

SONOGRAPHY CANADA PHYSICS CORE PRACTICE EXAM (SAMPLE)

STUDY GUIDE



**SAMPLE STUDY GUIDE
WITH LIMITED QUESTIONS**

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THE FULL VERSION STUDY GUIDE**

<https://sonographycanadaphysicscore.examzify.com>



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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 duty factor for continuous wave (CW) ultrasound imaging?**
 - A. 0%
 - B. 50%
 - C. 100%
 - D. 75%

- 2. Which of the following angles represents normal incidence?**
 - A. 0 degrees
 - B. 30 degrees
 - C. 60 degrees
 - D. 90 degrees

- 3. The equation for calculating IRC involves which of the following elements?**
 - A. Incident wavelength and frequency
 - B. Two different impedance values
 - C. Reflected and absorbed intensities
 - D. Speed of sound in different media

- 4. What does ITC stand for in sonography physics?**
 - A. Intensity Time Control
 - B. Image Time Constant
 - C. Incident to Transmitted Coefficient
 - D. Incident Transmission Coefficient

- 5. What is the primary characteristic of longitudinal waves?**
 - A. Particles move perpendicular to the wave direction
 - B. Particles move parallel to the wave direction
 - C. There is no particle movement
 - D. The waves have sharp crests and troughs

- 6. What is measured at the location where the intensity reaches its maximum value during a pulse?**
 - A. SPTP
 - B. Spatial average intensity
 - C. Temporal peak intensity
 - D. Pulsed average intensity

7. What are the typical frequency values utilized in clinical imaging?

- A. 1-2 MHz
- B. 0.5-5 MHz
- C. 2-15 MHz
- D. 10-20 MHz

8. What determines pulse duration?

- A. Transducer frequency
- B. Sound source
- C. Impedance
- D. Medium type

9. How is acoustic impedance calculated?

- A. Speed of Medium x Density
- B. Density of Medium + Speed
- C. Density of Medium x Speed
- D. Density of Medium / Speed

10. Which intensity is associated with the average over the most intense half cycle?

- A. I_{max}
- B. Temporal Peak Intensity
- C. Pulsed Average Intensity
- D. Spatial Average Intensity

Answers

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

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Explanations

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1. What is the duty factor for continuous wave (CW) ultrasound imaging?

- A. 0%
- B. 50%
- C. 100%**
- D. 75%

The duty factor in ultrasound imaging refers to the proportion of time that the ultrasound system is actively transmitting sound waves compared to the total time of the pulse cycle. In continuous wave (CW) ultrasound, the system continuously emits ultrasound signals without pauses or gaps between pulse transmissions. This results in a duty factor of 100%, signifying that the ultrasound beam is on at all times during the imaging process. This continuous emission allows for the measurement of high-velocity blood flow and provides excellent sensitivity for certain applications, particularly in Doppler ultrasound. Because the sound waves are transmitted continuously without interruption, the entire time frame is devoted to producing ultrasound energy, thus confirming that the duty factor is effectively at its maximum value. Other choices reflect different duty factors, implying either pulsed settings or inactive periods, which do not apply in the context of CW ultrasound.

2. Which of the following angles represents normal incidence?

- A. 0 degrees
- B. 30 degrees
- C. 60 degrees
- D. 90 degrees**

Normal incidence refers to the angle at which an ultrasound beam strikes a surface, typically referring to a boundary between two media, at a right angle. This means that the ultrasound wave is approaching the interface perpendicularly, which is defined mathematically as an angle of 90 degrees to the surface. When the angle of incidence is 90 degrees, the ultrasound beam enters the second medium without any deviation, ensuring that the entire beam's energy is transmitted into the second medium without reflection or scattering. This condition is ideal for many ultrasound imaging applications, as it maximizes the amount of energy that continues through the body tissues. Understanding this principle is crucial in sonography, as various angles of incidence can affect the amount of reflection and transmission that occurs at tissue interfaces, influencing the quality and clarity of the ultrasound images produced. Hence, the angle that represents normal incidence is indeed 90 degrees.

