SACE STAGE 2 BIOLOGY 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. What is the result of total non-disjunction in plants?

A. Formation of haploid offspring
B. Reduced genetic diversity
C. Potential formation of a new species
D. Increase in somatic mutations

2. What is a characteristic of Type 2 Diabetes?

A. Insulin is produced in excess
B. Cells become resistant to insulin
C. Insulin production stops completely
D. All blood sugar levels are normal

3. What is the role of the proximal convoluted tubule in the kidneys?

A. It collects urine before it exits the body
B. It reabsorbs nutrients into the blood
C. It filters blood to create urine
D. It produces hormones

4. What is the net ATP yield during glycolysis?

A. 2 ATP
B. 4 ATP
C. 36 ATP
D. 10 ATP

5. What is thermoregulation?

A. The body's mechanism to maintain homeostasis
B. The process of regulating blood sugar levels
C. The control of body temperature
D. The balance of water retention in cells

6. Epigenetics primarily studies what kind of changes?

A. Changes that involve alterations in DNA sequence
B. Heritable changes in gene function that do not change DNA
C. Physical mutations in chromosomes
D. Non-heritable environmental effects on genes

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7. Which cellular structure is involved in creating food vacuoles during phagocytosis?

A. Microtubules

B. Cytoskeleton

C. Cell membrane

D. Intermediate filaments

8. Which phase involves the pulling apart of homologous pairs to opposite poles of the cell?

A. Anaphase I

B. Telophase II

C. Prophase II

D. Metaphase I

9. Homologous structures arise from which of the following?

A. Convergent evolution

B. Adaptive radiation

C. Common ancestry

D. Geographical isolation

10. What distinguishes steroid hormones from other types of hormones?

A. They are derived from amino acids

B. They are derived from cholesterol

C. They are proteins with more than fifty amino acids

D. They consist of short chains of amino acids

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Answers

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

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Explanations

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1. What is the result of total non-disjunction in plants?

A. Formation of haploid offspring

B. Reduced genetic diversity

C. Potential formation of a new species

D. Increase in somatic mutations

Total non-disjunction occurs when both homologous chromosomes fail to separate during meiosis, resulting in gametes that have an abnormal number of chromosomes. In plants, this phenomenon can lead to polyploidy, where cells have more than two complete sets of chromosomes. The potential formation of a new species is a significant consequence of total non-disjunction because polyploid individuals often have reproductive barriers with their diploid relatives. This reproductive isolation can lead to speciation, as the polyploid plants may differ enough genetically and phenotypically from their parent species that they no longer interbreed effectively, allowing a new species to arise. In contrast, while reduced genetic diversity may occur in some cases due to inbreeding or other factors, it is not a direct result of non-disjunction. Similarly, the formation of haploid offspring is not a consequence of total non-disjunction; instead, it would be associated with normal meiosis leading to gametes with half the chromosome number. Lastly, while an increase in somatic mutations can happen in any organism, this is not specifically tied to the event of total non-disjunction, which is focused on chromosomal anomalies rather than mutations. Thus, the most fitting result of total non-disjunction in plants

2. What is a characteristic of Type 2 Diabetes?

A. Insulin is produced in excess

B. Cells become resistant to insulin

C. Insulin production stops completely

D. All blood sugar levels are normal

Type 2 Diabetes is primarily characterized by the body's cells becoming resistant to insulin. This resistance means that, although insulin is produced by the pancreas, its effectiveness at facilitating the uptake of glucose into cells is diminished. As a result, even though there may be sufficient amounts of insulin present, the blood sugar levels can remain elevated because glucose is not effectively utilized by the cells. In the context of Type 2 Diabetes, the body initially compensates for this resistance by producing more insulin, but over time, the pancreatic beta cells may fail to keep up with the increasing demand. This can eventually lead to a decline in insulin production, but it is the resistance of cells to insulin that is a hallmark of the disease. The other options do not accurately describe the condition. Insulin is not produced in excess in the straightforward sense, as the pancreas may struggle to maintain insulin levels in the face of resistance. Insulin production does not typically stop completely in Type 2 Diabetes; rather, it may decrease over time due to beta cell exhaustion. Lastly, blood sugar levels in individuals with Type 2 Diabetes are not normal; they are usually elevated due to the ineffective use of insulin.

