

# OAR Mechanical Comprehension Practice Test (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. How is the area ratio of two pistons related to their distance moved?**
  - A. The larger piston moves a shorter distance**
  - B. The smaller piston moves a shorter distance**
  - C. The larger piston moves the same distance as the smaller piston**
  - D. The smaller piston always moves twice the distance**
  
- 2. What principle does buoyancy demonstrate?**
  - A. The weight of an object influences its buoyancy**
  - B. The force created by an object is equal to the weight of water displaced**
  - C. Density affects how high an object will float**
  - D. Water temperature influences buoyant forces**
  
- 3. Which quantity refers to how fast an object is moving?**
  - A. Acceleration**
  - B. Velocity**
  - C. Speed**
  - D. Displacement**
  
- 4. How does compressing air in a closed space affect its temperature?**
  - A. It decreases temperature**
  - B. It has no effect**
  - C. It increases temperature**
  - D. It stabilizes temperature**
  
- 5. What is the formula for calculating net force?**
  - A.  $F = m / a$**
  - B.  $F = m + a$**
  - C.  $F = m \times a$**
  - D.  $F = a / m$**

**6. What scientific principle explains the behavior of air density with altitude changes?**

- A. Archimedes' Principle**
- B. Boyle's Law**
- C. Bernoulli's Principle**
- D. Charles's Law**

**7. Which pendulum will swing faster?**

- A. The one with a longer string**
- B. The one with a shorter string**
- C. Both will swing at the same speed**
- D. Neither will swing**

**8. What does a mechanical gauge display in a car?**

- A. Speed of the vehicle**
- B. Pressure, temperature, or fluid levels in the engine**
- C. Battery voltage**
- D. Oil levels only**

**9. What is the speed of sound in feet per second?**

- A. 900 ft/sec**
- B. 1126 ft/sec**
- C. 1500 ft/sec**
- D. 2000 ft/sec**

**10. Which of these activities is influenced by increased altitude and decreased air density?**

- A. Swimming**
- B. Mountain climbing**
- C. Driving**
- D. Fishing**

## **Answers**

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

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## **Explanations**

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## 1. How is the area ratio of two pistons related to their distance moved?

- A. The larger piston moves a shorter distance**
- B. The smaller piston moves a shorter distance**
- C. The larger piston moves the same distance as the smaller piston**
- D. The smaller piston always moves twice the distance**

In hydraulic systems, the principle of Pascal's Law states that when pressure is applied to a confined fluid, it transmits that pressure throughout the fluid in all directions. The movement and force transmission can be understood using the concept of area ratios of the pistons involved. When comparing two pistons in a hydraulic system, the area ratio of the pistons directly affects their movement distances. The larger piston has a greater surface area compared to the smaller piston, which means that for a given force applied, the larger piston will experience a lower movement distance than the smaller piston. This is because the work done on both pistons must be equal, as work is defined as force times distance. Since force is proportional to the area of the piston (as pressure is consistent throughout the system), a larger piston can exert more force but will move a shorter distance. Conversely, the smaller piston must move further to compensate for the larger piston's movement, given that the product of force and distance remains constant. This principle is foundational in hydraulic systems, illustrating how mechanical advantage is achieved through varying piston sizes—where the larger piston moves a shorter distance compared to the smaller piston, which moves a greater distance.

## 2. What principle does buoyancy demonstrate?

- A. The weight of an object influences its buoyancy**
- B. The force created by an object is equal to the weight of water displaced**
- C. Density affects how high an object will float**
- D. Water temperature influences buoyant forces**

Buoyancy is fundamentally described by Archimedes' principle, which states that an object submerged in a fluid experiences an upward force equal to the weight of the fluid displaced by that object. This principle highlights that buoyancy is not directly about the weight of the object itself, but rather about how much fluid it displaces. When an object is placed in a fluid, it pushes aside a volume of fluid equal to its own submerged volume. The weight of that displaced fluid then creates a buoyant force that acts against the object's weight. If the buoyant force is greater than the weight of the object, the object will float; if less, it will sink. While other options might seem related to buoyancy considerations, they do not capture the essence of what determines buoyant force as effectively as this option. The weight of an object and density do play a role in whether the object floats or sinks, but the core principle is centered around the relationship between the displaced fluid's weight and the object itself. Water temperature can have an effect on fluid density, but it is not a fundamental principle of buoyancy itself.

### 3. Which quantity refers to how fast an object is moving?

- A. Acceleration
- B. Velocity
- C. Speed**
- D. Displacement

The correct answer is speed, as it specifically refers to how fast an object is moving, regardless of its direction. Speed is a scalar quantity, meaning it only has magnitude and does not include any directional information. This is different from velocity, which also measures how fast an object is moving but incorporates the direction of that movement, making it a vector quantity. Acceleration, on the other hand, describes the rate of change of velocity over time and is related to how quickly an object is speeding up or slowing down. Displacement refers to the change in position of an object and is a vector quantity that considers both distance and direction from the starting point to the endpoint. Therefore, while all these terms are related to motion, speed uniquely identifies the rate of movement without any consideration of direction.

### 4. How does compressing air in a closed space affect its temperature?

- A. It decreases temperature
- B. It has no effect
- C. It increases temperature**
- D. It stabilizes temperature

When air is compressed in a closed space, its temperature increases due to the principles of thermodynamics. This phenomenon can be explained by the ideal gas law, which states that, for a fixed amount of gas at a constant volume, an increase in pressure results in an increase in temperature. As the air molecules are forced closer together during compression, their kinetic energy increases. This heightened kinetic energy manifests as an increase in temperature. In practical terms, this is why you might feel warmth when compressing air in a bicycle pump or during operations in pneumatic tools. Thus, understanding that the relationship between pressure, volume, and temperature is governed by thermodynamic principles clarifies why compressing air leads to an elevation in temperature.

