HEMATOLOGY BOC 7TH ED. PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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.

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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!

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Questions

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1. Methemoglobin has iron in which oxidation state and can it bind oxygen?

A. It has iron in the +2 state and binds oxygen

B. It has iron in the +3 state and cannot bind oxygen

C. It has iron in the +4 state and binds oxygen

D. It has iron in the 0 oxidation state and binds oxygen

2. To obtain accurate results from an electronic particle counter, which action is recommended?

A. Warm the specimen and recount

B. Dilute the specimen and recount

C. Check the tube for clots

D. Clean the aperture tubes and recount

3. Which value is calculated from the red blood cell indices in an automated hematology analyzer?

A. red blood cell count (RBC)

B. HCT

C. MCV

D. RDW

4. Aspirin affects platelets by interfering with which enzyme?

A. Lipoxygenase

B. Thromboxane synthase

C. Cyclooxygenase

D. Phospholipase A2

5. Which of the following are examples of abnormal hemoglobins?

A. Carboxyhemoglobin

B. Methemoglobin

C. Sulfhemoglobin

D. Carboxyhemoglobin, Methemoglobin, and Sulfhemoglobin

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6. Which bone marrow finding favors a diagnosis of multiple myeloma?

A. Sheaths of immature plasma cells

B. Plasmacytic satellitosis

C. Presence of occasional flame cell

D. Reed-Sternberg cells

7. If the RDW is elevated on a CBC, the smear would most likely show which finding?

A. hypochromia

B. anisocytosis

C. poikilocytosis

D. macrocytosis

8. Gamma globin chain production occurs during fetal liver and bone marrow erythropoiesis and decreases after birth. Which statement best describes this pattern?

A. It occurs after birth only

B. It occurs during fetal development and then decreases

C. It never occurs

D. It occurs only in the spleen

9. Which surface antigen is commonly expressed on myeloid blasts and used in immunophenotyping?

A. CD13

B. CD23

C. CD10

D. CD20

10. A large cell with dark blue granules on Wright stain is best described as which cell type?

A. Neutrophil

B. Basophil

C. Eosinophil

D. Myelocyte

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Answers

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

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Explanations

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1. Methemoglobin has iron in which oxidation state and can it bind oxygen?

A. It has iron in the +2 state and binds oxygen

B. It has iron in the +3 state and cannot bind oxygen

C. It has iron in the +4 state and binds oxygen

D. It has iron in the 0 oxidation state and binds oxygen

Oxygen binding by hemoglobin requires iron in the ferrous state (Fe2+). In methemoglobin, the iron is in the ferric state (Fe3+), and this oxidized form cannot bind oxygen reversibly. Because of that, methemoglobin cannot carry oxygen effectively, reducing the blood's oxygen-carrying capacity even if lung oxygen levels are normal. Clinically, methemoglobinemia occurs when oxidants convert Fe2+ to Fe3+ or when redox systems that normally keep iron reduced are impaired. Treatment with reducing agents like methylene blue helps by converting Fe3+ back to Fe2+, restoring oxygen binding.

2. To obtain accurate results from an electronic particle counter, which action is recommended?

A. Warm the specimen and recount

B. Dilute the specimen and recount

C. Check the tube for clots

D. Clean the aperture tubes and recount

Temperature can profoundly affect how cells behave in a specimen and, in turn, how an electronic particle counter reads them. Some samples contain cold-reactive factors, such as cold agglutinins or cryoglobulins, that cause red cells or platelets to clump together when the sample is not warmed. Those clumps are counted as single particles or counted inaccurately, which skews the result. Warming the specimen to near body temperature dissolves these aggregates and disperses the cells, allowing the counter to distinguish individual particles more reliably. Recounting after warming gives a result that better reflects the true circulating cell numbers, improving accuracy. Other options address different artifact sources. For example, diluting is sometimes used for extremely high counts or poor dispersion but doesn't resolve aggregation due to temperature. Checking the tube for clots or cleaning the instrument targets separate issues that can affect accuracy but don't specifically correct temperature-related aggregation that can mislead an electronic counter.

3. Which value is calculated from the red blood cell indices in an automated hematology analyzer?

A. red blood cell count (RBC)

B. HCT

C. MCV

D. RDW

Hematocrit is the value that's calculated from the red blood cell data. It represents the percentage of blood volume occupied by red cells and on an automated analyzer is derived from how many red cells there are and how big they are. The typical relationship used is hematocrit (%) ≈ (RBC x MCV) / 10, linking red cell count (a direct measurement) with the mean cell volume (an index of cell size) to estimate the overall red cell mass in blood. This is why the hematocrit is considered a calculated parameter: it depends on the RBC indices, rather than being a primary direct measurement. The other options fit different roles: the red blood cell count is a direct count; RDW reflects the distribution of red cell sizes rather than a simple product of counts and volumes; MCV is itself an index calculated from size data (and can be derived from Hct and RBC as well).

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4. Aspirin affects platelets by interfering with which enzyme?

