Health Physics (PMT 102A) Practice Test (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

1. **Why might tungsten be chosen over lead for gamma shielding in certain applications?**
   - **A. Tungsten offers very high density and a high melting point, which can allow thinner shielding but at higher cost than lead.**
   - **B. Tungsten is lighter than lead, making handling easier.**
   - **C. Tungsten provides better gamma attenuation at all energies with no trade-offs.**
   - **D. Tungsten is not suitable for shielding in any case.**

2. **Which statement best describes the source term in shielding design?**
   - **A. It measures the shielding thickness required.**
   - **B. It determines the regulatory exposure limit.**
   - **C. It describes the amount, type, energy, and distribution of emitted radiation.**
   - **D. It defines patient dose after shielding.**

3. **A neutron particle is characterized by which of the following?**
   - **A. Positively charged**
   - **B. Neutral**
   - **C. Positively charged and heavy**
   - **D. Negatively charged**

4. **Which instrument is primarily used to measure exposure rate in air and is a gas-filled detector?**
   - **A. Geiger-Müller counter.**
   - **B. TLD.**
   - **C. OSL dosimeter.**
   - **D. Ionization chamber.**

5. **How many rem are contained in 1 sievert (Sv)?**
   - **A. 10 rem**
   - **B. 100 rem**
   - **C. 1 rem**
   - **D. 1000 rem**

6. Which statement correctly defines Derived Air Concentration (DAC) and Annual Limit on Intake (ALI)?

- **A. DAC is the concentration in air that would deliver a specified dose; ALI is the maximum annual intake allowed given exposure conditions.**
- **B. DAC is the rate of air contamination; ALI is the annual limit on inhalations.**
- **C. DAC is the concentration in water; ALI is the annual limit on intake by ingestion.**
- **D. DAC is the maximum dose allowed in air; ALI is the average intake per year.**

7. Which form is used for the record of occupational radiation exposure?

- **A. OF23**
- **B. DD Form 1952**
- **C. DD Form 1149**
- **D. SF 600**

8. When should a follow-up sample be taken for a bioassay to confirm results?

- **A. 1 week post exposure**
- **B. 1 day post exposure**
- **C. 2 weeks post exposure**
- **D. 1 month post exposure**

9. Which marking set corresponds to Rad/Nuke hazard?

- **A. CBRN Marking Set: Red on Yellow**
- **B. CBRN Marking Set: Red on Blue**
- **C. CBRN Marking Set: White on Red**
- **D. CBRN Marking Set: Black on White**

10. Annual occupational dose limit for whole-body exposure is typically about?

- **A. Typically about 50 mSv per year.**
- **B. Typically about 5 mSv per year.**
- **C. Typically about 100 mSv per year.**
- **D. Typically about 0.5 Sv per year.**

Answers

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

Explanations

1. **Why might tungsten be chosen over lead for gamma shielding in certain applications?**

   A. **Tungsten offers very high density and a high melting point, which can allow thinner shielding but at higher cost than lead.**

   B. **Tungsten is lighter than lead, making handling easier.**

   C. **Tungsten provides better gamma attenuation at all energies with no trade-offs.**

   D. **Tungsten is not suitable for shielding in any case.**

The important idea is how material properties influence gamma shielding and the trade-offs in material choice. A shield's effectiveness per thickness depends strongly on density and how well the material can stand up to the environment where shielding is used. Tungsten's density is about 19.3 g/cm3, compared with lead's 11.3 g/cm3. That higher density means more atoms packed into a given thickness, so gamma rays have a greater chance of interacting as they pass through, allowing you to achieve the same level of attenuation with a thinner layer. The high density also coincides with good structural stability, and tungsten's melting point is around 3422 C, far above lead's ~327 C, so it remains solid and intact in hotter conditions or where shielding absorbs significant heat. However, this comes with a cost: tungsten is much more expensive and harder to machine into shielding shapes than lead, so you trade reduced thickness for higher material cost and more complex fabrication. It's not that tungsten is better at all energies with no downsides; the choice depends on whether reduced shielding thickness and heat resistance justify higher cost and manufacturing challenges for a given application.

2. **Which statement best describes the source term in shielding design?**

   A. **It measures the shielding thickness required.**

   B. **It determines the regulatory exposure limit.**

   C. **It describes the amount, type, energy, and distribution of emitted radiation.**

   D. **It defines patient dose after shielding.**

The source term in shielding design defines what the radiation source is emitting: the amount, the type (photons, neutrons, etc.), the energy spectrum, and how it is distributed in space and time. This information is the essential input for calculating shielding because attenuation depends on the radiation's energy and type, as well as how it is oriented and how long it is emitted. Higher energy or more intense emission requires thicker shielding, and the directionality affects shielding placement. Therefore, describing the emitted radiation itself—the source term—is what the design uses to determine required shielding. The other ideas describe either the shielding thickness as an outcome, regulatory dose limits, or the dose after shielding, which are not the emission characteristics driving the calculation.

3. A neutron particle is characterized by which of the following?

A. Positively charged

B. Neutral

C. Positively charged and heavy

D. Negatively charged

Neutrons are electrically neutral. They have no net electric charge, unlike protons which are positively charged and electrons which are negatively charged. This neutrality means neutrons don't interact with electric or magnetic fields in the same way as charged particles, and they don't produce ionization directly as they travel. Instead, they interact mainly through the strong nuclear force when they collide with nuclei, which is why shielding and detection rely on nuclear interactions and secondary charged products rather than simple Coulomb interactions. The neutron's mass is similar to that of the proton, so it contributes significantly to nuclear mass without carrying a charge.

