

# Sonography Canada Physics Core Practice Exam (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. What is the relationship between frequency and period?**
  - A. Directly related
  - B. Inversely related
  - C. Unrelated
  - D. Both are constants
- 2. What important tissue property influences the amount of reflection?**
  - A. Density
  - B. Acoustic Impedance
  - C. Speed of Sound
  - D. Attenuation Rate
- 3. What does 'Ipa' stand for in the context of intensity measurements?**
  - A. Instantaneous power average
  - B. Pulse average intensity
  - C. Peak average intensity
  - D. Spatial peak amplitude
- 4. What is another term used for backscatter in ultrasound physics?**
  - A. Diffuse reflection
  - B. Specular reflection
  - C. Rayleigh scattering
  - D. Absorption
- 5. What term describes the average intensity of a pulse when measured over the entire repetition period?**
  - A. Max intensity
  - B. Average pulse intensity
  - C. Pulsed average intensity
  - D. Temporal average intensity

**6. If an angle of incidence is not measured at 90 degrees, it is referred to as what?**

- A. Acute**
- B. Obtuse**
- C. Oblique**
- D. Reflected**

**7. What does the ability of a reflection primarily depend on?**

- A. Acoustic frequency**
- B. Acoustic impedance**
- C. Tissue density**
- D. Wave velocity**

**8. What frequency is categorized as infrasonic?**

- A. 20-100 Hz**
- B. 10 Hz to 20 kHz**
- C. Below 20 Hz**
- D. 1 Hz to 50 Hz**

**9. Absorption in ultrasound is directly related to which of the following factors?**

- A. Distance**
- B. Frequency**
- C. Intensity**
- D. Phase**

**10. What term describes the decrease in amplitude, intensity, and power of a sound wave?**

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

## **Answers**

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

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## **Explanations**

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## 1. What is the relationship between frequency and period?

- A. Directly related
- B. Inversely related**
- C. Unrelated
- D. Both are constants

The relationship between frequency and period is indeed inversely related. Frequency refers to the number of cycles of a wave that occur in one second, measured in hertz (Hz). The period, on the other hand, is the amount of time it takes for one complete cycle of the wave to occur, usually measured in seconds. Mathematically, this relationship can be expressed with the formula: 
$$f = \frac{1}{T}$$
 This means that as the frequency increases (more cycles per second), the period decreases (the time per cycle becomes shorter). Conversely, if the frequency decreases, the period increases. This inverse relationship signifies that if one quantity goes up, the other goes down, thereby reinforcing the idea that frequency and period are tightly linked, but in opposite directions. Other options do not accurately describe the relationship. For example, stating they are directly related would imply that both increase or decrease together, which is not the case. Calling them unrelated ignores the intrinsic mathematical connection. Lastly, saying both are constants is incorrect since both frequency and period vary depending on the characteristics of the wave being analyzed.

## 2. What important tissue property influences the amount of reflection?

- A. Density
- B. Acoustic Impedance**
- C. Speed of Sound
- D. Attenuation Rate

The amount of reflection that occurs at an interface between two tissues in ultrasound imaging is primarily influenced by acoustic impedance. Acoustic impedance is a critical property that combines both the density of a material and the speed of sound within that material. It determines how much ultrasound energy is transmitted versus reflected at the interface between different tissues. When the acoustic impedance of two adjacent tissues differs significantly, a larger proportion of the ultrasound waves is reflected back to the transducer. This reflection occurs because the change in impedance causes a mismatch in the transmission of sound waves; thus, more energy is returned rather than passed through. For example, when ultrasound travels from a medium with low impedance (like fat) to one with higher impedance (like muscle), the difference in their acoustic impedances leads to a higher amount of reflection. This principle is essential for image formation in ultrasound, as reflections contribute to the echogenicity that is visualized on the ultrasound image. In contrast, while density and speed of sound are components that contribute to acoustic impedance, they do not alone determine the amount of reflection. Similarly, attenuation rate refers to the decrease in intensity of the ultrasound wave as it travels through tissue, which impacts the overall signal but not specifically the reflection at tissue interfaces. Thus, the key

