CAMPBELL BIOLOGY CONCEPTS & CONNECTIONS PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Table of Contents

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

1. During translation, what is formed by the amino acids carried by tRNA?

A. A ribosome catalyzes RNA synthesis.

B. The mRNA strand is degraded.

C. A polypeptide chain is formed.

D. Ribosomal RNA is released.

2. Which statement best contrasts the rough endoplasmic reticulum with the smooth endoplasmic reticulum?

A. Rough ER has ribosomes and synthesizes secreted and membrane proteins; smooth ER lacks ribosomes and synthesizes lipids/detoxification

B. Rough ER lacks ribosomes and synthesizes lipids

C. Smooth ER has ribosomes and synthesizes secreted proteins

D. Rough ER participates in DNA replication

3. Which type of RNA is the most abundant in cells?

A. mRNA

B. tRNA

C. snRNA

D. rRNA

4. Covalent bonds on DNA connect which components to form the backbone?

A. The nitrogen bases across strands

B. The sugar to the base

C. The sugar of one nucleotide to the phosphate of the next nucleotide

D. The phosphate groups to the bases

5. What is the primary function of stomata in leaves?

A. To absorb sunlight

B. To regulate gas exchange (CO_2 in, O_2 out) and transpiration

C. To transport water from roots

D. To produce chlorophyll

6. During DNA replication, which enzyme unwinds the double helix by breaking hydrogen bonds?

A. DNA Polymerase.

B. Helicase.

C. Ligase.

D. Primase.

7. What does the fluid mosaic model describe about cellular membranes, and which molecules diffuse most readily?

A. The membrane is a phospholipid bilayer with embedded proteins and cholesterol; small nonpolar molecules diffuse most readily

B. The membrane is a static barrier that prevents all diffusion

C. The membrane is a phospholipid bilayer with embedded proteins and cholesterol; large polar molecules diffuse most readily

D. The membrane is a water-filled gel; ions diffuse fastest

8. Purines are which bases?

A. Bases with a single-ring structure

B. Adenine and Guanine

C. Thymine and Cytosine

D. Bases that pair with cytosine only

9. What is the function of Rubisco in the Calvin cycle?

A. It splits water to release oxygen.

B. It fixes CO_2 by carboxylating RuBP to produce 2 molecules of 3-PGA.

C. It converts $NADP^+$ to NADPH.

D. It transports electrons in the electron transport chain.

10. Which option describes the telomere concept in replication?

A. Telomeres code for essential genes

B. Telomeres are unaffected by replication

C. Telomeres are the origin of replication

D. Telomeres shorten with each replication

Answers

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

Explanations

1. During translation, what is formed by the amino acids carried by tRNA?

A. A ribosome catalyzes RNA synthesis.

B. The mRNA strand is degraded.

C. A polypeptide chain is formed.

D. Ribosomal RNA is released.

Translation builds a polypeptide chain. As the ribosome reads the mRNA, tRNA brings the corresponding amino acids and peptide bonds form between them, creating a growing chain that becomes a protein after folding. The other options describe events not produced by translation: RNA synthesis would be transcription, not the product of translating mRNA; mRNA isn't the direct product of translation (the product is a polypeptide); and ribosomal RNA isn't released as the outcome of this process.

2. Which statement best contrasts the rough endoplasmic reticulum with the smooth endoplasmic reticulum?

A. Rough ER has ribosomes and synthesizes secreted and membrane proteins; smooth ER lacks ribosomes and synthesizes lipids/detoxification

B. Rough ER lacks ribosomes and synthesizes lipids

C. Smooth ER has ribosomes and synthesizes secreted proteins

D. Rough ER participates in DNA replication

The difference in structure and function between the rough and smooth endoplasmic reticulum is what's being tested. The rough ER is studded with ribosomes, making it the site where proteins destined for secretion or for membranes are synthesized and folded, then processed as they enter the ER lumen or become part of the ER membrane. The smooth ER lacks ribosomes and thus does not synthesize proteins; instead it focuses on lipid production for membranes and on detoxification processes, such as metabolizing drugs and toxins—especially in liver cells. So, saying that the rough ER has ribosomes and makes secreted and membrane proteins, while the smooth ER lacks ribosomes and makes lipids and handles detoxification, captures the key contrast. The other statements misstate ribosome presence or the primary roles of each ER type, or note functions (like DNA replication) that aren't tied to ER activity.

3. Which type of RNA is the most abundant in cells?

A. mRNA

B. tRNA

C. snRNA

D. rRNA

Ribosomal RNA is the most abundant RNA in cells because it forms the core of ribosomes, the molecular machines that translate mRNA into proteins. Ribosomes are present in huge numbers to meet the demand for protein synthesis, and each ribosome contains multiple rRNA molecules that make up its structural and catalytic centers. Because of that immense demand, rRNA accounts for the majority of total cellular RNA across many cell types and conditions. mRNA, the templates that carry gene-specific instructions for protein production, is present in far fewer copies at any given time and fluctuates with gene expression. Transfer RNA is also essential for bringing amino acids to the ribosome and is relatively abundant, but it does not reach the same overall quantity as rRNA. Small nuclear RNA participates in RNA processing and is typically present in smaller amounts.

4. Covalent bonds on DNA connect which components to form the backbone?

A. The nitrogen bases across strands

B. The sugar to the base

C. The sugar of one nucleotide to the phosphate of the next nucleotide

D. The phosphate groups to the bases

DNA's backbone is the sugar-phosphate chain. Covalent phosphodiester bonds connect the deoxyribose sugar of one nucleotide to the phosphate group of the next nucleotide, creating a continuous sugar–phosphate backbone along each strand. This backbone runs the length of the molecule, while the nitrogenous bases extend inward and pair with the opposite strand via hydrogen bonds. So the covalent link that forms the backbone is between the sugar of one nucleotide and the phosphate of the next.