4. Which instrument is primarily used to measure exposure rate in air and is a gas-filled detector?

A. Geiger-Müller counter.

B. TLD.

C. OSL dosimeter.

D. Ionization chamber.

Measuring exposure rate in air relies on detecting the ionization produced by radiation in a known volume of air and converting that ionization into an electrical signal. An ionization chamber does exactly this: it is a gas-filled detector with an electric field. Radiation creates ion pairs in the air inside the chamber, and the applied field collects these charges, producing a current that is proportional to the rate of ionization, i.e., the exposure rate. This real-time, linear response over a wide range makes it the instrument of choice for air exposure-rate measurements and for calibrating other dosimeters. Geiger-Müller counters are also gas-filled, but they are designed to register individual events and can suffer from dead time and energy dependence, which makes them less accurate for precise exposure-rate measurements over a broad range. TLDs and OSL dosimeters are passive, integrating dose over time and then read out later, so they do not provide real-time exposure-rate information.

5. How many rem are contained in 1 sievert (Sv)?

A. 10 rem

B. 100 rem

C. 1 rem

D. 1000 rem

Biological dose is described by the dose equivalent, which uses a weighting factor to reflect the different effects of radiation. The rem is the old unit for dose equivalent, while the sievert is the SI unit. For common radiations like X-rays and gamma rays, the weighting factor is 1, so the dose equivalent in rem or in sieverts aligns with the absorbed dose in grays. Since 1 gray equals 100 rad, 1 sievert (with a weighting factor of 1) corresponds to 100 rem. Equivalently, 1 rem equals 0.01 sievert. Therefore, in 1 Sievert there are 100 rem.

6. **Which statement correctly defines Derived Air Concentration (DAC) and Annual Limit on Intake (ALI)?**

   A. DAC is the concentration in air that would deliver a specified dose; ALI is the maximum annual intake allowed given exposure conditions.

   B. DAC is the rate of air contamination; ALI is the annual limit on inhalations.

   C. DAC is the concentration in water; ALI is the annual limit on intake by ingestion.

   D. DAC is the maximum dose allowed in air; ALI is the average intake per year.

Derived Air Concentration is the concentration of a radionuclide in air that would deliver a specified committed dose to a worker if that air is inhaled under the defined exposure conditions. The annual limit on intake is the maximum activity a worker may ingest or inhale in one year without exceeding regulatory dose limits. These two concepts are connected by how much air a person breathes in a year: DAC equals ALI divided by the annual inhaled air volume (breathing rate times time). This converts a dose-based limit into an air concentration used for monitoring and control.

7. **Which form is used for the record of occupational radiation exposure?**

   A. OF23

   B. DD Form 1952

   C. DD Form 1149

   D. SF 600

Tracking how much ionizing radiation a worker has been exposed to over time is essential for safety and medical monitoring. A standardized record that collects all dose data from dosimeters and stays with the worker across assignments lets health physics and medical staff review the history, assess against dose limits, and decide on needed protections or medical evaluations. DD Form 1952 is the designated DoD form for recording occupational radiation exposure. It is specifically built to capture the individual's dose history from monitoring results, making it the portable, official record used to document deep, lens, and shallow dose data and to track exposure over time. The other forms serve different purposes: OF-23 is not the standard radiation exposure log, DD Form 1149 is for requisitions/shipping documents, and SF 600 is a general medical record form rather than a dedicated exposure record.

8. When should a follow-up sample be taken for a bioassay to confirm results?

A. 1 week post exposure

B. 1 day post exposure

C. 2 weeks post exposure

D. 1 month post exposure

The main idea is to confirm that an initial bioassay result reflects internal contamination rather than just surface contamination or a transient exposure. A follow-up sample is taken to see if there is consistent excretion from an internal burden. Taking the follow-up about one week after exposure provides a good window: it's long enough for a radionuclide that has entered the body to be mobilized and excreted into urine or feces to produce a measurable signal, but not so long that the activity could drop due to biological clearance or be confounded by new exposures. If the follow-up sample is much sooner, it may not distinguish internal uptake from surface contamination; if it's much later, the signal could diminish or be harder to interpret. So, a follow-up around one week post exposure is the best balance for confirming uptake.

9. Which marking set corresponds to Rad/Nuke hazard?

A. CBRN Marking Set: Red on Yellow

B. CBRN Marking Set: Red on Blue

C. CBRN Marking Set: White on Red

D. CBRN Marking Set: Black on White

Rad/Nuke hazards are identified by high-contrast markings so responders can spot them quickly. In this marking system, radiological or nuclear danger uses black text or symbols on a white background. The stark black-on-white contrast stays legible across different lighting and backgrounds, which is essential when time is critical and radiation awareness matters. The other color combinations are assigned to different hazard categories, so they wouldn't be interpreted as Rad/Nuke. Therefore, the marking set with black on white is the correct choice.

10. Annual occupational dose limit for whole-body exposure is typically about?

A. Typically about 50 mSv per year.

B. Typically about 5 mSv per year.

C. Typically about 100 mSv per year.

D. Typically about 0.5 Sv per year.

Understanding occupational exposure limits helps balance the need to work with protecting health. For the whole body, the typical annual limit is about 50 millisieverts. This cap is set because it limits the risk of stochastic effects from repeated exposure while still allowing necessary occupational activities. It's higher than the public exposure limit (about 1 mSv per year) because workers may encounter higher doses in their jobs, but it remains a conservative limit to protect long-term health. The other numbers don't fit standard practice: 5 mSv per year is far too low for most occupational roles; 100 mSv per year would exceed common safety guidelines; 0.5 Sv (500 mSv) per year is well above typical limits. In some regulations you'll see a related rule—an average of 20 mSv per year over five years, with no more than 50 mSv in any single year—but the practical whole-body limit many programs use is 50 mSv per year.

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://healthphysicspmt102a.examzify.com

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