Campbell Biology Concepts & Connections Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

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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

1. What is an anticodon?

A. On mRNA, the start codon

B. On rRNA, the anticodon matches tRNA

C. On DNA, a triplet that codes for an amino acid

D. On a tRNA molecule, a sequence of three nucleotides complementary to a codon on mRNA

2. Which type of RNA forms the core of ribosomes along with proteins?

A. rRNA.

B. mRNA.

C. tRNA.

D. DNA.

3. DNA stands for?

A. Ribonucleic acid

B. Deoxyribonucleic acid

C. Deoxyribose nucleic acid

D. Nucleic acid

4. Chargaff's rule states that which pairing relation holds in DNA?

A. A=T and C=G

B. A=T and C=A

C. A=C and T=G

D. A=G and C=T

5. Which enzyme synthesizes RNA by using a DNA template during transcription?

A. DNA Polymerase

B. Ligase

C. Helicase

D. RNA Polymerase

6. Which scientist discovered bacterial transformation?

- **A. Avery**
- **B. Bacteriophage**
- **C. Hershey-Chase**
- **D. Griffith**

7. In describing a base substitution mutation, which option shows a single nucleotide change?

- **A. Deletion**
- **B. Substitution**
- **C. Insertion**
- **D. Inversion**

8. In the described sickle cell mutation, which amino acid change occurs?

- **A. Glycine to Valine**
- **B. Valine to Glutamic acid**
- **C. Glutamic acid to Valine**
- **D. Leucine to Phenylalanine**

9. Which statement describes eukaryotic DNA?

- **A. Eukaryotic DNA consists of a single circular chromosome in the nucleus**
- **B. Eukaryotic DNA consists of many linear chromosomes in the nucleus**
- **C. Eukaryotic DNA replicates in the cytoplasm**
- **D. Eukaryotic DNA uses no replication bubbles**

10. Rosalind Franklin contributed to understanding DNA structure by:

- **A. James Watson**
- **B. Francis Crick**
- **C. Rosalind Franklin**
- **D. Linus Pauling**

Answers

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

Explanations

1. What is an anticodon?

A. On mRNA, the start codon

B. On rRNA, the anticodon matches tRNA

C. On DNA, a triplet that codes for an amino acid

D. On a tRNA molecule, a sequence of three nucleotides complementary to a codon on mRNA

An anticodon is a trio of nucleotides on a transfer RNA (tRNA) molecule that is complementary to a codon on messenger RNA (mRNA). During translation, this pairing ensures the tRNA brings the correct amino acid to the ribosome so the growing protein sequence is built accurately. The anticodon is located on the tRNA and is oriented antiparallel to the codon on mRNA, not on mRNA itself, nor on rRNA or DNA. The start codon, by contrast, is a specific codon on mRNA (usually AUG) that signals where translation begins, not the anticodon itself.

2. Which type of RNA forms the core of ribosomes along with proteins?

A. rRNA.

B. mRNA.

C. tRNA.

D. DNA.

Ribosomes are ribonucleoprotein machines built around RNA that provides both the structural framework and catalytic function. The RNA component forms the core of the ribosome, folding into the peptidyl transferase center that catalyzes peptide bond formation, while proteins surround and stabilize this core to support proper assembly and function. Other RNAs—mRNA, which carries the genetic code, and tRNA, which delivers amino acids—participate in translation but do not form the ribosome's central scaffold. DNA is not part of the ribosome.

3. DNA stands for?

A. Ribonucleic acid

B. Deoxyribonucleic acid

C. Deoxyribose nucleic acid

D. Nucleic acid

DNA stands for deoxyribonucleic acid. The name reveals its chemistry: "deoxy" means the sugar in its backbone lacks an oxygen atom at the 2' carbon, "ribo" refers to ribose—the five-carbon sugar used in nucleotides—though in DNA it is in the deoxy form, and "nucleic acid" places it in the family of molecules composed of nucleotides that store genetic information. The other options don't fit because RNA uses ribonucleic acid, not deoxyribonucleic; the standard term is "deoxyribonucleic acid" rather than "deoxyribose nucleic acid"; and simply "nucleic acid" is too general to specify DNA.

4. Chargaff's rule states that which pairing relation holds in DNA?

A. A=T and C=G

B. A=T and C=A

C. A=C and T=G

D. A=G and C=T

The concept being tested is that DNA base pairing is complementary, which makes the amounts of the paired bases equal across the molecule. In a double-stranded DNA molecule, adenine always pairs with thymine and cytosine always pairs with guanine. Because each A on one strand is matched with a T on the other, the total number of adenine bases equals thymine bases. Similarly, cytosine equals guanine. This pairing sets up the consistent width of the DNA helix and explains why Chargaff observed equal amounts of A and T, and equal amounts of C and G in most organisms. This rule specifically applies to DNA; RNA uses uracil instead of thymine, so the pairing pattern differs there.

