

TEXAS A&M UNIVERSITY (TAMU) BIOL 351 FUNDAMENTALS OF MICROBIOLOGY EXAM 1 PRACTICE (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. Complex medium is described as...**
 - A. Medium lacking any organic nutrients
 - B. Medium in which the exact chemical composition is not exactly known
 - C. Medium with a precisely defined recipe
 - D. Medium formulated for anaerobes only
- 2. Binary fission is the division of a cell into two.**
 - A. Division into two after chromosome replication
 - B. Division by budding
 - C. Division into four
 - D. Division of a cell into two
- 3. Phylogenetic classification is best described as classification based on what?**
 - A. Evolutionary relationships and branching patterns of phylogenetic trees
 - B. Observed characteristics
 - C. Metabolic pathways
 - D. Geographic distribution
- 4. Which prefix corresponds to 10^9 ?**
 - A. Centi
 - B. Kilo
 - C. Mega
 - D. Giga
- 5. Which prefix corresponds to 10^3 ?**
 - A. Mega
 - B. Kilo
 - C. Giga
 - D. Centi
- 6. How are chains or pairs formed by bacteria?**
 - A. From division of a single plane
 - B. From division along several planes
 - C. From divisions along random planes
 - D. From budding

- 7. Which statement best describes the flagellum's placement relative to cell structures?**
- A. Outside of the plasma membrane, anchored in the cell wall
 - B. Inside the nucleus
 - C. In the cytoplasm
 - D. On the outer membrane of Gram-negative bacteria only
- 8. Which statement correctly distinguishes disinfectants from antiseptics?**
- A. Disinfectants are used on inanimate objects, while antiseptics are used on body tissue
 - B. Antiseptics are used on inanimate objects, while disinfectants are used on body tissue
 - C. Disinfectants sterilize; antiseptics reduce
 - D. Antiseptics kill spores; disinfectants do not
- 9. Which component is unique to Gram-negative cell walls that contributes to antibiotic resistance?**
- A. Teichoic acids are a major component of Gram-negative outer membranes.
 - B. A thick peptidoglycan layer alone provides all structural support.
 - C. A periplasmic space contains a thin peptidoglycan layer without an outer membrane.
 - D. Outer membrane with LPS is unique to Gram-negative bacteria and contributes to antibiotic resistance.
- 10. During glycolysis, what are the net ATP and NADH produced per glucose?**
- A. 2 ATP and 0 NADH
 - B. 2 ATP and 2 NADH
 - C. 4 ATP and 2 NADH
 - D. 0 ATP and 2 NADH

Answers

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

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Explanations

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1. Complex medium is described as...

- A. Medium lacking any organic nutrients
- B. Medium in which the exact chemical composition is not exactly known**
- C. Medium with a precisely defined recipe
- D. Medium formulated for anaerobes only

The idea being tested is that complex media contain ingredients whose exact chemical composition isn't known. Complex media use natural extracts like yeast extract or peptones, beef extract, etc., whose exact amounts and constituents vary between batches, so the overall composition isn't precisely defined. That's why the statement describing the medium as having an exact composition not known best fits. In practical terms, this type of medium supports growth of many organisms because it supplies a broad mix of nutrients, but you don't get a fixed recipe. This contrasts with a defined (synthetic) medium, where every component and its amount are precisely known. The option about lacking organic nutrients would describe a minimal or inorganic medium, not a complex one. The idea of being formulated only for anaerobes isn't relevant to whether the composition is defined.

2. Binary fission is the division of a cell into two.

- A. Division into two after chromosome replication
- B. Division by budding
- C. Division into four
- D. Division of a cell into two**

Binary fission is the process by which a cell divides to form two daughter cells. In bacteria, this starts with the replication of the chromosome, followed by segregation and constriction of the cell membrane and wall to split the cell into two. The defining outcome is simply division into two, not into four or by budding. While chromosome replication is part of the process, the key idea is that the end result is two cells.

3. Phylogenetic classification is best described as classification based on what?

- A. Evolutionary relationships and branching patterns of phylogenetic trees**
- B. Observed characteristics
- C. Metabolic pathways
- D. Geographic distribution

Phylogenetic classification groups organisms by their evolutionary relationships as shown by the branching patterns on phylogenetic trees. The idea is to reflect true ancestry and how species diverged over time, so organisms that share a more recent common ancestor cluster together. This approach uses data that reveal evolutionary history—often genetic sequences in modern practice—to reconstruct those relationships, and the resulting tree structure is what guides classification. Relying on observed characteristics alone can be misleading because similar traits can arise independently in different lineages (convergent evolution). Metabolic pathways can be shared for reasons other than close relatedness, and geographic distribution tells us where organisms live but not how they are related evolutionarily. So the best description is a system based on evolutionary relationships and the branching patterns that represent shared ancestry.

4. Which prefix corresponds to 10^9 ?

- A. Centi
- B. Kilo
- C. Mega
- D. Giga**

Understanding SI prefixes and powers of ten helps you interpret measurements quickly. The prefix that represents 10^9 is giga, as in gigabyte or gigahertz, meaning a billion of the base units. In contrast, centi is 10^{-2} (one hundredth), kilo is 10^3 (one thousand), and mega is 10^6 (one million). So for 10^9 , the correct prefix is giga.