### 3. What does 'Ipa' stand for in the context of intensity measurements?

- A. Instantaneous power average
- B. Pulse average intensity**
- C. Peak average intensity
- D. Spatial peak amplitude

'Ipa' stands for Pulse average intensity. In sonography, wave intensity is a key parameter as it relates to the amount of energy transmitted to the tissue during an ultrasound examination. The pulse average intensity specifically measures the average intensity of the ultrasound beam during the time the pulse is "on," essentially accounting for the energy delivered over that time frame. This metric is particularly important in evaluating the potential effects of ultrasound on biological tissues, helping to ensure that the intensity levels utilized in diagnostic imaging are safe and effective. Understanding pulse average intensity helps practitioners choose appropriate settings and minimizes risk to patients. This is crucial as it ensures that the exposure to ultrasound is kept within safe limits while still providing high-quality diagnostic information.

### 4. What is another term used for backscatter in ultrasound physics?

- A. Diffuse reflection**
- B. Specular reflection
- C. Rayleigh scattering
- D. Absorption

Backscatter refers to the scattering of ultrasound waves that occurs when they encounter small particles or irregularities in the medium through which they travel. The term "diffuse reflection" is commonly associated with backscatter because it is characterized by the scattering of waves in multiple directions, rather than in a single, organized direction. This is particularly relevant when considering how ultrasound waves interact with small structures within tissues, where the returning echoes are not just reflections but dispersed returns from various angles. In ultrasound physics, backscatter is crucial for imaging because it contributes to the echoes that are received by the transducer, allowing us to visualize structures within the body. The importance of diffuse reflection is highlighted in various applications, especially in assessing soft tissues, where the variety of tissue interfaces leads to backscatter that produces usable imaging data. The other terms, although relevant in the context of ultrasound, do not describe backscatter. Specular reflection pertains to images formed by smooth surfaces reflecting sound waves at specific angles. Rayleigh scattering specifically addresses how sound waves scatter when they hit particles smaller than their wavelength, which is more specialized than the general concept of backscatter. Absorption deals with the loss of energy as sound waves pass through tissues and does not refer to the scattering of waves.

**5. What term describes the average intensity of a pulse when measured over the entire repetition period?**

- A. Max intensity**
- B. Average pulse intensity**
- C. Pulsed average intensity**
- D. Temporal average intensity**

The term that describes the average intensity of a pulse when measured over the entire repetition period is known as pulsed average intensity. This concept represents the average power per unit area that is delivered by the ultrasound beam during the time it is actually on, accounting for the "on" time and the "off" time of the pulse. In ultrasound imaging, the intensity of the sound wave fluctuates because it is transmitted in pulses. Pulsed average intensity provides a more accurate reflection of the overall exposure from the ultrasound source by incorporating the pulsing nature of the system. It is critical for understanding the potential effects of ultrasound on tissues, especially in terms of thermal and mechanical interactions, as well as for maintaining safety standards. By contrast, terms such as maximum intensity would refer to the peak intensity occurring at any point in time during the pulse, and average pulse intensity may lead to confusion without clarifying its specific context. Temporal average intensity encompasses intensities measured across both the transmission and reception phases, which may not be specifically relevant for analyzing pulsed ultrasound within its own repetitive context. In summary, pulsed average intensity provides a clear and specific measurement that encompasses the unique characteristics of ultrasound pulsing, which is crucial for both practical applications in sonography and adherence to safety.

**6. If an angle of incidence is not measured at 90 degrees, it is referred to as what?**

- A. Acute**
- B. Obtuse**
- C. Oblique**
- D. Reflected**

When an angle of incidence is not measured at 90 degrees, it is typically referred to as oblique. The term "oblique" signifies that the angle deviates from the standard perpendicular incidence, which is at 90 degrees. In the context of sonography and wave interactions, an oblique angle can significantly affect how waves are transmitted or reflected, influencing the quality and accuracy of imaging. Understanding the nature of oblique incidence is crucial as it pertains to scenarios such as sound propagation in tissues, impedance matching, and the resultant reflection or transmission coefficients. This contrasts with angles described as acute (less than 90 degrees) or obtuse (greater than 90 degrees), which do not universally apply to non-perpendicular incidences. Other terms like "reflected" refer specifically to the behavior of waves upon striking a surface, rather than the angle of incidence. Recognizing and utilizing the term "oblique" is essential for interpreting and analyzing ultrasound interactions accurately.

