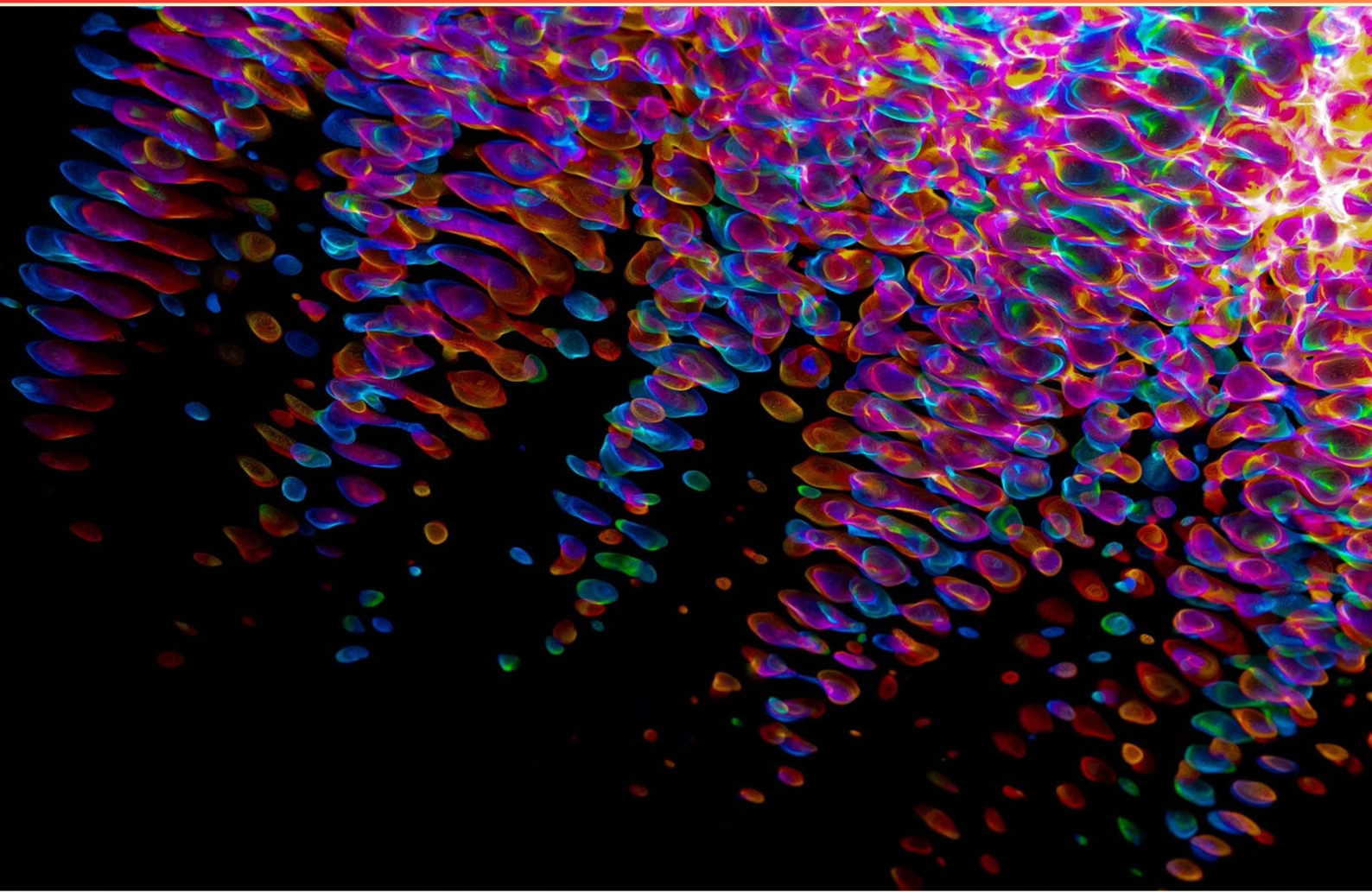


IB BIOLOGY PRACTICE EXAM (SAMPLE)

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. What is a gene?

