

NCEA Level 3 Waves Practice Test (Sample)

Study Guide



Everything you need from our exam experts!

This is a sample study guide. To access the full version with hundreds of 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. 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!

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Questions

- 1. What occurs when a wave bends as it passes into a different medium?**
 - A. Reflection**
 - B. Refraction**
 - C. Diffraction**
 - D. Interference**
- 2. What is defined as the distance between two nearest points on a wave that are in the same phase?**
 - A. Wave crest**
 - B. Amplitude**
 - C. Wavelength**
 - D. Wave speed**
- 3. What property of a coherent light source is critical for its definition?**
 - A. It emits light at different wavelengths**
 - B. It emits light waves that are in phase**
 - C. It is bright and concentrated**
 - D. It can be polarized**
- 4. What phenomenon causes white light to split into colors when passing through a prism?**
 - A. Reflection**
 - B. Diffraction**
 - C. Dispersion**
 - D. Refraction**
- 5. Which type of light source emits waves that are in phase and have a constant phase difference?**
 - A. Incoherent light source**
 - B. Coherent light source**
 - C. Unpolarized light source**
 - D. Monochromatic light source**

- 6. What is the principle of superposition?**
- A. The individual displacements of waves affect total amplitude**
 - B. The sum of wave velocities results in a new wave speed**
 - C. The frequencies of overlapping waves combine to form new frequencies**
 - D. The behavior of waves is independent of each other**
- 7. What phenomenon occurs when a wave strikes a boundary at an angle greater than the critical angle?**
- A. Total internal reflection**
 - B. Refraction**
 - C. Diffraction**
 - D. Absorption**
- 8. What does the term "wavefront" represent?**
- A. An imaginary line representing wave speed**
 - B. An imaginary surface of points in a wave that are in phase**
 - C. A measurement of wave amplitude**
 - D. A physical wave particle**
- 9. Which property of a wave relates to its height from the rest position?**
- A. Wavelength**
 - B. Frequency**
 - C. Amplitude**
 - D. Phase**
- 10. What phenomenon occurs when waves meet and combine?**
- A. Refraction**
 - B. Interference**
 - C. Diffraction**
 - D. Reflection**

Answers

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

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Explanations

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1. What occurs when a wave bends as it passes into a different medium?

- A. Reflection**
- B. Refraction**
- C. Diffraction**
- D. Interference**

When a wave bends as it passes from one medium into another, this phenomenon is known as refraction. This behavior occurs because waves travel at different speeds in different media. For example, light travels slower in water than in air. As the wave enters the new medium, its speed changes, which causes the wave to change direction. The extent to which the wave bends depends on the angle at which it hits the interface between the two media, as well as the properties of both media, such as their densities and refractive indices. This bending effect is responsible for various optical phenomena, such as the apparent bending of a straw in a glass of water or the formation of rainbows. Understanding refraction is crucial in many fields, such as optics, acoustics, and various engineering applications. It contrasts with other wave behaviors like reflection, where the wave bounces back into the original medium, diffraction, which involves the spreading of waves around obstacles or through openings, and interference, where waves superpose to form a resultant wave pattern. Each of these phenomena has distinct characteristics and occurs under different circumstances.

2. What is defined as the distance between two nearest points on a wave that are in the same phase?

- A. Wave crest**
- B. Amplitude**
- C. Wavelength**
- D. Wave speed**

Wavelength is defined as the distance between two nearest points on a wave that are in the same phase. This means that if you were to look at two consecutive peaks (crests) or troughs of a wave, the distance between these points would represent the wavelength. In wave mechanics, understanding the wavelength is essential because it is a fundamental characteristic of the wave that relates to its frequency and speed. Wavelength plays a critical role in determining how energy is transmitted through different mediums and is key in various applications, such as telecommunications and acoustics. The other terms mentioned do not describe this specific distance. For instance, a wave crest refers to the highest point of the wave, amplitude describes the height of the wave from the equilibrium position to the crest or trough, and wave speed refers to how fast the wave is traveling through a medium. Each of these terms captures different aspects of wave behavior, but it is specifically the wavelength that defines the distance between points in the same phase.

3. What property of a coherent light source is critical for its definition?

- A. It emits light at different wavelengths**
- B. It emits light waves that are in phase**
- C. It is bright and concentrated**
- D. It can be polarized**

A coherent light source is defined by its ability to emit light waves that are in phase with one another. This means that there is a consistent phase relationship between the waves emitted, allowing for constructive and destructive interference to occur predictably. Coherence is essential for phenomena such as interference patterns, which can be observed in experiments like the double-slit experiment. When light waves are in phase, they maintain a constant phase difference over time and space, enabling them to reinforce or cancel each other effectively. This characteristic is what makes coherent sources, such as lasers, especially useful in applications like holography, telecommunications, and various scientific measurements. The other properties mentioned do not define coherence. For instance, emitting light at different wavelengths typically indicates a mixture of colors, which doesn't contribute to the coherence of the light. Brightness and concentration of light are aspects of intensity but do not address the phase relationship necessary for coherence. Polarization describes the orientation of the light waves but is not a requirement for coherence. Thus, the consistent phase relationship is the unique and defining property of a coherent light source.

4. What phenomenon causes white light to split into colors when passing through a prism?

- A. Reflection**
- B. Diffraction**
- C. Dispersion**
- D. Refraction**

When white light passes through a prism, it undergoes a process known as dispersion. Dispersion occurs because different colors of light travel at different speeds when they pass through a medium like glass. Each color has a different wavelength, which affects how much it bends, or refracts, as it enters and exits the prism. In a prism, shorter wavelengths (like blue or violet light) are refracted more than longer wavelengths (like red light). This difference in the angle of refraction for each color causes the light to spread out into a spectrum, resulting in the visible range of colors: red, orange, yellow, green, blue, indigo, and violet. So, while refraction is the bending of light, it is the specific interaction of light with the material that leads to the separation of colors, and this interaction is termed dispersion. Understanding this concept is crucial for exploring how prisms reveal the spectrum of light that makes up what we perceive as white light.