3. The equation for calculating IRC involves which of the following elements?

- A. Incident wavelength and frequency
- B. Two different impedance values**
- C. Reflected and absorbed intensities
- D. Speed of sound in different media

The calculation of the Intensity Reflection Coefficient (IRC) is fundamentally based on the properties of the media involved in the sound wave transmission. The IRC specifically assesses how much of an ultrasound wave's intensity is reflected when it encounters a boundary between two different materials or tissues. To compute the IRC, one must consider the two different impedance values of the media on either side of the interface. Impedance is a measure of how much resistance an acoustic wave encounters as it travels through a medium and is determined by both density and the speed of sound within that medium. The greater the difference in impedance values between the two media, the higher the proportion of intensity that will be reflected. The other elements mentioned in the options do not relate to the calculation of IRC effectively. Incident wavelength and frequency pertain to the wave's characteristics but do not influence the proportion of intensity reflected. Reflected and absorbed intensities are outcomes of the interaction between the wave and the interface but do not form the basis of the IRC calculation itself. Similarly, while the speed of sound is vital for understanding wave propagation in different media, it is the impedance values that are specifically used when determining IRC.

4. What does ITC stand for in sonography physics?

- A. Intensity Time Control
- B. Image Time Constant
- C. Incident to Transmitted Coefficient
- D. Incident Transmission Coefficient**

In sonography physics, ITC stands for Incident Transmission Coefficient. This term describes the fraction of ultrasound energy that is transmitted through a boundary when the sound wave encounters a medium with different acoustic properties. Understanding the Incident Transmission Coefficient is essential for interpreting ultrasound images accurately, as it directly impacts the intensity and quality of the sound waves that are reflected back to the transducer, thereby affecting the resulting image. The concept of ITC is crucial in areas such as tissue characterization and assessing the interactions between different tissues and boundaries. By calculating this coefficient, sonographers and physicists can better understand how sound behaves as it travels through various media, allowing them to optimize imaging techniques and improve diagnostic clarity.

5. What is the primary characteristic of longitudinal waves?

- A. Particles move perpendicular to the wave direction
- B. Particles move parallel to the wave direction**
- C. There is no particle movement
- D. The waves have sharp crests and troughs

The primary characteristic of longitudinal waves is that particles of the medium move parallel to the direction of wave propagation. This means that as the wave travels, the particles in the medium oscillate back and forth in the same direction as the wave itself. This movement creates areas of compression, where particles are close together, and rarefaction, where particles are further apart. In the context of longitudinal waves, such as sound waves traveling through air, the compression and rarefaction are fundamental to how the wave transmits energy through the medium. This concept contrasts with transverse waves, where particles move perpendicular to the wave direction. Understanding this distinction is crucial for grasping how different types of waves behave in various environments and materials, which is especially relevant in fields such as sonography.

6. What is measured at the location where the intensity reaches its maximum value during a pulse?

A. SPTP

B. Spatial average intensity

C. Temporal peak intensity

D. Pulsed average intensity

The measurement taken at the location where the intensity reaches its maximum value during a pulse is known as the Spatial Peak Temporal Peak (SPTP) intensity. SPTP is defined as the highest intensity measured within the spatial region of interest over the temporal duration of the pulse. It reflects both the maximum value of the intensity in a spatial context and also considers the peak timing during the pulse duration. This measurement is particularly significant in ultrasound and sonography because it indicates the highest level of energy delivered at a specific point and specific moment. Understanding SPTP is crucial for evaluating the safety and effectiveness of ultrasound applications, as it helps ensure that the intensity of the sound wave is within acceptable limits to avoid potential tissue damage. In contrast, measurements like spatial average intensity provide an average over a defined area, while temporal peak intensity considers the highest intensity over time but may not correspond to the location of maximum intensity within that spatial area. Pulsed average intensity averages the intensity over the pulse duration, which does not represent the peak maximum that SPTP captures. Thus, SPTP is the most relevant measure at the point of maximum intensity in the context of pulse measurements in sonography.

