NCEA Level 3 Physics – Mechanics Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Table of Contents

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. Don't worry about getting everything right, 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, and take breaks to retain information better.

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.

7. Use Other Tools

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

1. What does conservation of angular momentum state?

A. Angular momentum can change with any force

B. Angular momentum remains constant without external torque

C. Angular momentum is always zero

D. Angular momentum increases with mass

2. Which type of motion occurs when a restoring force is opposite to and proportional to a displacement?

A. Simple harmonic motion

B. Linear motion

C. Circular motion

D. Rotational motion

3. How is kinetic energy defined?

A. Kinetic energy is the energy of an object due to its heat

B. Kinetic energy is the energy of an object due to its motion

C. Kinetic energy is the energy stored within an object

D. Kinetic energy is independent of velocity

4. In the context of motion, what does 'apparent weight' mean?

A. The true weight of an object

B. The weight felt by an object in a free environment

C. The weight experienced by an object during acceleration

D. The weight felt under normal gravitational conditions

5. What term describes the time taken by a projectile from the moment it is thrown until it touches the ground?

A. Time of flight

B. Acceleration

C. Velocity

D. Range

6. In which type of motion does the distance covered change during equal time intervals?

- **A. Uniform motion**
- **B. Non-uniform motion**
- **C. Straight-line motion**
- **D. Circular motion**

7. What characterizes circular motion in physics?

- **A. An object moves at a constant speed with constant velocity**
- **B. An object has a varying speed and constant velocity**
- **C. An object moves along a curved path with constant speed but changing velocity**
- **D. An object moves at constant velocity and changing speed**

8. What type of acceleration occurs when the velocity of a body changes by unequal amounts during equal time intervals?

- **A. Uniform acceleration**
- **B. Non-uniform acceleration**
- **C. Constant acceleration**
- **D. Instantaneous acceleration**

9. In a collision, what dictates if momentum is conserved?

- **A. The presence of external forces**
- **B. The types of materials involved**
- **C. The total mass of the colliding objects**
- **D. The absence of external forces**

10. Which scenario represents circular motion?

- **A. A car accelerating in a straight line**
- **B. A satellite orbiting the Earth**
- **C. A ball rolling down a hill**
- **D. A person walking on a flat surface**

Answers

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

Explanations

1. What does conservation of angular momentum state?

A. Angular momentum can change with any force

B. Angular momentum remains constant without external torque

C. Angular momentum is always zero

D. Angular momentum increases with mass

Conservation of angular momentum is a fundamental principle in physics that states that the angular momentum of a system remains constant if there are no external torques acting on it. This means that in a closed system where no outside forces are affecting the rotation, the total angular momentum will not change over time. This principle is particularly important in situations involving rotating bodies or systems, such as spinning ice skaters who can increase their spin by pulling their arms in. The absence of external torques ensures that the initial angular momentum equals the final angular momentum. Therefore, if we analyze the system carefully, we can predict how the angular velocity or moment of inertia will change in response to internal configurations without external influence. In contrast, the other options suggest incorrect interpretations of angular momentum. One implies it can change with any force, which neglects the specific condition requiring external torque for change; another inaccurately states it is always zero, which is not true since angular momentum can have non-zero values; and the last suggests that angular momentum increases linearly with mass, ignoring the dependency of angular momentum on both mass and radius from the axis of rotation. Overall, the conservation of angular momentum is pivotal in understanding rotational dynamics in physics.

2. Which type of motion occurs when a restoring force is opposite to and proportional to a displacement?

A. Simple harmonic motion

B. Linear motion

C. Circular motion

D. Rotational motion

The concept of a restoring force being opposite to and proportional to a displacement is a fundamental characteristic of simple harmonic motion. In simple harmonic motion, when an object is displaced from its equilibrium position, the restoring force tries to bring the object back to that position. This relationship can be mathematically described by Hooke's Law, which states that the force exerted by a spring (or any other system that undergoes simple harmonic motion) is proportional to the displacement from its equilibrium position and acts in the opposite direction. For instance, if a mass attached to a spring is pulled down and released, the spring will exert an upward force that increases with greater displacements. This results in oscillatory motion about the equilibrium position, producing the unique characteristics of simple harmonic motion, including constant frequency and a sinusoidal pattern over time. In contrast, linear motion refers to motion along a straight path without any restoring force acting towards an equilibrium position. Circular motion involves movement along a circular path and does not incorporate a restoring force concept. Rotational motion is associated with the rotation of objects around an axis, which is also distinct from the characteristics of simple harmonic motion. Therefore, the answer is clearly related to the principles governing simple harmonic motion, highlighting the role of restoring forces