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3. What is the role of the proximal convoluted tubule in the kidneys?

A. It collects urine before it exits the body

B. It reabsorbs nutrients into the blood

C. It filters blood to create urine

D. It produces hormones

The proximal convoluted tubule (PCT) plays a critical role in the reabsorption of essential nutrients, ions, and water from the renal filtrate back into the bloodstream. After the initial filtration process occurs at the glomerulus, the fluid that enters the proximal convoluted tubule contains not only waste products but also valuable substances such as glucose, amino acids, and various ions. The cells lining the PCT are equipped with numerous microvilli, which enhance the surface area for absorption, and they possess specific transport mechanisms for facilitating this reabsorption process. For example, glucose is reabsorbed through active transport mechanisms, while ions like sodium and potassium are reabsorbed via both active and passive transport. This reabsorption process is vital for maintaining the body's homeostasis, ensuring that necessary nutrients are retained while waste products continue to be processed and eventually excreted. Thus, the role of the proximal convoluted tubule is crucial to the kidney's overall function of filtering blood and regulating the body's fluid and electrolyte balance.

4. What is the net ATP yield during glycolysis?

A. 2 ATP

B. 4 ATP

C. 36 ATP

D. 10 ATP

During glycolysis, one molecule of glucose is converted into two molecules of pyruvate. This metabolic pathway occurs in the cytoplasm and involves several key steps that result in both the investment and generation of ATP. Initially, two ATP molecules are consumed in the early steps of glycolysis to help convert glucose into fructose-1,6-bisphosphate. This investment is necessary to prepare the glucose for subsequent cleavage and further breakdown. As glycolysis continues, four ATP molecules are produced through substrate-level phosphorylation, where phosphate groups are transferred directly to ADP to form ATP. When calculating the net yield, you subtract the ATP that was used from the ATP that was produced. Therefore, from the four ATP produced, two ATP are used, leading to a net yield of two ATP molecules for each molecule of glucose that undergoes glycolysis. This net gain is crucial for cells, as it provides some energy that can be used for various cellular processes. Hence, the net ATP yield during glycolysis is indeed two ATP molecules.

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5. What is thermoregulation?

A. The body's mechanism to maintain homeostasis

B. The process of regulating blood sugar levels

C. The control of body temperature

D. The balance of water retention in cells

Thermoregulation refers specifically to the process by which an organism regulates its body temperature to maintain homeostasis, especially in response to external environmental changes. This involves various physiological mechanisms that help an organism either to lose or conserve heat, ensuring that its internal temperature remains within an optimal range for cellular functions and overall metabolic processes. For example, in humans, thermoregulation occurs through mechanisms such as sweating to facilitate evaporative cooling when the body overheats, or shivering to generate heat when the body is cold. The hypothalamus plays a critical role in sensing temperature changes and initiating appropriate responses to maintain the set point temperature. While maintaining homeostasis encompasses a broad range of physiological processes (which involves balancing numerous factors in the body), thermoregulation is specifically focused on temperature control. Other processes mentioned in the incorrect options, such as regulating blood sugar levels or maintaining water balance, relate to different systems within the body's overall homeostatic mechanisms. Therefore, the precise definition of thermoregulation and its importance in maintaining optimal conditions for biological functions underscores why it is correctly identified as the control of body temperature.

6. Epigenetics primarily studies what kind of changes?

A. Changes that involve alterations in DNA sequence

B. Heritable changes in gene function that do not change DNA

C. Physical mutations in chromosomes

D. Non-heritable environmental effects on genes

Epigenetics focuses on heritable changes in gene expression or cellular phenotype that do not involve alterations to the underlying DNA sequence. This includes mechanisms such as DNA methylation and histone modification, which can regulate how genes are turned on or off. These changes can be influenced by various factors, including environmental conditions, and can be passed down from one generation to the next without altering the genetic code itself. This ability to modify gene function while maintaining the DNA sequence is essential for understanding development and diseases, as it illustrates how external factors can lead to significant biological effects. In contrast, the other options pertain to different biological concepts. The first option involves actual mutations in the DNA sequence itself, which is not the focus of epigenetics. The third option refers to physical mutations in chromosomes, which relate to structural changes rather than the regulatory mechanisms studied in epigenetics. Lastly, non-heritable environmental effects on genes do not involve changes that can be passed on to subsequent generations, thus falling outside the scope of epigenetic study.

