

TEXAS INDUSTRIAL RADIOGRAPHY GAMMA PRACTICE TEST (SAMPLE)

STUDY GUIDE



Prepare with structure. Pass with confidence



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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 can cause a dosimeter to give a "high" reading?**
 - A. Being exposed to high levels of radiation
 - B. Being dropped or struck by a hard object
 - C. Leaking charge due to dirt or damage
 - D. All of the above
- 2. What indicates a need to replace a dosimeter?**
 - A. It is off-scale
 - B. It has logged low doses
 - C. It recorded a normal exposure
 - D. It is less than 10% of maximum limit
- 3. On a radiographic job-site, if the source assembly becomes disconnected from the drive cable, the radiographer should:**
 - A. Quickly reconnect the source assembly to the drive cable before continuing work.
 - B. Notify the local Hazardous Materials Unit
 - C. Follow the procedures contained in the licensee's Operating and Emergency Procedures
 - D. Leave the job site immediately
- 4. When performing a radiography operation, the dosimeter is used to:**
 - A. Measure the radiation levels in the environment
 - B. Calculate exposure time
 - C. Protect against overexposure
 - D. Record the type of radiation emitted
- 5. Which of the following are the most widely used shielding materials in industrial radiography?**
 - A. Lead, Water, and Concrete Blocks
 - B. Lead, Steel, and Concrete
 - C. Wood, Concrete, and Water
 - D. Steel, Concrete Blocks, and Wood

6. What is the approximate reduction in dose rate at a location with a $\frac{1}{2}$ inch thick lead shield in the path of Co60 radiation?
- A. $\frac{2}{3}$
 - B. $\frac{1}{2}$
 - C. $\frac{3}{4}$
 - D. None of the above
7. The primary function of a decay curve in a utilization log is to:
- A. Show the rate of decay of radioactive material
 - B. Document exposure history over time
 - C. Assess the quality of radiation shielding
 - D. Provide performance metrics for safety devices
8. How many half-value layers of shielding are needed to reduce the intensity from 8,192 mr/hr to 8 mr/hr at a distance of 10 feet from a Cobalt 60 source?
- A. 8
 - B. 10
 - C. 16
 - D. 20
9. What personal monitoring device(s) must a radiographer wear when working with radioactive material?
- A. A TLD or a Film Badge
 - B. A Film Badge only
 - C. A Pocket Dosimeter, a Film Badge or TLD and an Alarm Ratemeter
 - D. Two Pocket Dosimeters of different ranges
10. Which isotopes are commonly used as gamma sources in industrial radiography?
- A. Uranium-235 and Radon-222
 - B. Iridium-192 and Cobalt-60
 - C. Cesium-137 and Strontium-90
 - D. Iodine-131 and Technetium-99

Answers

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

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Explanations

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1. What can cause a dosimeter to give a "high" reading?

- A. Being exposed to high levels of radiation
- B. Being dropped or struck by a hard object
- C. Leaking charge due to dirt or damage
- D. All of the above**

A dosimeter is a device that measures an individual's exposure to ionizing radiation over time. A high reading on a dosimeter can result from several factors, each contributing to the measurement of radiation exposure in different ways. When exposed to high levels of radiation, the dosimeter accumulates more energy from the radiation, leading to a higher reading. This scenario is common in environments where industrial radiography or other forms of radiation work are being performed. The dosimeter is designed to accurately capture and reflect the levels of radiation in those situations. Dropping or striking the dosimeter can also cause it to register a high reading. Physical impacts might damage the sensitive components inside the dosimeter, leading to malfunctions that can misrepresent the actual radiation exposure. Such damage may cause the dosimeter to malfunction, thus displaying an inaccurate reading that registers as "high." Additionally, if a dosimeter has dirt or damage on its surface, it may experience leaking charge. This can affect the ability of the device to function correctly, potentially resulting in an elevated reading. Contaminants or physical impairments can interfere with the internal mechanisms, leading to erroneous exposure readings. In summary, a dosimeter might record a high reading because of actual radiation exposure, physical damage from impact,

2. What indicates a need to replace a dosimeter?

- A. It is off-scale**
- B. It has logged low doses
- C. It recorded a normal exposure
- D. It is less than 10% of maximum limit

The correct response is that a dosimeter being off-scale clearly indicates that it has reached or exceeded its measurement range for radiation exposure. When a dosimeter is off-scale, it signifies that the levels of radiation exposure that it has detected surpass the maximum limit that the device can measure accurately. This is a critical situation, as it may imply that the individual using the dosimeter has been exposed to potentially harmful levels of radiation, and the device can no longer provide reliable readings. Therefore, immediate replacement is necessary to ensure proper monitoring of ongoing exposure levels and to maintain safety protocols. In contrast, logging low doses or recording a normal exposure would not indicate that the dosimeter needs replacement. It suggests that the dosimeter is functioning correctly within acceptable exposure limits. Similarly, if a dosimeter is less than 10% of its maximum limit, it indicates that it is still effectively monitoring exposure and does not warrant replacement.