## 5. What is the formula for calculating net force?

- A.  $F = m / a$
- B.  $F = m + a$
- C.  $F = m \times a$**
- D.  $F = a / m$

The formula for calculating net force in physics is derived from Newton's second law of motion, which states that the net force acting on an object is equal to the mass of the object multiplied by its acceleration. This relationship can be expressed mathematically as  $F = m \times a$ , where  $F$  represents the net force,  $m$  represents the mass of the object, and  $a$  represents its acceleration. This formula illustrates that the net force is directly proportional to both the mass of the object and the acceleration it experiences. When either the mass or the acceleration increases, the net force will also increase, provided that the other factor remains constant. This principle is fundamental in understanding how objects will behave under different forces and is critical in mechanics for solving problems related to motion and forces. Other calculations involving mass and acceleration, such as dividing mass by acceleration or simply adding them together, do not provide meaningful relationships in the context of net force, which is why those options do not represent the correct approach.

## 6. What scientific principle explains the behavior of air density with altitude changes?

- A. Archimedes' Principle
- B. Boyle's Law**
- C. Bernoulli's Principle
- D. Charles's Law

The correct answer is Boyle's Law, which states that at a constant temperature, the pressure of a gas is inversely proportional to its volume. As altitude increases, air pressure decreases, leading to a corresponding increase in the volume of air, which in turn causes a decrease in air density. At higher altitudes, the weight of the air above pushes down with less force, resulting in lower atmospheric pressure. As a result, the same amount of air occupies a larger volume, causing the density to decline. This principle is crucial for understanding how air density affects various phenomena, such as the performance of aircraft and the behavior of gases in the atmosphere. Although the other choices are significant in their own contexts—like Bernoulli's Principle, which deals with fluid dynamics, and Archimedes' Principle, which is focused on buoyancy—Boyle's Law specifically describes how pressure and volume changes impact gas density with altitude variations.

## 7. Which pendulum will swing faster?

- A. The one with a longer string
- B. The one with a shorter string**
- C. Both will swing at the same speed
- D. Neither will swing

A pendulum's swing speed is influenced primarily by the length of its string. In simple terms, a shorter string will allow the pendulum to swing back and forth more quickly than a longer string. This is due to the physics of pendulum motion, which is governed by the principles of gravity and inertia. When a pendulum swings, the time it takes to complete one full oscillation (back and forth motion) is referred to as the period. The formula for the period of a simple pendulum is given by the equation:  $T = 2\pi \sqrt{\frac{L}{g}}$  where  $T$  is the period,  $L$  is the length of the pendulum string, and  $g$  is the acceleration due to gravity. According to this formula, the period is directly proportional to the square root of the string length. This means that as the string length increases, the time taken for each swing also increases, resulting in a slower swing. Therefore, the pendulum with the shorter string will swing faster, completing its oscillations in less time than the one with the longer string. The conclusion aligns with the established principles of pendulum motion, as shorter lengths yield quicker swings.

## 8. What does a mechanical gauge display in a car?

- A. Speed of the vehicle
- B. Pressure, temperature, or fluid levels in the engine**
- C. Battery voltage
- D. Oil levels only

A mechanical gauge in a car is designed to provide real-time information about various important parameters regarding the engine's performance and operating conditions. It typically measures and displays pressure levels, temperature readings, or fluid levels essential for the optimal functioning of the engine. For instance, a mechanical pressure gauge can indicate oil pressure, which is crucial for the engine's lubrication system. Similarly, a temperature gauge can show the engine's coolant temperature, helping to prevent overheating. Additionally, fluid level indicators can display the levels of vital fluids such as coolant, oil, or transmission fluid, which are essential for ensuring the vehicle operates effectively and safely. By providing this critical data, mechanical gauges help drivers monitor their vehicle's health and take necessary actions to maintain its performance.

**9. What is the speed of sound in feet per second?**

- A. 900 ft/sec
- B. 1126 ft/sec**
- C. 1500 ft/sec
- D. 2000 ft/sec

The speed of sound in air at sea level and at standard atmospheric conditions is approximately 1126 feet per second. This value can change based on various factors such as temperature and humidity, but 1126 ft/sec is widely accepted as the standard speed for sound in air. In contrast, lower speeds like 900 ft/sec would not accurately reflect the speed of sound under normal conditions, and higher speeds such as 1500 ft/sec and 2000 ft/sec are not achievable for sound in air. The speed of sound can be significantly higher in denser media, such as water or steel, but the question specifically refers to the speed of sound in air. Hence, the selection of 1126 ft/sec is the best representation of the speed of sound in typical conditions.

**10. Which of these activities is influenced by increased altitude and decreased air density?**

- A. Swimming
- B. Mountain climbing**
- C. Driving
- D. Fishing

Increased altitude and decreased air density have a significant impact on activities that involve physical exertion, particularly those taking place at high elevations, such as mountain climbing. At higher altitudes, the air pressure drops, which results in lower oxygen levels. This can affect a climber's physical performance, leading to quicker fatigue and requiring acclimatization to avoid altitude sickness. In contrast, activities like swimming, driving, and fishing are less influenced by altitude and air density. Swimming takes place in water and is not affected by air pressure changes in the same way, while driving and fishing activities do not involve significant physical exertion in higher altitudes that would be impacted by decreased air density. Therefore, mountain climbing is the activity most directly influenced by changes in altitude and air density.

# 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://oarmechcomprehension.examzify.com>**

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

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