5. Which type of light source emits waves that are in phase and have a constant phase difference?

- A. Incoherent light source**
- B. Coherent light source**
- C. Unpolarized light source**
- D. Monochromatic light source**

A coherent light source is characterized by emitting waves that are in phase with each other, maintaining a constant phase difference over time. This coherence is essential for a variety of optical phenomena, such as interference and diffraction, which occur when multiple light waves overlap. In coherence, the relationship between the waves' phases remains stable, allowing for predictable and observable patterns. For example, lasers are typically considered coherent light sources because they produce light waves that oscillate in unison, making them ideal for applications like holography or precise measurements. Other types of light sources, such as incoherent light sources, produce waves with random phase relationships, resulting in a loss of consistent interference patterns. Unpolarized light sources emit waves that are oriented in different directions, while monochromatic light sources refer to waves of a single frequency or color; however, they do not inherently ensure coherence. Thus, the coherence of the waves and the constancy of their phase difference in a coherent light source make it the suitable choice for this question.

6. What is the principle of superposition?

- A. The individual displacements of waves affect total amplitude**
- B. The sum of wave velocities results in a new wave speed**
- C. The frequencies of overlapping waves combine to form new frequencies**
- D. The behavior of waves is independent of each other**

The principle of superposition states that when two or more waves overlap in a medium, the resultant amplitude at any point is equal to the algebraic sum of the individual displacements of those waves at that same point. This means that if multiple waves are present, they can interfere with each other, leading to constructive interference when their amplitudes add together, or destructive interference when their amplitudes partially or completely cancel each other out. This principle is foundational in wave theory because it helps to explain phenomena such as interference patterns, standing waves, and the overall behavior of waves in various contexts. The total amplitude at a point is thus directly influenced by the individual contributions of each wave, making the first choice logically sound and consistent with the known behaviors of waves.

7. What phenomenon occurs when a wave strikes a boundary at an angle greater than the critical angle?

A. Total internal reflection

B. Refraction

C. Diffraction

D. Absorption

When a wave strikes a boundary at an angle greater than the critical angle, total internal reflection occurs. This phenomenon is specific to the context of wave behavior, particularly for waves such as light, as they transition from a medium with a higher refractive index to one with a lower refractive index. At angles greater than the critical angle, the wave cannot enter the second medium; instead, it reflects back entirely into the first medium. This happens because the sine of the angle of incidence exceeds the maximum value allowed by Snell's law, which dictates the relationship between the angles of incidence and refraction based on the refractive indices of the two media involved. Total internal reflection plays a crucial role in various applications, such as optical fibers, where it allows light signals to be transmitted over long distances with minimal loss. This principle ensures that the light stays within the fiber by reflecting off the boundaries whenever it hits at an angle greater than the critical angle, thereby maintaining signal integrity. Understanding this concept is essential in wave behavior topics, and it highlights the unique characteristics of wave interactions at boundaries, particularly in the context of optics and light transmission.

8. What does the term "wavefront" represent?

A. An imaginary line representing wave speed

B. An imaginary surface of points in a wave that are in phase

C. A measurement of wave amplitude

D. A physical wave particle

The term "wavefront" refers to an imaginary surface that connects all points in a wave that are in phase with each other. This means that every point on a wavefront is at the same stage in the wave cycle, whether they are at their maximum displacement (crest) or at their minimum displacement (trough). Visualizing wavefronts can help in understanding how waves propagate through space; they move outward from a source in all directions, much like the ripples created when a stone is thrown into a calm pond. This concept is fundamental in wave theory, particularly in optics and acoustics, as it allows us to visualize how waves behave as they move through different mediums. Understanding wavefronts is critical in applications such as lens design and sound wave propagation, among others.

9. Which property of a wave relates to its height from the rest position?

- A. Wavelength**
- B. Frequency**
- C. Amplitude**
- D. Phase**

The property of a wave that relates to its height from the rest position is amplitude. Amplitude is defined as the maximum distance that points on a wave, such as the crest or trough, move away from their rest position or equilibrium. This gives a measure of the energy carried by the wave; higher amplitudes indicate more energy. In contrast, wavelength refers to the distance between successive crests or troughs in a wave, frequency concerns how many cycles or waves occur in a given time period, and phase pertains to the position of a point in time on a waveform cycle. The focus on height in this question correctly identifies amplitude as the property that corresponds specifically to this measurement.

10. What phenomenon occurs when waves meet and combine?

- A. Refraction**
- B. Interference**
- C. Diffraction**
- D. Reflection**

When waves meet and combine, the phenomenon that occurs is known as interference. This process involves the overlapping of two or more waves, resulting in a new wave pattern. Interference can lead to areas of constructive interference, where waves reinforce each other, leading to increased amplitude. Conversely, it can also result in destructive interference, where waves cancel each other out, resulting in reduced amplitude. Understanding interference is crucial in various applications, including sound, light, and water waves, as it helps explain complex wave patterns and behaviors observed in different contexts, such as noise canceling headphones or the patterns created by overlapping water waves. In the case of refraction, diffraction, and reflection, these phenomena involve the bending, spreading, or bouncing back of waves, rather than the combination of their amplitudes as seen in interference. Thus, the key aspect that defines interference is the direct interaction and combination of wave properties.

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://ncealvl3waves.examzify.com>

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