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7. Which cellular structure is involved in creating food vacuoles during phagocytosis?

A. Microtubules

B. Cytoskeleton

C. Cell membrane

D. Intermediate filaments

In creating food vacuoles during phagocytosis, the cytoskeleton plays a crucial role. The cytoskeleton is a network of protein filaments and tubules that provides structure and shape to the cell, and is instrumental in various cellular processes including movement and transport. During phagocytosis, the cell membrane engulfs solid particles, and the cytoskeleton facilitates the extension and retraction of cellular projections, such as pseudopodia, to surround the particle. This action requires the dynamic rearrangement of the cytoskeletal components, particularly actin filaments, which are part of the cytoskeleton. Once the particle is enclosed, it forms a food vacuole within the cell. While other structures, such as the cell membrane, are involved in the actual process of membrane engulfment, it is the cytoskeleton that provides the necessary support and movements needed to successfully navigate and manipulate the membrane during this process, making it integral to the formation of food vacuoles.

8. Which phase involves the pulling apart of homologous pairs to opposite poles of the cell?

A. Anaphase I

B. Telophase II

C. Prophase II

D. Metaphase I

The phase that involves the pulling apart of homologous pairs to opposite poles of the cell is Anaphase I. During this stage of meiosis, the paired homologous chromosomes, which have been aligned at the metaphase plate during Metaphase I, are separated and pulled toward opposite ends of the cell. This separation occurs when the spindle fibers shorten, effectively segregating the homologous chromosomes into two distinct groups. This is a critical step in ensuring that each daughter cell receives one chromosome from each homologous pair, ultimately contributing to genetic diversity in the resulting gametes. In contrast, the other phases mentioned have different functions. Telophase II occurs after the separation of sister chromatids and involves the reformation of the nuclear envelope around each set of chromosomes, but it does not involve pulling homologous pairs apart. Prophase II is the stage where the chromosomes condense again and the spindle apparatus forms without separating any chromosomes. Metaphase I is when homologous chromosomes line up at the metaphase plate but have not yet been aligned for separation. This differentiation in roles among the phases of meiosis clarifies why Anaphase I is the correct answer for this question.

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9. Homologous structures arise from which of the following?

A. Convergent evolution

B. Adaptive radiation

C. Common ancestry

D. Geographical isolation

Homologous structures are features in different organisms that share a similar form due to a common ancestral origin, even though they may serve different functions in modern species. The presence of homologous structures across various species is strong evidence for evolutionary theory, demonstrating how different species can evolve and adapt over time from a shared ancestor. For example, the forelimbs of mammals, birds, and reptiles exhibit a basic structural similarity despite being adapted for different purposes, such as grasping, flying, or swimming. This reflects their shared heritage rather than similarity due to environmental pressures or other evolutionary paths. While convergent evolution pertains to organisms developing similar traits independently to adapt to similar environments, and adaptive radiation involves the diversification of a species into different forms to fill various ecological niches, these do not result in homologous structures. Similarly, geographical isolation can lead to speciation and divergent evolution, but it does not inherently create homologous structures on its own without a common ancestor. Therefore, the key aspect of homologous structures lies in their derivation from a common ancestry, which explains why that choice is the correct one.

10. What distinguishes steroid hormones from other types of hormones?

A. They are derived from amino acids

B. They are derived from cholesterol

C. They are proteins with more than fifty amino acids

D. They consist of short chains of amino acids

Steroid hormones are distinct because they are derived from cholesterol. This characteristic sets them apart from other hormone types, particularly peptide and amine hormones, which are typically derived from amino acids. The structure of steroid hormones is characterized by a core structure of four fused carbon rings, allowing them to easily pass through cell membranes and bind to intracellular receptors. This binding often leads to changes in gene expression and the production of proteins in target cells. In contrast, hormones derived from amino acids, proteins, or short chains of amino acids do not possess this cholesterol-derived structure, impacting their mechanism of action and solubility in the bloodstream. Understanding the biochemical origins of steroid hormones highlights their unique properties and functions within physiological processes.

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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:

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

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