A. Lipoxygenase

B. Thromboxane synthase

C. Cyclooxygenase

D. Phospholipase A2

Aspirin blocks platelet function by irreversibly inhibiting cyclooxygenase, specifically the platelet enzyme COX-1. This prevents arachidonic acid from being converted to prostaglandin G2/H2 and, crucially, to thromboxane A2, a potent promoter of platelet activation and aggregation. Because platelets are anucleate, they cannot synthesize new COX-1, so the inhibition lasts for the life of the platelet (about 7–10 days), leading to a lasting anti-aggregatory effect. The other enzymes listed don't explain aspirin's action: lipoxygenase makes leukotrienes, thromboxane synthase acts downstream of COX and would have nothing to work on without the COX-produced substrate, and phospholipase A2 releases arachidonic acid rather than being inhibited by aspirin. Thus, cyclooxygenase is the enzyme aspirin targets to reduce thromboxane A2 formation and platelet aggregation.

5. Which of the following are examples of abnormal hemoglobins?

A. Carboxyhemoglobin

B. Methemoglobin

C. Sulfhemoglobin

D. Carboxyhemoglobin, Methemoglobin, and Sulfhemoglobin

Abnormal hemoglobins are variants in which the heme or its surrounding structure is altered, changing how oxygen is bound and released by red cells. Carboxyhemoglobin forms when carbon monoxide attaches to the iron in hemoglobin with a much higher affinity than oxygen, effectively occupying binding sites and shifting oxygen delivery away from tissues. Methemoglobin arises when iron is in the ferric (Fe^{3+}) state, which cannot bind oxygen, so even though the molecule is present, it cannot contribute to oxygen transport; small amounts are normal, but elevated levels cause hypoxia unless reduced. Sulfhemoglobin occurs when sulfur becomes incorporated into the heme, producing a form that cannot carry oxygen and is often not reversible with usual reducing systems. Because each of these represents a true alteration of hemoglobin that impairs oxygen transport, the correct answer includes all three forms.

6. Which bone marrow finding favors a diagnosis of multiple myeloma?

A. Sheaths of immature plasma cells

B. Plasmacytic satellitosis

C. Presence of occasional flame cell

D. Reed-Sternberg cells

In multiple myeloma, bone marrow is overtaken by clonal plasma cells, and the presence of immature plasma cells (plasmablasts) organized in sheets or "sheaths" of infiltration is a classic pattern of neoplastic plasma cell expansion. This finding directly reflects the malignant clone producing abnormal immunoglobulins, which is the hallmark of the disease. Reed-Sternberg cells are associated with Hodgkin lymphoma, not myeloma. Flame cells and plasmacytic satellitosis are not the characteristic marrow patterns for myeloma, making immature plasma cell sheaths the best clue to this diagnosis.

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7. If the RDW is elevated on a CBC, the smear would most likely show which finding?

A. hypochromia

B. anisocytosis

C. poikilocytosis

D. macrocytosis

Elevated RDW means there is a wide variation in red blood cell sizes. On the smear, this shows up as anisocytosis—the red cells come in a spectrum of sizes rather than being the same size. Hypochromia reflects less hemoglobin per cell, not size diversity. Poikilocytosis is a mix of cell shapes, which is a different aspect than size variation. Macrocytosis can occur with large cells, but elevated RDW specifically highlights size variability, i.e., anisocytosis.

8. Gamma globin chain production occurs during fetal liver and bone marrow erythropoiesis and decreases after birth. Which statement best describes this pattern?

A. It occurs after birth only

B. It occurs during fetal development and then decreases

C. It never occurs

D. It occurs only in the spleen

This question tests the fetal-to-adult hemoglobin switch. Gamma globin chains are part of fetal hemoglobin (HbF, α2γ2) and are produced mainly during fetal development in the liver, with contribution from bone marrow as development progresses. After birth, expression of the gamma globin genes is downregulated and the beta globin genes take over, shifting production toward adult hemoglobin (HbA, α2β2). Because of this switch, gamma globin production occurs during fetal life and then decreases after birth, making the described pattern the best fit. The other possibilities don't align with this developmental transition: gamma globin is not produced only after birth, it does occur during fetal life, and its production is not restricted to the spleen.

9. Which surface antigen is commonly expressed on myeloid blasts and used in immunophenotyping?

A. CD13

B. CD23

C. CD10

D. CD20

Immunophenotyping uses surface markers to identify the lineage of blasts. Myeloid blasts commonly express CD13, a marker used in standard myeloid panels alongside CD33 and sometimes CD117. This helps distinguish AML from ALL, where blasts would typically express B-cell–related markers. The other options are mainly associated with B cells—CD23 is an IgE receptor on certain B cells, CD10 (CALLA) on precursor B cells and some lymphomas, and CD20 on mature B cells. Therefore, detecting CD13 on blasts points to a myeloid lineage.

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10. A large cell with dark blue granules on Wright stain is best described as which cell type?

A. Neutrophil

B. Basophil

C. Eosinophil

D. Myelocyte

On Wright stain, cells are distinguished by the color and appearance of their cytoplasmic granules. Basophils have large, dark blue (basophilic) granules that can dominate the cytoplasm and often obscure the nucleus. This deep blue granular cytoplasm is the hallmark that sets basophils apart from other granulocytes. Neutrophils show pale lilac cytoplasm with fine pink granules, eosinophils have bright orange-red granules, and myelocytes are immature cells with a less distinctly granulated cytoplasm and a more subtle nucleus. So, a large cell with dark blue granules is best described as a basophil.

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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://hematologyboc7e.examzify.com

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

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