3. How is kinetic energy defined?

A. Kinetic energy is the energy of an object due to its heat

B. Kinetic energy is the energy of an object due to its motion

C. Kinetic energy is the energy stored within an object

D. Kinetic energy is independent of velocity

Kinetic energy is specifically defined as the energy possessed by an object due to its motion. This definition emphasizes the relationship between the energy and the velocity of the object. Mathematically, kinetic energy (KE) is expressed as $\frac{1}{2}mv^2$, where m is the mass of the object and v is its velocity. This formula illustrates that the kinetic energy increases with the square of the velocity, indicating how much the motion of the object contributes to its energy. In essence, the faster an object moves, or the greater its mass, the more kinetic energy it holds. Understanding kinetic energy in this way helps differentiate it from other forms of energy, such as thermal energy or potential energy, which relate to temperature or position, respectively.

4. In the context of motion, what does 'apparent weight' mean?

A. The true weight of an object

B. The weight felt by an object in a free environment

C. The weight experienced by an object during acceleration

D. The weight felt under normal gravitational conditions

'Apparent weight' refers to the weight experienced by an object when it is undergoing acceleration. This concept is particularly important in understanding how forces act on objects in non-inertial reference frames, such as when an object is in an elevator that is accelerating up or down, or when a vehicle is turning or speeding up. When an object is at rest or moving at a constant speed in a straight line, its weight (the force due to gravity acting on it) is what we typically consider. However, when the object accelerates, the net forces acting on it change, resulting in a difference between the true weight and what is perceived. For example, if you are in an elevator going upwards, you will feel heavier than your normal weight because the upward acceleration creates additional force against gravity. Conversely, if the elevator is accelerating downwards, you will feel lighter. This understanding of apparent weight allows us to comprehend experiences like the sensation of weightlessness in free fall or the increased force experienced during a rapid acceleration. It's a crucial and practical application of Newton's second law of motion, where the net force acting on an object influences its perceived weight.

5. What term describes the time taken by a projectile from the moment it is thrown until it touches the ground?

A. Time of flight

B. Acceleration

C. Velocity

D. Range

The term that describes the time taken by a projectile from the moment it is thrown until it touches the ground is known as the time of flight. This concept is crucial in projectile motion, as it determines how long the projectile will be in the air before returning to the ground. Time of flight is influenced by several factors, including the initial velocity of the projectile, the angle at which it is launched, and the acceleration due to gravity. It can be calculated using the equations of motion, which take into account the vertical and horizontal components of the projectile's trajectory. In this context, acceleration refers to the change in velocity of the projectile over time, but it does not specifically describe the duration of its flight. Velocity is the speed of the projectile in a given direction; while it plays a role in determining the time of flight, it is not the time duration itself. Range indicates the horizontal distance traveled by the projectile and is not related to the time taken to land. Understanding these distinctions helps clarify why time of flight is the correct term for this concept.

6. In which type of motion does the distance covered change during equal time intervals?

A. Uniform motion

B. Non-uniform motion

C. Straight-line motion

D. Circular motion

The scenario described pertains to non-uniform motion, where the distance covered by an object changes during equal time intervals. This type of motion is characterized by variations in speed or direction, resulting in an inconsistent distance traveled over equal durations. In non-uniform motion, the velocity of the object is not constant; it may increase or decrease. This causes the object to cover different distances in equal time intervals. For instance, if a car accelerates, it will travel a greater distance in the second second than in the first, as its speed increases. In the case of uniform motion, an object moves at a constant speed, meaning it covers equal distances in each time interval. Straight-line motion and circular motion can be either uniform or non-uniform, depending on whether the speed is constant. However, the key defining feature of non-uniform motion is the variation in distances covered in equal time intervals, making it the correct choice in this question.