5. Which prefix corresponds to 10^3 ?

- A. Mega
- B. Kilo**
- C. Giga
- D. Centi

Understanding SI prefixes and their powers of ten. 10^3 equals 1000, and the prefix that means a thousand is kilo, so 1 kilometer is 1000 meters and 1 kilogram is 1000 grams. Mega is 10^6 (a million), giga is 10^9 (a billion), and centi is 10^{-2} (0.01). So the prefix for 10^3 is kilo.

6. How are chains or pairs formed by bacteria?

- A. From division of a single plane**
- B. From division along several planes
- C. From divisions along random planes
- D. From budding

Chains and pairs form because the bacteria divide along a single plane, and the daughter cells remain attached in that plane. When divisions occur in the same plane over successive generations, the cells stay connected end-to-end, producing a chain; two cells that stay attached from the first division give a diplococcus (a pair). If division occurs in multiple or random planes, cells end up in clusters or irregular groups rather than a neat chain. Budding is a different reproductive mode and doesn't explain chain formation.

7. Which statement best describes the flagellum's placement relative to cell structures?

- A. Outside of the plasma membrane, anchored in the cell wall
- B. Inside the nucleus**
- C. In the cytoplasm
- D. On the outer membrane of Gram-negative bacteria only

Flagella are external cellular projections that extend from the cell surface and are anchored to the cell envelope. In bacteria, the flagellum emerges from the cell and is secured in the cell wall; in Gram-negative bacteria the basal body spans both inner and outer membranes so the flagellum projects outward, while in Gram-positive bacteria it anchors to a thick peptidoglycan layer. In eukaryotes, the flagellum is also outside the cell, a membrane-bound extension of the cytoskeleton. It is not located inside the nucleus or floating in the cytoplasm. It isn't restricted to the outer membrane of Gram-negative bacteria either. Therefore, describing the flagellum as outside the plasma membrane and anchored to the cell wall best captures its placement.

8. Which statement correctly distinguishes disinfectants from antiseptics?

- A. Disinfectants are used on inanimate objects, while antiseptics are used on body tissue**
- B. Antiseptics are used on inanimate objects, while disinfectants are used on body tissue
- C. Disinfectants sterilize; antiseptics reduce
- D. Antiseptics kill spores; disinfectants do not

The key idea is where these agents are applied: disinfectants are designed for nonliving surfaces, while antiseptics are intended for living tissue. That's why the correct statement says disinfectants are used on inanimate objects and antiseptics are used on body tissue. It's also worth remembering that disinfectants don't automatically sterilize, and antiseptics aren't meant to sterilize living tissue; many antiseptics reduce microbial load safely on skin, and sterilization requires more extreme methods. The other options misstate the typical use or capabilities of these agents (for example, applying antiseptics to inanimate objects or disinfectants to body tissue, or making blanket claims about sterilization or spore-killing).

9. Which component is unique to Gram-negative cell walls that contributes to antibiotic resistance?

- A. Teichoic acids are a major component of Gram-negative outer membranes.
- B. A thick peptidoglycan layer alone provides all structural support.
- C. A periplasmic space contains a thin peptidoglycan layer without an outer membrane.

D. Outer membrane with LPS is unique to Gram-negative bacteria and contributes to antibiotic resistance.

The feature that sets Gram-negative bacteria apart and contributes to their antibiotic resistance is the outer membrane that sits outside a thin peptidoglycan layer, with lipopolysaccharide on its surface. This outer membrane acts as a strong barrier, restricting entry of many antibiotics, and its embedded porins control which molecules can pass through. Because drugs that are large or hydrophobic struggle to cross this barrier, Gram-negative organisms tend to be more resistant to many antibiotics. Teichoic acids are characteristic of Gram-positive walls, a thick peptidoglycan layer alone doesn't provide the same outer barrier, and Gram-negative bacteria do have an outer membrane (so a periplasmic space with only a thin peptidoglycan and no outer membrane isn't accurate). Therefore, the outer membrane with LPS is the feature unique to Gram-negative cells that contributes to antibiotic resistance.

10. During glycolysis, what are the net ATP and NADH produced per glucose?

- A. 2 ATP and 0 NADH
- B. 2 ATP and 2 NADH**
- C. 4 ATP and 2 NADH
- D. 0 ATP and 2 NADH

Glycolysis yields a net gain of two ATP and two NADH per glucose. The process starts by investing two ATP to phosphorylate glucose, activating it. As the pathway progresses, four ATP are produced by substrate-level phosphorylation, but because two were spent at the start, the net ATP is two. At the same time, two molecules of NADH are formed when glyceraldehyde-3-phosphate is oxidized to pyruvate (one NADH per glyceraldehyde-3-phosphate, and there are two such molecules per glucose). So the overall products per glucose are 2 ATP and 2 NADH. The other options misstate either the net ATP or the NADH production.

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://tamu-biol351exam1.examzify.com>

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

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