

FOUNDATIONS OF BIOLOGY OF EXAM 1 PRACTICE TEST (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. A cellular response to a signal is initiated by the receptor, transduced and amplified by other cellular molecules, and results in a change in the target.**
 - A. Initiated by the receptor and amplified by other molecules to change the target
 - B. Occurring spontaneously without receptor input
 - C. Requiring ligand diffusion only
 - D. Irreversible in all cases

- 2. Which structure is not present in prokaryotic cells?**
 - A. Plasma membrane
 - B. Pili or flagella
 - C. Outer membrane
 - D. Nucleus

- 3. The cytoskeleton is composed of which components?**
 - A. Microfilaments, intermediate filaments, and microtubules
 - B. DNA, RNA, ribosomes
 - C. Lipids, carbohydrates, proteins
 - D. Chloroplasts, mitochondria, nuclei

- 4. Which statement about the Na⁺/K⁺ pump energy usage is correct?**
 - A. It is a primary active transporter driven directly by ATP
 - B. It is a secondary active transporter driven by ion gradients
 - C. It is a passive channel
 - D. It transports glucose

- 5. Lysosomes are described as which of the following?**
 - A. Energy-Producing Organelles
 - B. Membrane Vesicles That Contain Digestive Enzymes
 - C. Sites of Ribosome Assembly
 - D. Storage of Calcium Ions

- 6. Which of the following describes how ATP provides energy to cellular processes?**
- A. By creating water
 - B. By converting energy into light
 - C. By consuming energy
 - D. By donating phosphate groups to other molecules
- 7. Hydrolysis reactions involve**
- A. Water out, energy in
 - B. Water in, energy in
 - C. No water involved, energy out
 - D. Water in, energy out
- 8. Where does glycolysis occur in the cell?**
- A. Cytoplasm
 - B. Mitochondria
 - C. Nucleus
 - D. Endoplasmic reticulum
- 9. Photorespiration occurs because Rubisco has both oxygenase and carboxylase activities. What term describes these dual functions?**
- A. Oxidase and reductase
 - B. Oxygenase and carboxylase
 - C. Kinase and isomerase
 - D. Hydrolase and lyase
- 10. Gap junctions mainly provide which function?**
- A. Inhibit intercellular communication
 - B. Allow molecules to move between cells through pores for communication
 - C. Form tight seals between cells
 - D. Anchor cells to the extracellular matrix

Answers

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

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Explanations

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1. A cellular response to a signal is initiated by the receptor, transduced and amplified by other cellular molecules, and results in a change in the target.

A. Initiated by the receptor and amplified by other molecules to change the target

B. Occurring spontaneously without receptor input

C. Requiring ligand diffusion only

D. Irreversible in all cases

Cells detect signals with receptors, and the message begins when a receptor binds its signal. That event sets off a transduction cascade where the signal is passed along and amplified by intracellular molecules, so a small signal can produce a large effect at the target. The final result is a change in the target's behavior or state, such as altered enzyme activity, ion channel function, or gene expression. This is why the description "initiated by the receptor and amplified by other molecules to change the target" is the best fit. It captures both the receptor-based start and the amplification that makes the response substantial. The other ideas fail because signals require receptor input to begin, not just spontaneous diffusion, and because many cellular responses are reversible and tightly regulated rather than irreversible in all cases. For example, a hormone binding to its receptor can trigger a cascade involving second messengers like cAMP or calcium, culminating in a precise, controllable change in the target.

2. Which structure is not present in prokaryotic cells?

A. Plasma membrane

B. Pili or flagella

C. Outer membrane

D. Nucleus

Prokaryotic cells lack a membrane-bound nucleus. Their DNA sits in the cytoplasm in a region called the nucleoid, not inside a nucleus. This distinguishes them from eukaryotic cells, which house their genetic material inside a true nucleus surrounded by a double membrane. Prokaryotes still have a plasma membrane to enclose the cell, and many have pili or flagella for movement or attachment, and some possess an outer membrane as part of their cell envelope. So the structure that prokaryotes do not have is a nucleus.

3. The cytoskeleton is composed of which components?

A. Microfilaments, intermediate filaments, and microtubules

B. DNA, RNA, ribosomes

C. Lipids, carbohydrates, proteins

D. Chloroplasts, mitochondria, nuclei

The cytoskeleton is a dynamic network of protein filaments that gives the cell its shape, provides mechanical support, and serves as tracks for movement of organelles and cargo. It consists of three main filament systems: microfilaments, intermediate filaments, and microtubules. Microfilaments are thin strands made of actin and are key for changing cell shape and enabling movement. Intermediate filaments are more rope-like and provide mechanical strength to the cell. Microtubules are hollow tubes built from tubulin that organize the cell's interior, position organelles, and form the mitotic spindle during cell division. These filaments continually assemble and disassemble, allowing quick remodeling as the cell's needs change. The other options describe things that aren't part of the cytoskeleton: genetic material and protein synthesis machinery (DNA, RNA, ribosomes); basic biomolecule classes (lipids, carbohydrates, proteins) that make up membranes and enzymes but aren't the filament network; and whole organelles (chloroplasts, mitochondria, nuclei) rather than the filamentous framework inside the cell.

