ONRAMPS PHYSICS PRACTICE TEST (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.

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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!

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Questions

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1. What is the Celsius temperature corresponding to 300 Kelvin?

A. 0 C

B. 300 C

C. -273 C

D. 27 C

2. Zeroth Law: If objects A and B are each in thermal equilibrium with object C, then what can be said about A and B?

A. If A is touching B, heat always flows from A to B.

B. If A is in thermal equilibrium with C, and B is in thermal equilibrium with C, then A and B are in equilibrium with each other.

C. Temperature is the same for all objects in equilibrium.

D. Energy must be conserved during thermal contact.

3. A vertical spring carries a mass m = 2 kg. With g = 9.8 m/s^2 and k = 10 N/m, what is the equilibrium extension d?

A. 1.96 m

B. 0.98 m

C. 19.6 m

D. 0.2 m

4. In a given medium, which statement about wave speeds is true?

A. The speed depends only on the frequency

B. The speed is the same for all wave types in all media

C. The speed depends on the medium and the type of wave

D. The speed is determined solely by the amplitude

5. In rotational equilibrium, what does tau_net = 0 imply?

A. tau_clockwise = tau_counterclockwise

B. omega = 0

C. I remains constant

D. L remains constant

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6. For the harmonic wavelengths of a string fixed at both ends, lambda_n = 2L/n. Which statement is true as n increases?

A. Lambda decreases as n increases.

B. Lambda increases as n increases.

C. Lambda stays the same for all n.

D. Lambda becomes negative.

7. What value correctly represents Avogadro's number?

A. 6.022 × 10^24

B. 1.602 × 10^-19

C. 3.00 × 10^8

D. 6.022 × 10^23

8. For torque due to a force F applied at radius r with angle theta between r and F, which expression is correct?

A. tau = r F cos theta

B. tau = F

C. tau = r F sin theta

D. tau = r F

9. Which formula gives the x-coordinate of the center of mass for multiple point masses?

A. x_cm = (m1*x1 + m2*x2 + ... + mn*xn) / (m1 + m2 + ... + mn)

B. x_cm = (x1 + x2 + ... + xn) / n

C. x_cm = (m1 + m2 + ... + mn) / (x1 + x2 + ... + xn)

D. x_cm = (m1*x1 - m2*x2 + ... + (-1)^n mn*xn) / (m1 + m2 + ... + mn)

10. What is the term for the rate of change of angular velocity?

A. Linear Acceleration

B. Angular Acceleration

C. Torque

D. Moment of Inertia

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Answers

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

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Explanations

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1. What is the Celsius temperature corresponding to 300 Kelvin?

A. 0 C

B. 300 C

C. -273 C

D. 27 C

To convert between Kelvin and Celsius you subtract 273.15, because the two scales have the same degree size but Celsius is shifted by 273.15 from Kelvin. So for 300 K, the Celsius temperature is 300 − 273.15 ≈ 26.85 °C, which rounds to about 27 °C. That means 300 K corresponds to roughly 27 °C. For reference, 0 °C equals 273.15 K, and −273.15 °C equals 0 K, while 300 °C would be about 573 K.

2. Zeroth Law: If objects A and B are each in thermal equilibrium with object C, then what can be said about A and B?

A. If A is touching B, heat always flows from A to B.

B. If A is in thermal equilibrium with C, and B is in thermal equilibrium with C, then A and B are in equilibrium with each other.

C. Temperature is the same for all objects in equilibrium.

D. Energy must be conserved during thermal contact.

The main idea is that temperature can be compared using a third object as a reference. If A is in thermal equilibrium with C, A has the same temperature as C. If B is in thermal equilibrium with C, B also has the same temperature as C. Therefore A and B share the same temperature, so there would be no net heat flow between them if they are placed in contact. That means A and B are in thermal equilibrium with each other. Why this is the best answer: it captures the transitive nature of thermal equilibrium—the law says if two objects are each in equilibrium with a third, they are in equilibrium with each other. The other ideas either describe no heat flow generally, or bring in broader or unrelated statements about temperature or energy that aren't the precise statement of this law.

3. A vertical spring carries a mass m = 2 kg. With g = 9.8 m/s^2 and k = 10 N/m, what is the equilibrium extension d?

A. 1.96 m

B. 0.98 m

C. 19.6 m

D. 0.2 m

At equilibrium, the spring's upward force balances the mass's downward weight. The spring force is k d, and the weight is m g. So set k d = m g and solve for d: d = (m g) / k. With m = 2 kg, g = 9.8 m/s^2, and k = 10 N/m, d = (2 × 9.8) / 10 = 1.96 m. The weight is 19.6 N, and the spring must extend 1.96 m to provide that force. Other options correspond to spring forces that are too small or too large to balance the weight.

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4. In a given medium, which statement about wave speeds is true?

A. The speed depends only on the frequency

B. The speed is the same for all wave types in all media

C. The speed depends on the medium and the type of wave

D. The speed is determined solely by the amplitude

Wave speed is not a single universal value; it depends on what is waving and what is waving through. Different media have different restoring forces and inertia, and different kinds of waves use those properties in distinct ways. So in the same material, a longitudinal sound wave and a transverse wave can travel at different speeds because the underlying mechanics differ. The relation v = fλ shows how frequency and wavelength are tied, but the actual speed you get for a given wave depends on the medium and the wave type, not on amplitude. That's why the best description is that speed depends on the medium and the type of wave.