5. What is the primary function of stomata in leaves?

A. To absorb sunlight

B. To regulate gas exchange (CO_2 in, O_2 out) and transpiration

C. To transport water from roots

D. To produce chlorophyll

Stomata are openings on the leaf surface that primarily regulate gas exchange and water loss. Their main job is to control the movement of carbon dioxide into the leaf for photosynthesis and the release of oxygen, while also allowing water vapor to exit in a process called transpiration. Guard cells surrounding each stoma change shape to open or close the pore in response to light, CO_2 levels, humidity, and signals like drought stress, which helps balance photosynthetic needs with water conservation. When stomata are open, CO_2 diffuses into the leaf for fixation, and O_2 exits as a byproduct; transpiration helps pull water up from the roots through the xylem, aiding nutrient transport and temperature regulation. Absorbing sunlight happens in chloroplasts inside leaf cells, not through stomata; water transport from roots is done by the xylem; and chlorophyll is produced in chloroplasts, not in the stomata.

6. During DNA replication, which enzyme unwinds the double helix by breaking hydrogen bonds?

A. DNA Polymerase.

B. Helicase.

C. Ligase.

D. Primase.

Hydrogen bonds between base pairs hold the two DNA strands together, so unwinding during replication requires an enzyme that can break those bonds and separate the strands. This role is played by helicase, which uses energy from ATP to move along the DNA and pry apart the strands, forming the replication fork. Once the strands are open, other players take over: primase lays down RNA primers to start synthesis, DNA polymerase builds the new DNA, ligase seals nicks on the lagging strand, and single-strand binding proteins stabilize the exposed templates while topoisomerase relieves twisting tension. The other enzymes don't unwind the helix—polymerase makes DNA, ligase joins fragments, and primase provides primers.

7. What does the fluid mosaic model describe about cellular membranes, and which molecules diffuse most readily?

A. The membrane is a phospholipid bilayer with embedded proteins and cholesterol; small nonpolar molecules diffuse most readily

B. The membrane is a static barrier that prevents all diffusion

C. The membrane is a phospholipid bilayer with embedded proteins and cholesterol; large polar molecules diffuse most readily

D. The membrane is a water-filled gel; ions diffuse fastest

Cell membranes are dynamic, fluid mosaics made of a phospholipid bilayer with embedded proteins and cholesterol that can move laterally within the membrane. This fluid structure means the interior of the bilayer is hydrophobic, so molecules that are small and nonpolar diffuse through readily because they don't have to deal with a charged or polar barrier. Tiny nonpolar molecules like oxygen and carbon dioxide slip through the lipid core with ease, while larger polar molecules and ions face a steep barrier and usually need transport proteins or channels to cross. So describing the membrane as a phospholipid bilayer with embedded proteins and cholesterol, where small nonpolar molecules diffuse most readily, captures how membranes permit some diffusion while restricting others. The other ideas—viewing the membrane as a static barrier, a water-filled gel, or asserting that large polar molecules or ions diffuse fastest—don't align with how the membrane's structure and selective permeability actually work.

8. Purines are which bases?

A. Bases with a single-ring structure

B. Adenine and Guanine

C. Thymine and Cytosine

D. Bases that pair with cytosine only

Purines are nitrogenous bases with two-ring structures. The purines present in DNA and RNA are adenine and guanine. This two-ring setup distinguishes them from pyrimidines, which have a single ring and include cytosine, thymine, and uracil. In base pairing, purines pair with pyrimidines: adenine pairs with thymine (or uracil in RNA) and guanine pairs with cytosine. So adenine and guanine are the bases that are purines.

9. What is the function of Rubisco in the Calvin cycle?

A. It splits water to release oxygen.

B. It fixes CO_2 by carboxylating RuBP to produce 2 molecules of 3-PGA.

C. It converts NADP+ to NADPH.

D. It transports electrons in the electron transport chain.

Rubisco fixes carbon in the Calvin cycle by catalyzing the carboxylation of RuBP with CO_2. This reaction forms an unstable six carbon intermediate that immediately splits into two molecules of 3 phosphoglycerate (3 PGA). This step is how carbon from CO_2 enters the cycle, setting up the series of reactions that uses ATP and NADPH to convert 3 PGA into sugars. The other processes described belong to the light reactions: splitting water to release oxygen, the production of NADPH, and electron transport, which occur before the Calvin cycle begins. Rubisco is a carboxylase, and while it can also catalyze an oxygenation reaction under certain conditions, its role in the Calvin cycle is to fix CO_2 into RuBP to form 3 PGA.

10. Which option describes the telomere concept in replication?

A. Telomeres code for essential genes

B. Telomeres are unaffected by replication

C. Telomeres are the origin of replication

D. Telomeres shorten with each replication

The idea being tested is what happens to telomeres during cell division. On linear chromosomes, ends carry telomeres, which are repetitive, noncoding sequences that protect essential genes from erosion. DNA polymerase can only synthesize DNA in a 5′ to 3′ direction and cannot fully copy the very ends of chromosomes—the end-replication problem. Because of this, without a special solution, each round of replication trims the telomeres a little shorter. Over many divisions, telomeres shorten, contributing to a limit on cell divisions and to aging processes. Some cells express the enzyme telomerase, which can extend telomeres and counteract shortening, but in most somatic cells telomeres do shorten with each replication. This is why the correct statement is that telomeres shorten with each replication.

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://campbellbioconceptsconnections.examzify.com

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