7. What are the typical frequency values utilized in clinical imaging?

A. 1-2 MHz

B. 0.5-5 MHz

C. 2-15 MHz

D. 10-20 MHz

The range of 2-15 MHz is commonly used in clinical imaging due to the balance it provides between image resolution and tissue penetration. Higher frequencies, such as those at the lower end of this spectrum, are capable of producing images with excellent spatial resolution, which is essential for visualizing superficial structures, such as the thyroid or breast tissue. However, higher frequencies also have lower tissue penetration capabilities, making them less ideal for deeper structures. On the other hand, frequencies at the upper end of 15 MHz can be beneficial for detailed imaging of small or superficial structures without significantly compromising the quality of the image. This frequency range is widely utilized in various applications, including abdominal, obstetric, gynecological, and cardiac ultrasound, where the pursuit of clarity and fine detail is crucial. Other frequency options do not encapsulate the typical range used for general clinical applications as effectively. Frequencies below 2 MHz have applications primarily in specific scenarios such as deep tissue imaging but do not provide the detail necessary for most clinical imaging purposes. Frequencies above 15 MHz tend to be used in specialized areas, and their use is limited by the superficial nature of the structures they can adequately visualize. Therefore, the selection of 2-15 MHz aligns with the requirements of

8. What determines pulse duration?

- A. Transducer frequency
- B. Sound source**
- C. Impedance
- D. Medium type

Pulse duration is defined as the amount of time it takes for one pulse of ultrasound to occur. It is influenced primarily by the characteristics of the sound source, specifically the transducer itself. The pulse duration is determined by the number of cycles in a pulse and the frequency of the sound waves generated by the transducer. When a transducer generates a pulse, several ultrasonic cycles occur in a very short amount of time—a factor that is related to the frequency of the emitted sound waves. However, it's essential to note that the term "sound source" in this context principally refers to the transducer's properties rather than an array of waves in the medium. Variations in the sound source (transducer) frequency can result in different pulse durations; higher frequencies convey shorter wavelengths that contribute to shorter pulse durations, while lower frequencies can produce longer pulse durations. This relationship makes the sound source the most critical factor determining the duration of ultrasound pulses. Thus, understanding how the sound source relates to pulse duration is vital for optimizing imaging techniques in ultrasound.

9. How is acoustic impedance calculated?

- A. Speed of Medium x Density
- B. Density of Medium + Speed
- C. Density of Medium x Speed**
- D. Density of Medium / Speed

Acoustic impedance is calculated using the formula that relates the density of a medium to the speed of sound within that medium. It is defined as the product of the medium's density and the speed of sound in that medium. When sound waves travel through a medium, both the medium's density and the propagation speed of sound play crucial roles in determining how those sound waves will behave, particularly in terms of reflection and transmission at interfaces. The formula for acoustic impedance (Z) is given by: $Z = \rho * c$ where ρ represents the density of the medium and c represents the speed of sound in that medium. This relationship is foundational in understanding how sound interacts with different materials, especially in fields like ultrasonography, where predicting the behavior of ultrasound waves at tissue interfaces is critical for imaging. Being aware of this relationship is essential for anyone working in sonography, as it affects the overall quality of the images produced and the interpretation of ultrasound data.

10. Which intensity is associated with the average over the most intense half cycle?

A. I_{max}

B. Temporal Peak Intensity

C. Pulsed Average Intensity

D. Spatial Average Intensity

The intensity that is associated with the average over the most intense half cycle is referred to as I_{max} . This concept is important in understanding how ultrasound intensity is quantified during the transmission of sound waves. I_{max} specifically measures the highest intensity level during the most intense half-cycle of a pulse. This provides a clear representation of the peak energy within that interval, which is crucial for assessing safety and effectiveness in therapeutic and diagnostic applications of ultrasound. In sonography, understanding the peak intensity allows practitioners to evaluate the potential bioeffects of ultrasound on tissues and ensure that exposure levels remain within safe limits. I_{max} is particularly relevant when considering the potential for thermal and mechanical effects on biological tissues, as it directly reflects the maximum energy delivered at any moment during the ultrasound pulse.

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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://sonographycanadaphysicscore.examzify.com>

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

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