5. In rotational equilibrium, what does tau_net = 0 imply?

A. tau_clockwise = tau_counterclockwise

B. omega = 0

C. I remains constant

D. L remains constant

Net torque being zero means the torques around the chosen axis cancel each other out. This makes the angular acceleration zero, so the rotation rate isn't speeding up or slowing down. In other words, the torques producing rotation in one direction balance those in the opposite direction. That's why the best description is that clockwise torques equal counterclockwise torques. The other statements aren't guaranteed: the object can be rotating at a constant nonzero rate and still have tau_net = 0, and the moment of inertia is a property of the body's mass distribution that isn't dictated by the net torque alone. Angular momentum would remain constant only if both its factors (I and omega) aren't changing.

6. For the harmonic wavelengths of a string fixed at both ends, lambda_n = 2L/n. Which statement is true as n increases?

A. Lambda decreases as n increases.

B. Lambda increases as n increases.

C. Lambda stays the same for all n.

D. Lambda becomes negative.

Higher harmonic numbers produce shorter wavelengths on a string fixed at both ends. Since the allowed wavelengths are lambda_n = 2L / n, increasing n makes lambda_n smaller. Physically, more nodes along the string mean a shorter distance between adjacent nodes, so a shorter half-wavelength fits in the same length. Because the wave speed on the string is set by tension and linear density, a shorter wavelength corresponds to a higher frequency, f_n = v / lambda_n, which increases with n. The wavelength cannot be negative, and it does not stay the same or grow with increasing n, so it must decrease as n grows.

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7. What value correctly represents Avogadro's number?

A. 6.022 × 10^24

B. 1.602 × 10^-19

C. 3.00 × 10^8

D. 6.022 × 10^23

Avogadro's number is the number of particles in one mole of a substance, which lets us connect the microscopic world of atoms and molecules to macroscopic amounts we measure in grams. It tells us that one mole contains about 6.022×10^23 particles, whether we're counting atoms, ions, or molecules depending on the substance. This is why 12 g of carbon-12 contains exactly 6.022×10^23 carbon atoms. The other numbers refer to different ideas: 6.022×10^24 would be ten times as many particles per mole, 1.602×10^-19 is the elementary charge, and 3.00×10^8 is the speed of light. So the value that correctly represents Avogadro's number is 6.022×10^23.

8. For torque due to a force F applied at radius r with angle theta between r and F, which expression is correct?

A. tau = r F cos theta

B. tau = F

C. tau = r F sin theta

D. tau = r F

Torque measures how strongly a force tends to rotate an object about a pivot. The rotational effect depends on how far from the pivot the force is applied (the lever arm, r) and how much of the force acts perpendicular to that lever arm. The torque magnitude is given by the cross product, $|\tau| = |r \times F| = r F \sin(\theta)$, where theta is the angle between r and F. The perpendicular component of the force is F sin(theta), and multiplying by the lever arm r gives the rotational tendency: r F sin theta. This is why the expression with sin theta is the correct one. When theta is 90°, you get the maximum torque rF; when theta is 0°, the torque is zero. The direction of torque is perpendicular to the plane formed by r and F, determined by the right-hand rule.

9. Which formula gives the x-coordinate of the center of mass for multiple point masses?

A. x_cm = (m1*x1 + m2*x2 + ... + mn*xn) / (m1 + m2 + ... + mn)

B. x_cm = (x1 + x2 + ... + xn) / n

C. x_cm = (m1 + m2 + ... + mn) / (x1 + x2 + ... + xn)

D. x_cm = (m1*x1 - m2*x2 + ... + (-1)^n mn*xn) / (m1 + m2 + ... + mn)

*The x-coordinate of the center of mass is found by weighting each position by its mass and then dividing by the total mass. In other words, x_cm = (m1*x1 + m2*x2 + ... + mn*xn) / (m1 + m2 + ... + mn). Heavier masses pull the center closer to their x positions, so their contributions matter more in the average. If all masses were the same, this reduces to the simple average x_cm = (x1 + x2 + ... + xn)/n, which explains why that form might look familiar. But without equal masses, the plain average doesn't correctly locate the balance point. The other expressions don't implement this mass-weighted averaging, so they don't generally give the correct center of mass.*

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10. What is the term for the rate of change of angular velocity?

A. Linear Acceleration

B. Angular Acceleration

C. Torque

D. Moment of Inertia

Angular velocity tells you how fast something is rotating and in what direction. The rate at which that spin rate changes is angular acceleration, often denoted alpha. Mathematically, it's the time derivative of angular velocity: alpha = dω/dt, measured in radians per second squared. This tells you how quickly the rotation is speeding up or slowing down. If a torque is applied to a rotating object, it produces angular acceleration proportional to the torque divided by the object's moment of inertia (τ = Iα). Positive angular acceleration means the rotation rate is increasing, while negative means it's decreasing. This is the rotational counterpart to linear acceleration, with angular velocity playing the role of velocity and torque playing the role of force.

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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://onrampshysics.examzify.com

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

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