3. On a radiographic job-site, if the source assembly becomes disconnected from the drive cable, the radiographer should:

- A. Quickly reconnect the source assembly to the drive cable before continuing work.
- B. Notify the local Hazardous Materials Unit
- C. Follow the procedures contained in the licensee's Operating and Emergency Procedures**
- D. Leave the job site immediately

The correct answer emphasizes the importance of following established safety protocols during radiographic operations. When a source assembly becomes disconnected from the drive cable, it represents a potential safety hazard, and it is crucial to handle the situation according to the procedures set forth in the licensee's Operating and Emergency Procedures. These procedures are designed to ensure the safety of personnel and the public and typically outline the steps necessary to secure the area, manage the disconnection of the source assembly, and mitigate any potential radiation exposure. Following these procedures ensures that all actions are taken with the appropriate level of training and caution, considering the specific safety measures outlined for such incidents. This approach helps to prevent further complications, maintain safety standards, and ensures compliance with regulatory requirements. Other options may not provide the necessary protocol or could lead to unsafe situations. For example, attempting to quickly reconnect the source assembly could introduce additional risks without addressing the underlying safety considerations. Similarly, notifying the local Hazardous Materials Unit could be appropriate in certain contexts, but following internal procedures is typically the immediate priority. Leaving the job site could also be an overreaction if proper safety protocols are in place to handle the situation effectively. Therefore, adhering to the established Operating and Emergency Procedures is the best course of action.

4. When performing a radiography operation, the dosimeter is used to:

- A. Measure the radiation levels in the environment**
- B. Calculate exposure time
- C. Protect against overexposure
- D. Record the type of radiation emitted

A dosimeter is an essential tool in radiography operations designed to measure the amount of ionizing radiation to which an individual has been exposed over a specified period. It provides a quantitative assessment of radiation levels that the operator experiences while conducting radiographic activities. The primary function of a dosimeter is to monitor personal radiation exposure to ensure it remains within safe limits established by regulatory bodies. By accurately measuring the radiation dose received, the dosimeter enables workers to stay informed about their exposure levels, thus contributing to their safety and health in environments where they may encounter radiation. Other choices, while related to radiation safety, do not specifically reflect the main purpose of a dosimeter. For example, calculating exposure time generally requires different techniques and is not the direct responsibility of the dosimeter. Additionally, while dosimeters help in monitoring exposure, they do not actively protect against overexposure; rather, they alert the user to potential risks. Lastly, the recording of the type of radiation emitted is more complex and typically involves specialized equipment, as dosimeters primarily provide dose measurements rather than detailed analyses of radiation types.

5. Which of the following are the most widely used shielding materials in industrial radiography?

- A. Lead, Water, and Concrete Blocks
- B. Lead, Steel, and Concrete**
- C. Wood, Concrete, and Water
- D. Steel, Concrete Blocks, and Wood

The main idea is how well a material blocks gamma radiation from industrial radiography sources. Attenuation depends on density and atomic number—the higher they are, the more gamma rays are absorbed per inch. Lead is the standard shield because it's very dense and easy to shape, giving strong attenuation with relatively thin barriers. Concrete is widely used for room shielding because it's inexpensive, easy to construct into thick barriers, and provides substantial attenuation for large-area shielding. Steel is also used where a durable, dense shield is needed or where shielding must be integrated with equipment or structural components. Wood and other low-density materials offer poor shielding for gamma rays and aren't practical for effective barriers. Water can attenuate gamma rays but isn't as convenient or economical for permanent shielding compared to solid materials.

6. What is the approximate reduction in dose rate at a location with a ½ inch thick lead shield in the path of Co60 radiation?

- A. 2/3
- B. ½**
- C. ¾
- D. None of the above

To understand why the dose rate is approximately halved with a ½ inch thick lead shield in the path of Co60 radiation, it's essential to consider how lead functions as a shielding material. Cobalt-60 (Co60) is a radionuclide that emits gamma radiation, which is highly penetrating and requires substantial protection to reduce dose rates effectively. The effectiveness of lead in attenuating this radiation can be quantified using its half-value layer (HVL), which is the thickness of the material required to reduce the intensity of the radiation by half. For Co60, the HVL in lead is around 0.5 inches, meaning that when you place a ½ inch thick lead barrier between the source and the measurement point, it reduces the radiation exposure by approximately 50%. Therefore, if the original dose rate was 100%, after passing through the ½ inch of lead, it would be reduced to about 50%. This principle highlights the significance of using adequate shielding to protect against high-energy gamma rays, emphasizing that selecting materials and their respective thicknesses are critical components in radiation safety practices. Thus, in this scenario, the approximate reduction in dose rate due to the lead shield effectively is about half of the original rate.