5. Which enzyme synthesizes RNA by using a DNA template during transcription?

A. DNA Polymerase

B. Ligase

C. Helicase

D. RNA Polymerase

RNA polymerase is the enzyme that makes RNA using a DNA template during transcription. It binds to a promoter, temporarily unwinds the DNA, and then adds ribonucleotides to the growing RNA strand in the 5' to 3' direction, pairing bases with the DNA template (A with U in RNA, T with A, G with C, C with G). It doesn't require a primer, unlike DNA polymerase. This specificity for transcribing DNA into RNA is what sets RNA polymerase apart from the other enzymes listed, which have roles in DNA replication or repair rather than transcription.

6. Which scientist discovered bacterial transformation?

A. Avery

B. Bacteriophage

C. Hershey-Chase

D. Griffith

Transformation refers to the uptake of external DNA by a bacterium and the resulting heritable change in its traits. The major breakthrough showing that this phenomenon can occur in bacteria came from Frederick Griffith in 1928. In his experiment with Pneumococcus, he demonstrated that harmless bacteria could be converted into a virulent form when exposed to heat-killed virulent bacteria, implying the transfer of a heritable transforming substance. This established that genetic material could move between cells, even if the donor cells were no longer alive. Later work by Avery, MacLeod, and McCarty identified DNA as that transforming principle, and Hershey and Chase showed DNA is the genetic material in viruses, but the initial discovery of bacterial transformation is Griffith's.

7. In describing a base substitution mutation, which option shows a single nucleotide change?

A. Deletion

B. Substitution

C. Insertion

D. Inversion

Base substitution, also called a point mutation, involves replacing one nucleotide with a different one, keeping the DNA length the same. That single base swap is exactly what a base substitution describes. The other mutation types change either the number of nucleotides or the arrangement of a DNA segment: deletion removes bases, insertion adds bases, and inversion flips the orientation of a segment. Because they involve adding, removing, or reordering bases rather than just replacing one nucleotide, they are not single-nucleotide changes. For example, changing a codon from GCA to GTA is a substitution—a single base is changed.

8. In the described sickle cell mutation, which amino acid change occurs?

A. Glycine to Valine

B. Valine to Glutamic acid

C. Glutamic acid to Valine

D. Leucine to Phenylalanine

A single-nucleotide change in the beta-globin gene causes a missense mutation that alters one amino acid in the protein. In sickle cell disease, the sixth amino acid of beta-globin changes from glutamic acid, which is charged and water-loving, to valine, which is hydrophobic. This Glu-to-Val substitution changes how hemoglobin behaves, especially when oxygen levels are low, leading to polymerization and the characteristic sickling of red blood cells. That's why the correct description is Glutamic acid to Valine. The other possible substitutions would involve different amino acid changes and do not match the well-known sickle mutation.

9. Which statement describes eukaryotic DNA?

A. Eukaryotic DNA consists of a single circular chromosome in the nucleus

B. Eukaryotic DNA consists of many linear chromosomes in the nucleus

C. Eukaryotic DNA replicates in the cytoplasm

D. Eukaryotic DNA uses no replication bubbles

DNA in eukaryotes is organized into multiple linear chromosomes housed in a membrane-bound nucleus. This linear chromosome arrangement, wrapped with histones as chromatin, distinguishes eukaryotic genomes from prokaryotic ones, which typically have a single circular chromosome in an open region of the cell. Replication occurs in the nucleus and involves many origins of replication along the chromosomes, producing replication bubbles that expand as forks proceed in both directions. So the description that matches how eukaryotic DNA is structured is that it consists of many linear chromosomes in the nucleus.

10. Rosalind Franklin contributed to understanding DNA structure by:

A. James Watson

B. Francis Crick

C. Rosalind Franklin

D. Linus Pauling

Understanding DNA's shape comes from the evidence scientists gathered about its form. Rosalind Franklin used X-ray diffraction to image DNA fibers, producing clear patterns that reveal not just that DNA is helical, but specific details about its dimensions. Her images, especially the one known as Photo 51, showed an X-shaped pattern indicating a regular helix, and they helped scientists estimate a uniform diameter of about 2 nanometers and a repeating base-pair spacing of roughly 3.4 angstroms per rung. Those concrete measurements and the visible helicity provided crucial, concrete evidence that DNA is a double helix with specific geometry, which then guided the building of the correct model. So the contribution is that Franklin's diffraction data gave the essential structural evidence—the helical nature and dimensions—that made the double-helix model plausible. While Watson and Crick later constructed the actual model using that and other data, Franklin's experimental results were the key input that pointed to the helical structure and informed the correct arrangement of the two strands. Linus Pauling proposed an incorrect triple-helix idea, so his model did not match the true DNA structure.

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!