant downward acceleration of magnitude g on the vertical motion. This downward pull makes the vertical velocity decrease as the projectile rises, reach zero at the top, and then become downward as it falls. The acceleration is the same downward value regardless of the projectile's speed or direction (near Earth's surface). In this idealized view, horizontal motion has no acceleration, so the vertical acceleration being downward with magnitude g is what governs the vertical dynamics.

5. Two objects are dropped from heights of 2 meters and 1 meter respectively, neglecting drag. Which hits the ground first?

- A. The object dropped from 2 meters reaches the ground first.**
- B. The object dropped from 1 meter reaches the ground first.
- C. They reach ground at the same time.
- D. Depends on mass.

In gravity with no air resistance, all objects fall the same way regardless of mass, and the fall time from rest depends only on how far you drop. The time to reach the ground from height h is $t = \sqrt{2h/g}$. Doubling the height increases the fall time by a factor of $\sqrt{2}$. So from 2 meters, $t \approx \sqrt{4/g} \approx 0.64$ s, while from 1 meter, $t \approx \sqrt{2/g} \approx 0.45$ s. Since the shorter drop takes less time, the object released from 1 meter hits the ground first.

6. Which statement best describes the difference between precision and accuracy in measurements?

- A. Precision is how close repeated measurements are to each other; accuracy is how close measurements are to the true value.**
- B. Precision is closeness to the true value; accuracy is closeness between repeated measurements.
- C. They are the same concept.
- D. Accuracy is how close repeated measurements are to each other; precision is how close measurements are to the true value.

The main idea is to separate how tightly repeated measurements cluster from how close they are to the true value. Precision describes how close multiple measurements are to each other. If you measure the same length many times and get nearly the same number each time, you're high in precision. Accuracy, on the other hand, is about closeness to the true value. If those measurements, on average, hit the true length, you're high in accuracy. You can have both high precision and high accuracy, which is ideal. You can also have high precision but low accuracy if your measurements are tightly clustered but consistently off from the true value due to a systematic error (like a miscalibrated ruler). Conversely, you can have high accuracy but low precision if your measurements average to the true value but are spread out. The important distinction is that precision is about repeatability, while accuracy is about closeness to the true value.

7. In pinhole imaging, which principle is demonstrated by the tiny light spots under the tree?

A. Lenses focus light

B. Refraction by air

C. Pinhole camera principle

D. Shadow formation

Light travels in straight lines and can form an image when the light is constrained by a very small opening. In a pinhole camera, there is no lens; the tiny hole acts as the imaging aperture. Each point of the scene sends rays through that small opening to project onto the opposite surface, creating an inverted image or, in this case, a collection of bright spots where light can pass through small gaps in the leaves. The tiny light spots under the tree are sunlight passing through these small gaps, each acting like a miniature pinhole projection of the scene onto the ground. This illustrates how the pinhole camera principle uses a small aperture to form an image without lenses, unlike focusing with a lens, refraction by air, or simply shadowing.

8. What is the momentum just before impact for a 0.5 kg ball hitting the ground with speed 6.26 m/s?

A. 3.13 kg m/s

B. 6.26 kg m/s

C. 1.57 kg m/s

D. 9.81 kg m/s

Momentum is the product of mass and velocity, $p = m v$. Just before impact, the ball has velocity 6.26 m/s downward, and its mass is 0.5 kg, so its momentum is $p = 0.5 \times 6.26 = 3.13 \text{ kg}\cdot\text{m/s}$ in the downward direction. The other numbers would come from using velocity alone or mixing in gravity's acceleration, but momentum requires multiplying mass by velocity.

9. Define weight and normal force. For a block on an incline of angle θ with no friction, what is the normal force?

A. $N = m g \sin \theta$

B. $N = m g$

C. $N = m g \cos \theta$

D. $N = m g \tan \theta$

The normal force on a frictionless incline equals the component of gravity perpendicular to the surface. Gravity mg acts straight down, while the surface pushes perpendicular to itself with the normal force. When you resolve gravity into components relative to the incline, the perpendicular component is $mg \cos \theta$ and the parallel component is $mg \sin \theta$. Since there's no acceleration into or away from the plane, the normal force must balance that perpendicular component, so $N = mg \cos \theta$. This also checks out in limits: flat ground gives $N = mg$, vertical wall gives $N = 0$.

10. If the drop height is halved to 1.0 m, what is the speed just before impact (ignoring air resistance)?

- A. 6.26 m/s
- B. 2.21 m/s
- C. 8.00 m/s
- D. 4.43 m/s

When something falls freely with negligible air resistance, gravity converts gravitational potential energy into kinetic energy, so how fast you're going depends only on how far you fall. Using energy conservation, $m g h = \frac{1}{2} m v^2$, which gives $v = \sqrt{2 g h}$. With a drop height of 1.0 m, $v = \sqrt{2 \times 9.8 \times 1.0} \approx \sqrt{19.6} \approx 4.43$ m/s. So the speed just before impact is about 4.43 m/s. The other numbers correspond to different heights—for example, a 2 m drop would give around 6.26 m/s.

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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://asu-phy101exam1.examzify.com>

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

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