## 7. What does the ability of a reflection primarily depend on?

- A. Acoustic frequency
- B. Acoustic impedance**
- C. Tissue density
- D. Wave velocity

The ability of a reflection primarily depends on acoustic impedance, which is a property that relates to how much resistance an ultrasound wave encounters as it passes through different tissues. Acoustic impedance is defined as the product of the density of a material and the speed of sound within that material. When an ultrasound beam travels through tissues of varying acoustic impedance, a portion of the sound wave is reflected at the interface between the two tissues. The greater the difference in acoustic impedance between the tissues, the greater the amount of reflection. In practical terms, when there is a significant difference in acoustic impedance, such as at the boundary between fat and muscle, or muscle and bone, a larger portion of the ultrasound wave is reflected back to the transducer, resulting in a stronger echo. This principle helps create clearer images in sonography, as reflections from different tissues help differentiate between structures. While other factors like acoustic frequency, tissue density, and wave velocity play roles in ultrasound, they do not influence reflection to the same extent as acoustic impedance. Changes in acoustic frequency can affect resolution and penetration but do not directly govern the amount of reflection. Similarly, while tissue density may influence acoustic impedance, it is the impedance itself that is the critical determinant for reflection of the ultrasound waves.

## 8. What frequency is categorized as infrasonic?

- A. 20-100 Hz
- B. 10 Hz to 20 kHz
- C. Below 20 Hz**
- D. 1 Hz to 50 Hz

Infrasonic refers to sound waves that fall below the range of human hearing, which is generally recognized as the frequency range from 20 Hz to 20 kHz. Frequencies that are classified as infrasonic are those that are lower than 20 Hz. Therefore, the correct categorization for infrasonic frequencies is any sound wave with a frequency below 20 Hz. This range is often associated with natural phenomena like earthquakes and certain animal communications, which can produce sounds that resonate at low frequencies not detectable by human hearing. In contrast, the other options include frequency ranges that either include audible sounds or extend above the threshold of 20 Hz, which is why they do not fit the definition of infrasonic.

**9. Absorption in ultrasound is directly related to which of the following factors?**

- A. Distance**
- B. Frequency**
- C. Intensity**
- D. Phase**

Absorption in ultrasound is closely related to frequency. As the frequency of the ultrasound waves increases, the absorption in the medium also typically increases. Higher frequency waves tend to be absorbed more than lower frequency waves due to their shorter wavelengths. This increased absorption occurs because higher frequency waves are more likely to interact with the molecules of the medium, causing them to vibrate more and convert sound energy into heat. Understanding this relationship is crucial in clinical practice because it influences the choice of frequency for imaging. While higher frequency can provide better resolution, it also means greater absorption, which can limit penetration depth in thicker or denser tissues. Thus, choosing the appropriate frequency is a vital consideration for effective ultrasound imaging. In contrast, distance, intensity, and phase are not direct factors affecting absorption in the same way frequency does. Distance can influence the overall intensity of the ultrasound beam as it propagates through the medium, but it doesn't determine the absorption itself. Intensity relates to the amplitude of the ultrasound wave but does not directly correlate with how much of that energy is absorbed by the tissue. Lastly, phase refers to the stage of the waveform cycles but has no bearing on absorption characteristics.

**10. What term describes the decrease in amplitude, intensity, and power of a sound wave?**

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

The decrease in amplitude, intensity, and power of a sound wave is referred to as attenuation. This phenomenon occurs as sound waves propagate through a medium, and it is caused by various factors including absorption, scattering, and reflection of the wave energy. As sound travels, some of its energy is absorbed by the medium it is passing through, resulting in a reduction of the wave's power and intensity. Additionally, scattering can result from inhomogeneities within the medium, causing the sound to disperse in various directions and further diminishing its amplitude. Attenuation is a critical concept in sonography since it influences image quality and the ability to penetrate tissues, making an understanding of this term essential for effective imaging and interpretation of ultrasound data.

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

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

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