- A. A unit of heredity that is a segment of DNA
- B. A sequence of RNA that codes for proteins only
- C. A chromosome within the nucleus
- D. An enzyme that catalyzes biochemical reactions

2. What is the significance of the scientific method in biology?

- A. It allows for random experimentation without the need for evidence.
- B. It provides a systematic approach for investigating natural phenomena.
- C. It discourages the development of hypotheses.
- D. It emphasizes anecdotal evidence over empirical evidence.

3. What is the main purpose of photosynthesis?

- A. To produce oxygen from glucose
- B. To convert solar energy into chemical energy
- C. To utilize carbon dioxide for respiration
- D. To break down glucose for energy

4. What is a primary limitation of unicellular organisms regarding size?

- A. Energy production
- B. Surface area to volume ratio
- C. Oxygen diffusion
- D. Metabolic processes

5. Within metabolism, which process typically requires energy input?

- A. Catabolism
- B. Anabolism
- C. Cellular respiration
- D. Fermentation

6. What are proteins composed of?

- A. Chains of Nucleotides
- B. Chains of Amino Acids
- C. Chains of Monosaccharides
- D. Chains of Fatty Acids

7. What condition is caused by a base substitution mutation?

- A. Hemophilia
- B. Cystic fibrosis
- C. Sickle cell anemia
- D. Down syndrome

8. What defines a macromolecule or polymer?

- A. A large molecule made from one type of monomer
- B. A very small molecule involved in cellular processes
- C. A very large molecule composed of many repeated smaller subunits
- D. A molecule that can dissolve in water

9. How is the base sequence changed in sickle cell anemia?

- A. GAT GCC to GAC CTA
- B. GAG CTC to GTG CAC
- C. ATG CCG to ACG CCG
- D. CTC GAG to GAG CTA

10. Which taxonomic rank is directly above Genus?

- A. Species
- B. Order
- C. Family
- D. Class

Answers

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

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Explanations

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1. What is a gene?

- A. A unit of heredity that is a segment of DNA**
- B. A sequence of RNA that codes for proteins only
- C. A chromosome within the nucleus
- D. An enzyme that catalyzes biochemical reactions

A gene is fundamentally defined as a unit of heredity that consists of a specific segment of DNA. This definition encompasses the essence of what genes are and their primary role in biology. Genes serve as the instructions for the synthesis of proteins, which are crucial for many functions within an organism. Each gene contains the information needed to produce a particular protein or set of proteins, contributing to traits and characteristics passed down from one generation to the next. While some definitions may involve RNA, genes are intrinsically linked to DNA, from which RNA and, subsequently, proteins are synthesized through the processes of transcription and translation. This connection is vital for understanding molecular biology and genetics. In contrast, other options provided do not accurately capture the full scope or function of a gene, which is why option A stands out as the correct answer.

2. What is the significance of the scientific method in biology?

- A. It allows for random experimentation without the need for evidence.
- B. It provides a systematic approach for investigating natural phenomena.**
- C. It discourages the development of hypotheses.
- D. It emphasizes anecdotal evidence over empirical evidence.

The significance of the scientific method in biology lies in its systematic approach to investigating natural phenomena. This method establishes a structured framework that researchers follow to gather data, form hypotheses, conduct experiments, and analyze results. By adhering to this structured process, scientists can ensure that their investigations are objective, replicable, and based on empirical evidence rather than subjective opinion. This rigor allows for the development of reliable theories and conclusions that advance our understanding of biological processes and concepts. The scientific method promotes critical thinking and skepticism, enabling biologists to question existing knowledge, refine their hypotheses, and build on previous research. This ongoing cycle of inquiry is essential for the advancement of biological sciences, as it not only validates findings but also fosters innovation and discovery.

