

FORENSIC BIOLOGY AND DNA ANALYSIS – BLOOD, SEMEN, AND SKELETAL REMAINS PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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THE FULL VERSION STUDY GUIDE

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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. In rifling, what do the terms lands and grooves describe?**
 - A. The raised and recessed features inside the barrel that impart spin to the bullet.
 - B. The external ridges on the outside of the barrel.
 - C. The grooves in the cartridge case.
 - D. The sights alignment marks.
- 2. What is a common conclusion about using Amelogenin for sex determination across populations?**
 - A. Not always reliable due to deletions or rare anomalies in some populations.
 - B. Always reliable across populations.
 - C. Only indicates age.
 - D. Only for distinguishing one individual.
- 3. Why do laboratories model expected stutter percent by locus?**
 - A. To estimate sequencing error rates.
 - B. To calibrate the instrument.
 - C. To assess DNA degradation.
 - D. To account for expected minor peaks so true alleles are not misinterpreted.
- 4. Which blood type has A antigens and anti-B antibodies?**
 - A. Type A
 - B. Type B
 - C. Type AB
 - D. Type O
- 5. Which statement correctly describes how alcohol is eliminated from the body?**
 - A. Oxidation in the liver, converting alcohol to acetic acid, then to carbon dioxide and water.
 - B. Excretion via lungs.
 - C. Direct excretion in urine without metabolism.
 - D. Absorption into adipose tissue.

- 6. What is a practical reason to use inhibitor removal resins in DNA extraction?**
- A. To remove environmental inhibitors that can suppress PCR amplification.
 - B. To remove proteins from the sample to improve yield.
 - C. To increase the amount of degraded DNA.
 - D. To convert DNA to RNA.
- 7. Which statement best describes the combination of evidence in skeletal remains identification to support presumptive conclusions?**
- A. Genetic data is combined with anthropological context and reference genealogies
 - B. Genetic data alone suffices; context is unnecessary
 - C. Anthropological context is sufficient without DNA
 - D. Only mtDNA data is ever used
- 8. Spongy bone makes up about what percentage of skeletal mass?**
- A. 5%
 - B. 20%
 - C. 50%
 - D. 80%
- 9. Which pelvic characteristics are typical of female sex determination?**
- A. Narrow subpubic angle, and a narrow pelvic inlet
 - B. Wider subpubic angle, broad pelvic inlet, and wide circular opening
 - C. Deep greater sciatic notch and narrow pelvic inlet
 - D. Very small pelvic opening
- 10. What is the fluid portion of blood called?**
- A. Plasma
 - B. Serum
 - C. Platelets
 - D. Clot

Answers

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

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Explanations

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1. In rifling, what do the terms lands and grooves describe?

- A. The raised and recessed features inside the barrel that impart spin to the bullet.**
- B. The external ridges on the outside of the barrel.
- C. The grooves in the cartridge case.
- D. The sights alignment marks.

Lands and grooves refer to the internal rifling inside the gun barrel. Lands are the raised portions of the bore, while grooves are the recessed channels cut into the bore. As a bullet travels through these features, it is spun, or given angular momentum, which stabilizes its flight. The specific pattern of lands and grooves (including twist rate and depth) helps create this spin and also leaves distinctive rifling marks on the bullet, which is why these features are fundamental in ballistics and firearms identification. The other options describe features outside the bore, such as external barrel ridges, the cartridge case, or sight marks, which are not what lands and grooves refer to.

2. What is a common conclusion about using Amelogenin for sex determination across populations?

- A. Not always reliable due to deletions or rare anomalies in some populations.**
- B. Always reliable across populations.
- C. Only indicates age.
- D. Only for distinguishing one individual.

Amelogenin is useful because it compares X- and Y-linked copies of a gene, so a typical male sample yields two bands (one from X, one from Y) and a female sample yields a single X-band. But this approach isn't perfect across all populations because deletions or rare variants in the AMEL genes can prevent the Y-band from amplifying or produce unusual patterns. If AMELY is deleted or its primer binding is disrupted, a male may appear female, or a null allele could complicate interpretation. These known anomalies mean Amelogenin isn't universally reliable, so it's best used as a first screen and should be corroborated with additional sex-determining markers (like SRY or other Y-chromosome markers) when precise determination is critical.

3. Why do laboratories model expected stutter percent by locus?

- A. To estimate sequencing error rates.
- B. To calibrate the instrument.
- C. To assess DNA degradation.
- D. To account for expected minor peaks so true alleles are not misinterpreted.**

Stutter modeling by locus is used to distinguish true alleles from PCR artifacts that show up as smaller, "stutter" peaks. During PCR amplification of STR regions, the DNA polymerase can slip, producing a minor peak that is typically one repeat unit shorter than the main allele. The amount of this stutter peak is not random; it's predictable and varies from locus to locus and with allele size, so labs build empirical expectations (percent stutter) for each locus. By knowing the expected stutter percentage, analysts can tell whether a nearby smaller peak is likely just stutter or could be a real second allele. This is especially important in mixtures or when two peaks are close in height, where miscalling a stutter as a true allele could lead to incorrect conclusions about an individual's genotype. Stutter modeling helps set interpretation thresholds and improves the accuracy of peak calls. This focus on stutter is different from sequencing error rates, instrument calibration, or DNA degradation, which involve other aspects of data quality and interpretation.