7. The primary function of a decay curve in a utilization log is to:

- A. Show the rate of decay of radioactive material
- B. Document exposure history over time
- C. Assess the quality of radiation shielding
- D. Provide performance metrics for safety devices

The primary function of a decay curve in a utilization log is to show the rate of decay of radioactive material. A decay curve visually represents how the activity of a radioactive isotope decreases over time, which is crucial for understanding the behavior of the material being used in any radiographic application. In industrial radiography, it is vital to know how long a radioactive source remains effective and when it reaches a point where it may not provide sufficient radiation for the intended imaging purposes. The decay curve helps technicians monitor this change and make informed decisions about whether to continue using the source or to replace it. This understanding is essential for maintaining safety standards and ensuring that radiographic work is performed effectively. While documentation of exposure history, assessment of radiation shielding quality, and performance metrics for safety devices are important in radiography, they are not the primary purpose of the decay curve. Instead, those aspects are managed through separate logs and protocols that focus on other elements of safety and operational efficiency.

8. How many half-value layers of shielding are needed to reduce the intensity from 8,192 mr/hr to 8 mr/hr at a distance of 10 feet from a Cobalt 60 source?

- A. 8
- B. 10
- C. 16
- D. 20

To determine the number of half-value layers needed to reduce radiation intensity from 8,192 mR/hr to 8 mR/hr, it is essential to understand the concept of half-value layer (HVL). A half-value layer is the thickness of a specified material that reduces the intensity of radiation to half its original value. Starting with the intensity of 8,192 mR/hr, we can calculate how many times we need to halve this value to reach 8 mR/hr. 1. The first step involves finding how many times we can divide 8,192 by 2: - $8,192 / 2 = 4,096$ - $4,096 / 2 = 2,048$ - $2,048 / 2 = 1,024$ - $1,024 / 2 = 512$ - $512 / 2 = 256$ - $256 / 2 = 128$ - $128 / 2 = 64$ - $64 / 2 = 32$ - $32 / 2 = 16$ - $16 / 2 = 8$ Each division represents the

9. What personal monitoring device(s) must a radiographer wear when working with radioactive material?

A. A TLD or a Film Badge

B. A Film Badge only

C. A Pocket Dosimeter, a Film Badge or TLD and an Alarm Ratemeter

D. Two Pocket Dosimeters of different ranges

The correct choice indicates that a radiographer must wear multiple personal monitoring devices when working with radioactive material for effective safety monitoring. The inclusion of a pocket dosimeter, a film badge or TLD (thermoluminescent dosimeter), and an alarm ratemeter ensures comprehensive monitoring of radiation exposure. A pocket dosimeter provides real-time dose readings, enabling immediate awareness of exposure levels. The film badge or TLD records cumulative exposure over time, which is essential for maintaining records and assessing long-term radiation safety. The alarm ratemeter serves as an additional safety measure, giving audible or visual alerts when radiation levels exceed preset thresholds, thus enhancing the protective measures for the radiographer. This combination of devices allows for a multi-faceted approach to radiation safety, ensuring that different aspects of radiation exposure are monitored and that the radiographer remains within safe exposure limits.

10. Which isotopes are commonly used as gamma sources in industrial radiography?

A. Uranium-235 and Radon-222

B. Iridium-192 and Cobalt-60

C. Cesium-137 and Strontium-90

D. Iodine-131 and Technetium-99

In industrial radiography, the most commonly used gamma sources are Iridium-192 and Cobalt-60. These isotopes emit gamma radiation that is utilized for non-destructive testing of materials and structures, allowing inspectors to examine the integrity of welds, joints, and overall component structure without causing any damage. Iridium-192 is favored because it has a relatively short half-life of about 73 days, which allows for less long-term radioactive waste and makes it suitable for many applications in both industrial and medical settings. Cobalt-60, with a longer half-life of around 5.27 years, provides a strong gamma source that is essential for applications requiring deeper penetration, such as thick steel parts in heavy industry. The other isotopes listed in the choices have applications in other areas, but they are not typically used in industrial radiography. For example, Cesium-137 is used in various measurement devices, while Iodine-131 and Technetium-99 are primarily utilized in medical diagnostics and treatment. Thus, the combination of Iridium-192 and Cobalt-60 stands out as the standard in industrial radiography due to their effective gamma radiation properties and practical utility in safety inspections.

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://texas-insustrialradiographygamma.examzify.com>

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

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