3. What is the main purpose of photosynthesis?

- A. To produce oxygen from glucose
- B. To convert solar energy into chemical energy**
- C. To utilize carbon dioxide for respiration
- D. To break down glucose for energy

The main purpose of photosynthesis is to convert solar energy into chemical energy. This process occurs in the chloroplasts of plant cells, where light energy from the sun is captured and used to transform carbon dioxide and water into glucose and oxygen. The glucose produced serves as an energy source for the plant, and it can be used immediately or stored for later use. During this process, light energy is absorbed by chlorophyll and other pigments, and this energy is then used to drive the chemical reactions that create glucose through a series of steps known as the light-dependent reactions and the Calvin cycle. This transformation of light energy into a stable form of chemical energy in glucose is crucial not only for the plant itself but also for nearly all life on Earth, as it forms the basis of the food chain. The other choices focus on specific byproducts or side effects of photosynthesis rather than its main purpose. While the production of oxygen is a significant outcome, it is not the primary objective of the process. Similarly, while plants utilize carbon dioxide for many processes, including respiration, this is not the main goal of photosynthesis. Finally, breaking down glucose for energy is part of cellular respiration, which occurs after glucose is produced, not the aim of photosynthesis itself.

4. What is a primary limitation of unicellular organisms regarding size?

- A. Energy production
- B. Surface area to volume ratio**
- C. Oxygen diffusion
- D. Metabolic processes

The primary limitation of unicellular organisms regarding size is associated with the surface area to volume ratio. As a unicellular organism increases in size, the volume grows at a faster rate than the surface area. This relationship creates a challenge for the organism because the surface area is responsible for the exchange of substances such as nutrients and waste products with the environment. A high surface area to volume ratio is crucial for efficient exchange processes. Smaller cells can effectively transport materials across their membranes, ensuring that the metabolic needs are met. However, as the cell grows larger, the surface area becomes insufficient to allow adequate exchange to support the metabolic activity required for larger volumes. This limitation often constrains unicellular organisms from achieving larger sizes, as their ability to acquire nutrients, eliminate waste, and perform necessary metabolic functions diminishes with an increasing size. Therefore, understanding the relationship between surface area and volume provides insight into why unicellular organisms remain relatively small and highlights a crucial aspect of their biological design and functionality.

5. Within metabolism, which process typically requires energy input?

- A. Catabolism
- B. Anabolism**
- C. Cellular respiration
- D. Fermentation

Anabolism is the process that typically requires energy input because it involves the synthesis of complex molecules from simpler ones. This is essential for growth, repair, and the maintenance of cells, as it allows for the construction of macromolecules such as proteins, nucleic acids, carbohydrates, and lipids. During anabolic reactions, energy is often derived from adenosine triphosphate (ATP) or other high-energy molecules. For instance, when amino acids are linked together to form proteins, or when glucose molecules are combined to form glycogen, energy must be supplied to drive these reactions forward, against the thermodynamic tendency toward disorder. In contrast, catabolism breaks down complex molecules into simpler ones, releasing energy in the process. Cellular respiration and fermentation are also processes that either release or harness energy from organic compounds, but do not typically require energy input in the manner that anabolic processes do. Therefore, the focus on building and synthesizing new structures makes anabolism distinctly energy-dependent.

6. What are proteins composed of?

- A. Chains of Nucleotides
- B. Chains of Amino Acids**
- C. Chains of Monosaccharides
- D. Chains of Fatty Acids

Proteins are fundamentally composed of chains of amino acids. These amino acids are organic compounds that serve as the building blocks of proteins, each containing an amino group, a carboxyl group, and a unique side chain or R group that determines the amino acid's properties. The sequence and arrangement of these amino acids determine the protein's structure and function, which can vary greatly depending on the specific combination and sequence. During the process of protein synthesis, amino acids are linked together by peptide bonds in a specific order dictated by the genetic code. This polypeptide chain then folds into a three-dimensional structure that is critical for the protein's biological activity. The diverse range of functions performed by proteins—such as acting as enzymes, hormones, structural components, and antibodies—arises from their unique sequences of amino acids and the resulting complex shapes they adopt. This distinction is crucial because other biological macromolecules serve different roles. For example, nucleotides form nucleic acids like DNA and RNA, monosaccharides are the building blocks of carbohydrates, and fatty acids are components of lipids. Understanding that proteins are specifically formed from amino acids is essential for grasping broader biological concepts, including metabolism, genetics, and cellular physiology.