4. Which statement about the Na⁺/K⁺ pump energy usage is correct?

- A. It is a primary active transporter driven directly by ATP**
- B. It is a secondary active transporter driven by ion gradients
- C. It is a passive channel
- D. It transports glucose

The key idea here is that the Na⁺/K⁺ pump uses energy directly from ATP to move ions against their gradients, making it a primary active transporter. In each cycle, it hydrolyzes one ATP to drive conformational changes that pump three Na⁺ out of the cell and two K⁺ into the cell. This direct use of ATP energy, rather than relying on existing ion gradients, is what defines primary active transport. It is not a secondary active transporter, which would harness the energy stored in gradients to move substances; it is not a passive channel, which would allow ions to diffuse down their gradients without energy input. It also does not transport glucose, which is handled by other transporters such as GLUTs (facilitated diffusion) or by cotransporters like SGLT that rely on the Na⁺ gradient. The pump's role in maintaining ion gradients is essential for resting membrane potential and cell volume, and that energy demand comes from direct ATP hydrolysis.

5. Lysosomes are described as which of the following?

- A. Energy-Producing Organelles
- B. Membrane Vesicles That Contain Digestive Enzymes**
- C. Sites of Ribosome Assembly
- D. Storage of Calcium Ions

Lysosomes are membrane-bound vesicles that contain digestive enzymes. Their interior is acidic, which optimizes these acid hydrolases to break down proteins, nucleic acids, and other macromolecules from outside the cell or from damaged organelles. The lysosome's membrane protects the rest of the cell from these potent enzymes. They are formed from the Golgi apparatus and fuse with endosomes or autophagosomes to degrade their contents. This makes them best described as membrane vesicles that contain digestive enzymes. The other options don't fit because energy production is done by mitochondria (and chloroplasts in plants), ribosome assembly occurs in the nucleolus, and calcium storage is primarily handled by other organelles like the endoplasmic reticulum and mitochondria.

6. Which of the following describes how ATP provides energy to cellular processes?

- A. By creating water
- B. By converting energy into light
- C. By consuming energy
- D. By donating phosphate groups to other molecules**

Energy in cells is supplied by ATP through phosphorylation: ATP donates a phosphate group to target molecules. This phosphate transfer changes the substrate's shape and chemical reactivity, enabling it to participate in or accelerate cellular processes. The energy released when the terminal phosphate is removed (ATP becoming ADP and Pi) powers these tasks, such as enzyme activation, membrane transport, and motor activities. This mechanism explains why ATP is described as the energy currency of the cell. Other options don't describe how ATP provides energy: ATP isn't creating water, converting energy into light, or merely consuming energy—the essential point is phosphate transfer to drive work.

7. Hydrolysis reactions involve

- A. Water out, energy in
- B. Water in, energy in
- C. No water involved, energy out
- D. Water in, energy out**

Hydrolysis involves adding water to a molecule to break a bond. In many biological cases, that bond-breaking releases energy, providing power for cellular processes. So water is in the reaction and energy is released, which is captured by the description: water in, energy out. This contrasts with setups where water would be removed (dehydration/condensation) or where the reaction requires an input of energy (endergonic). A common example is ATP hydrolysis, which liberates energy to drive work in the cell.

8. Where does glycolysis occur in the cell?

- A. Cytoplasm**
- B. Mitochondria
- C. Nucleus
- D. Endoplasmic reticulum

Glycolysis happens in the cytoplasm because it's a cytosolic pathway that uses soluble enzymes floating in the cell's aqueous interior to break down glucose into two pyruvate molecules. This process yields a small amount of ATP and NADH right there in the cytosol and does not require any membrane-bound organelles. After glycolysis, the pyruvate typically enters mitochondria for further oxidation, linking to the TCA cycle, but glycolysis itself does not occur inside mitochondria, the nucleus, or the endoplasmic reticulum.

9. Photorespiration occurs because Rubisco has both oxygenase and carboxylase activities. What term describes these dual functions?

- A. Oxidase and reductase
- B. Oxygenase and carboxylase**
- C. Kinase and isomerase
- D. Hydrolase and lyase

Rubisco can perform two different catalytic tasks: it carboxylates RuBP by adding CO₂ to form 3-phosphoglycerate, and it oxygenates RuBP by adding O₂, which leads to different products. This combination of activities is described as oxygenase and carboxylase activities. Photorespiration happens when the oxygenase activity predominates, especially under conditions of high O₂ or low CO₂, causing a loss of fixed carbon and energy for the plant.

10. Gap junctions mainly provide which function?

- A. Inhibit intercellular communication
- B. Allow molecules to move between cells through pores for communication**
- C. Form tight seals between cells
- D. Anchor cells to the extracellular matrix

Gap junctions enable direct intercellular communication by forming channels that connect the cytoplasm of neighboring cells. These channels are built from connexin proteins into connexons, and when two connexons align, they create a pore that allows small ions and metabolites to pass straight from one cell to the next. This kind of direct cytoplasmic connection coordinates activities across a tissue, such as synchronized contraction in heart muscle, by enabling rapid electrical and chemical signaling. The other options don't fit because gap junctions don't inhibit communication; they actually promote it. They don't form tight seals between cells—that's the role of tight junctions. And they don't anchor cells to the extracellular matrix—anchorage to the matrix involve adhesion structures like focal adhesions and integrins.

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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://foundationsofbiology1.examzify.com>

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

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