7. What characterizes circular motion in physics?

A. An object moves at a constant speed with constant velocity

B. An object has a varying speed and constant velocity

C. An object moves along a curved path with constant speed but changing velocity

D. An object moves at constant velocity and changing speed

Circular motion in physics is characterized by an object moving in a circular path. In such motion, the magnitude of the speed can remain constant while the direction of the velocity constantly changes. This change in direction means that the velocity—defined as a vector quantity that includes both magnitude and direction—also changes over time, even if the speed (the scalar quantity) does not. When an object moves in a circular path, it is always experiencing a centripetal acceleration directed toward the center of the circle. This acceleration occurs regardless of whether the object's speed remains constant or varies. Hence, option C accurately describes this scenario: the object moves along a curved path—specifically, a circular one—with a constant speed while the velocity changes due to the continuous change in direction. In contrast, other options incorrectly state aspects of motion that do not align with the nature of circular motion. For instance, stating an object moves with constant velocity implies there is no acceleration, which contradicts the fundamental requirement of circular motion. Therefore, option C best describes the features associated with circular motion accurately.

8. What type of acceleration occurs when the velocity of a body changes by unequal amounts during equal time intervals?

A. Uniform acceleration

B. Non-uniform acceleration

C. Constant acceleration

D. Instantaneous acceleration

When the velocity of a body changes by unequal amounts during equal time intervals, this indicates that the acceleration is not consistent throughout that time period. In such scenarios, the object experiences variations in how quickly it is speeding up or slowing down, meaning that the rate of change of velocity is not the same from one interval to the next. Non-uniform acceleration captures this behavior, as it allows for the possibility of the object accelerating at different rates during different portions of its motion. This can be represented through a velocity-time graph where the slopes are varying, indicating that the rate of change of velocity (acceleration) is not constant. In contrast, uniform acceleration refers to a situation where the change in velocity is the same over equal time intervals, leading to a consistent and linear increase or decrease in speed. Constant acceleration similarly implies that the acceleration is unchanged over time. Instantaneous acceleration represents the acceleration at a specific moment, rather than over a period of time. Therefore, recognizing the nature of how velocity changes leads to the conclusion that the correct description is non-uniform acceleration.

9. In a collision, what dictates if momentum is conserved?

A. The presence of external forces

B. The types of materials involved

C. The total mass of the colliding objects

D. The absence of external forces

Momentum is a vector quantity that is conserved in a closed system where no external forces are acting. This principle is rooted in Newton's laws of motion, specifically the law of conservation of momentum, which states that in an isolated system (one not influenced by external forces), the total momentum before the collision will equal the total momentum after the collision. When considering a collision, if external forces are present, they can alter the overall momentum of the system. For example, if two objects collide while experiencing a significant external force like friction or air resistance, the momentum of the system may not be conserved as those forces contribute to a change in momentum. In contrast, if the system is isolated from these external influences, the internal interactions between the colliding objects will result in a conservation of momentum. This is evident in many physics problems involving collisions, where analyzing a system devoid of external interference allows for clear calculations of momentum before and after the event. Thus, the key determinant of momentum conservation during a collision is the absence of external forces acting on the system.

10. Which scenario represents circular motion?

A. A car accelerating in a straight line

B. A satellite orbiting the Earth

C. A ball rolling down a hill

D. A person walking on a flat surface

The scenario that represents circular motion is one where an object moves along a curved path that can be defined as a circle or part of a circle. A satellite orbiting the Earth is a perfect example of this. It travels in a path that continuously changes direction due to the gravitational pull from the Earth, which keeps it in a stable orbit. This constant change in direction while maintaining a constant distance from the center of the Earth is characteristic of circular motion. In this case, there are forces at play, primarily gravitational force, which ensures that the satellite does not move off into space or fall towards the Earth. The satellite is in a state of uniform circular motion if it travels at a constant speed around the Earth. The other scenarios describe linear or non-circular motion: the car accelerating in a straight line moves in a linear path; the ball rolling down a hill follows a curved path due to gravity but is not constricted to a circular track; and a person walking on a flat surface moves linearly as well. None of these scenarios involves the consistent radius and force dynamics inherent in circular motion like the satellite's orbit does.

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://ncealvl3physicsmechanics.examzify.com

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