7. What condition is caused by a base substitution mutation?

- A. Hemophilia
- B. Cystic fibrosis
- C. Sickle cell anemia**
- D. Down syndrome

Sickle cell anemia is directly caused by a base substitution mutation, which is a type of point mutation. In this condition, a single nucleotide in the DNA sequence is altered—specifically, adenine (A) is replaced by thymine (T) in the gene that encodes for the beta chain of hemoglobin. This single change leads to the substitution of valine for glutamic acid in the hemoglobin protein. As a result, the altered hemoglobin (known as hemoglobin S) causes red blood cells to deform into a sickle shape under low oxygen conditions, leading to complications such as blockages in blood vessels and reduced oxygen transport. In contrast, conditions like hemophilia and cystic fibrosis can arise from various mutations including deletions or large chromosomal abnormalities, while Down syndrome is specifically caused by an additional copy of chromosome 21, rather than a point mutation. Thus, the direct link between base substitution and sickle cell anemia makes it the correct choice.

8. What defines a macromolecule or polymer?

- A. A large molecule made from one type of monomer
- B. A very small molecule involved in cellular processes
- C. A very large molecule composed of many repeated smaller subunits**
- D. A molecule that can dissolve in water

A macromolecule or polymer is defined as a very large molecule composed of many repeated smaller subunits, known as monomers. These monomers are joined together through various types of chemical bonds, typically covalent bonds, to form a chain-like structure, which can be highly complex and serve various functions in biological organisms. For example, proteins are polymers made up of amino acid monomers, carbohydrates consist of sugar monomers, and nucleic acids are formed from nucleotide monomers. The characteristic of being composed of repeated smaller subunits is essential to the definition of macromolecules, as it highlights their structural organization and functionality in biological systems. This structural arrangement allows macromolecules to perform diverse roles, such as serving as enzymes, structural components, or energy storage molecules in living organisms. Other characteristics, such as solubility, size, or single-type composition, do not fully capture the essence of what defines macromolecules, reinforcing why this definition is the most accurate.

9. How is the base sequence changed in sickle cell anemia?

- A. GAT GCC to GAC CTA
- B. GAG CTC to GTG CAC**
- C. ATG CCG to ACG CCG
- D. CTC GAG to GAG CTA

The correct option highlights a specific mutation in the base sequence related to sickle cell anemia, which is caused by a single nucleotide change in the beta-globin gene of hemoglobin. In this case, the change from GAG to GTG results in the substitution of the amino acid glutamic acid (Glu) with valine (Val) at the sixth position of the beta-globin chain. This single point mutation alters the properties of the hemoglobin molecule, leading to a tendency for the hemoglobin to polymerize under low oxygen conditions, thus causing the characteristic sickling of red blood cells. This modification directly impacts the efficiency of oxygen transport and the overall health of individuals with this condition. Understanding that sickle cell anemia is primarily caused by a specific nucleotide substitution in the genetic code—where the original sequence (GAG) is changed to (GTG)—is crucial for grasping how genetic mutations can lead to significant physiological changes and diseases.

10. Which taxonomic rank is directly above Genus?

- A. Species
- B. Order
- C. Family**
- D. Class

The taxonomic rank that is directly above Genus is Family. In the hierarchical structure of biological classification, organisms are categorized into different ranks. The order of these ranks, from the broadest to the most specific, is Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species. Family encompasses one or more genera (plural of genus) that share common characteristics. For example, the genus *Panthera*, which includes lions and tigers, falls under the Family Felidae, which is the group that includes all felines. This classification system helps scientists organize and understand the relationships among different living organisms. In summary, Family is the appropriate answer as it is the rank immediately higher than Genus in the taxonomic hierarchy.

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://ibbiology.examzify.com>

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

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