4. Which blood type has A antigens and anti-B antibodies?

- A. Type A**
- B. Type B
- C. Type AB
- D. Type O

ABO blood typing hinges on which antigens sit on the surface of red blood cells and which antibodies are present in plasma. A person with A antigens on their red cells also has anti-B antibodies in their plasma. That combination—A antigens with anti-B antibodies—defines Type A blood. In contrast, Type B would have B antigens and anti-A antibodies; Type AB would display both A and B antigens but have no anti-A or anti-B antibodies; Type O would have neither antigen and would possess both anti-A and anti-B antibodies.

5. Which statement correctly describes how alcohol is eliminated from the body?

- A. Oxidation in the liver, converting alcohol to acetic acid, then to carbon dioxide and water.**
- B. Excretion via lungs.
- C. Direct excretion in urine without metabolism.
- D. Absorption into adipose tissue.

The main idea is that alcohol is eliminated from the body primarily through liver metabolism. In the liver, ethanol is oxidized to acetaldehyde, then acetaldehyde is oxidized to acetate (acetic acid). This acetate is further processed to acetyl-CoA and enters energy pathways, eventually yielding carbon dioxide and water. That metabolic route explains why most alcohol is cleared from the body, rather than being excreted as alcohol itself. A small portion is exhaled through the lungs, but this is only a minor route compared with metabolism. Direct excretion in urine without metabolism happens only to a small extent, not the main pathway. Alcohol is not stored in adipose tissue as the primary elimination mechanism.

6. What is a practical reason to use inhibitor removal resins in DNA extraction?

- A. To remove environmental inhibitors that can suppress PCR amplification.**
- B. To remove proteins from the sample to improve yield.
- C. To increase the amount of degraded DNA.
- D. To convert DNA to RNA.

PCR amplification depends on a clean DNA template, and many real-world samples bring in substances that can block the DNA polymerase or interfere with primer binding. Inhibitor removal resins are used during extraction to bind and remove these inhibitory compounds so the nucleic acids stay intact and unimpeded. By getting rid of inhibitors, PCR works more efficiently, producing reliable amplification, clearer results, and fewer dropouts. This step targets removing inhibitors specifically, rather than increasing yield by removing proteins, boosting degraded DNA, or converting DNA to RNA.

7. Which statement best describes the combination of evidence in skeletal remains identification to support presumptive conclusions?

- A. Genetic data is combined with anthropological context and reference genealogies
- B. Genetic data alone suffices; context is unnecessary
- C. Anthropological context is sufficient without DNA**
- D. Only mtDNA data is ever used

Identifications from skeletal remains are strongest when evidence from multiple sources converges. Genetic data provides a direct biological link and can establish identity or kinship, while anthropological analysis offers the physical profile—age at death, sex, ancestry, stature, and notable features—that narrows the search and places the remains in a biological and historical context. Reference genealogies connect living relatives to the remains, enabling presumptive conclusions when DNA matches support a kinship path. Relying on a single type of evidence leaves gaps: anthropology alone can't confirm who the person was, DNA alone may lack contextual placement, and using only mitochondrial DNA has limitations due to maternal inheritance and potential broad matches. Integrating genetic data, anthropological context, and reference genealogies provides the most robust basis for presumptive identification.

8. Spongy bone makes up about what percentage of skeletal mass?

- A. 5%
- B. 20%**
- C. 50%
- D. 80%

Spongy bone, also called cancellous bone, is the lighter, lattice-like tissue inside bones. It accounts for roughly one-fifth of the skeleton's mass, with the remaining majority coming from the dense outer layer called cortical bone. This distribution reflects the different roles: cortical bone provides most of the bone's strength and weight, while spongy bone is lighter, highly vascular, and houses bone marrow, contributing to metabolic activity and shock absorption without adding much to overall mass. So the best answer is about 20% of skeletal mass.

9. Which pelvic characteristics are typical of female sex determination?

- A. Narrow subpubic angle, and a narrow pelvic inlet
- B. Wider subpubic angle, broad pelvic inlet, and wide circular opening**
- C. Deep greater sciatic notch and narrow pelvic inlet
- D. Very small pelvic opening

Pelvic morphology shows clear differences between sexes because the pelvis is adapted for childbirth. In females, the pelvis is wider and more open to accommodate a baby. The subpubic angle is notably wider, creating a broader pubic arch. The pelvic inlet is also broader and more circular, giving a rounder opening. When you see a combination of a wide subpubic angle with a broad, round inlet, that pattern fits the female pelvis best and is most informative for sex estimation. Patterns like a narrow subpubic angle with a narrow inlet point toward male anatomy, and a very small pelvic opening aligns poorly with female morphology.

10. What is the fluid portion of blood called?

A. Plasma

B. Serum

C. Platelets

D. Clot

Plasma is the liquid part of blood that suspends the cells and carries dissolved substances such as nutrients, hormones, waste products, electrolytes, and the clotting proteins. It makes up about 55% of blood and contains proteins like albumin and fibrinogen that help with transport and maintaining blood volume and osmotic pressure. Serum is the fluid that remains after a blood sample clots; it lacks clotting factors like fibrinogen. Platelets are the cellular fragments that aid clot formation, not the liquid component. A clot is the gel-like mass formed during coagulation, not the fluid itself. Because the question asks for the fluid portion, plasma is the best answer.

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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://forensicbiodnaanalysis.examzify.com>

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

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