ARIZONA STATE UNIVERSITY (ASU) BIO 345 EVOLUTION EXAM 2 PRACTICE (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 long-term fate of a locus carrying two alleles, one with a fitness advantage, under natural selection?

A. Both alleles will persist indefinitely

B. The beneficial allele will be fixed

C. The detrimental allele will disappear

D. Neither allele will change

2. Which mechanism of evolution results in adaptation to the environment over time?

A. Genetic drift

B. Gene flow

C. Natural selection

D. Mutation

3. In what way can sexual selection lead to evolutionary change?

A. By reducing the number of offspring

B. Through the development of traits that improve mating success

C. By promoting traits that increase survival in harsh environments

D. By stabilizing population dynamics

4. Which locus is most likely to be in linkage disequilibrium with the mutation?

A. The one farthest from the mutation

B. The one closest to the star

C. Any randomly selected locus

D. The one in a different chromosome

5. What concept does gene flow refer to?

A. The transfer of genetic material between populations, altering allele frequencies

B. The mixing of alleles within a single population

C. The process of mutations occurring within a population

D. The survival of traits beneficial to the species over time

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6. What does evolution through adaptation typically result in?

A. Maintaining genetic diversity

B. Improvement in fitness related to an environment

C. Increased reproductive isolation

D. Decreasing organismal size

7. Which concept describes changes in species due to mate choice preferences?

A. Genetic drift

B. Sexual selection

C. Natural selection

D. Ecosystem succession

8. What is an example of altruism among prairie dogs?

A. Leaving a foraging area to find food

B. Giving up foraging to watch for predators

C. Sharing food with family

D. Taking risks to defend the group

9. Which of the following statements demonstrates a misconception about biological development?

A. Ontogeny recapitulates phylogeny

B. All developmental stages are crucial

C. Environmental influences shape development

D. Development shows variability among species

10. At which position in a codon are mutations most likely to be selectively neutral?

A. First position

B. Second position

C. Third position

D. None of the above

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Answers

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

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Explanations

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1. What is the long-term fate of a locus carrying two alleles, one with a fitness advantage, under natural selection?

A. Both alleles will persist indefinitely

B. The beneficial allele will be fixed

C. The detrimental allele will disappear

D. Neither allele will change

The long-term fate of a locus with two alleles, where one allele confers a fitness advantage, is that the beneficial allele will typically become fixed in the population. This process occurs due to the differential reproduction of individuals carrying the advantageous allele compared to those carrying the less fit allele. When natural selection favors one allele, individuals with that allele tend to have higher reproductive success. Over successive generations, this leads to an increase in the frequency of the beneficial allele within the population. As this allele continues to provide a fitness advantage, it will gradually replace the less advantageous allele until it becomes the only allele present at that locus in the population, a situation referred to as fixation. Fixation may not be immediate and can be influenced by various factors such as mutation, genetic drift, and gene flow, but under strong selection for the beneficial allele, the likelihood of its fixation increases significantly. Thus, the scenario where the beneficial allele is fixed accurately reflects the dynamics of evolution under natural selection.

2. Which mechanism of evolution results in adaptation to the environment over time?

A. Genetic drift

B. Gene flow

C. Natural selection

D. Mutation

Natural selection is the mechanism of evolution that leads to adaptation over time by favoring individuals with traits that enhance their survival and reproductive success in a given environment. When certain traits provide a benefit, such as improved camouflage, foraging efficiency, or resistance to disease, individuals possessing those traits are more likely to reproduce and pass on their advantageous genes to the next generation. Over time, these advantageous traits become more common in the population, leading to a gradual adaptation that aligns with the specific conditions of the environment. By contrast, genetic drift involves random changes in allele frequencies within a population, which can lead to the loss of genetic variation but does not necessarily drive adaptation. Gene flow refers to the movement of genes between populations, which can introduce new genetic material but may not directly result in adaptations specific to an environment. Mutation introduces new genetic variations, which can be beneficial, neutral, or harmful, but it is natural selection that acts upon these variations to produce adaptations over time. Therefore, natural selection is the critical process that shapes the evolution of species in relation to their environment.

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3. In what way can sexual selection lead to evolutionary change?

A. By reducing the number of offspring

B. Through the development of traits that improve mating success

C. By promoting traits that increase survival in harsh environments

D. By stabilizing population dynamics

Sexual selection can lead to evolutionary change primarily through the development of traits that improve mating success. This process occurs when certain individuals possess advantageous traits that make them more attractive to potential mates. Examples of such traits include vibrant colors, elaborate courtship displays, or more pronounced physical features. These traits can increase an individual's chances of reproduction, allowing them to pass on their genes to the next generation. Over time, as these favored traits become more common within the population, they can lead to significant changes in the species. This mechanism highlights the role of mate choice and competition in shaping evolutionary pathways, emphasizing that reproductive success, rather than survival alone, can drive the evolution of particular characteristics. Sexual selection thus acts as a powerful force in shaping animal behavior and morphology, contributing to the diversity of life we see today.

4. Which locus is most likely to be in linkage disequilibrium with the mutation?

A. The one farthest from the mutation

B. The one closest to the star

C. Any randomly selected locus

D. The one in a different chromosome

Linkage disequilibrium refers to a non-random association of alleles at two or more loci. When considering which locus is most likely to be in linkage disequilibrium with a mutation, the key factor is the physical proximity of the loci on a chromosome. The locus that is closest to the mutation is likely to be the one that is in linkage disequilibrium with it because alleles that are near each other on the same chromosome tend to be inherited together during meiosis. This is due to the reduced likelihood of recombination events occurring between closely situated loci. The closer two loci are to each other, the higher the probability that they will be inherited as a block, preserving the association between the alleles of those loci. In contrast, loci that are farther away from the mutation may experience more recombination, which can break down any linkage disequilibrium that may have existed. Furthermore, loci on different chromosomes are inherited independently according to Mendel's laws, meaning there is no direct linkage or association between them. Therefore, the locus closest to the mutation has the greatest likelihood of remaining in linkage disequilibrium with it.

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5. What concept does gene flow refer to?

A. The transfer of genetic material between populations, altering allele frequencies

B. The mixing of alleles within a single population

C. The process of mutations occurring within a population

D. The survival of traits beneficial to the species over time

Gene flow refers to the transfer of genetic material between different populations, which can lead to changes in allele frequencies within those populations. This process occurs when individuals migrate from one population to another and interbreed, introducing new alleles into the gene pool. As a result, gene flow can reduce genetic differentiation between populations, increase genetic diversity, and influence overall evolutionary dynamics. It plays a critical role in maintaining genetic connectivity among populations, which can be particularly important for the survival and adaptability of species. The other concepts listed relate to different aspects of population genetics and evolutionary mechanisms but do not accurately describe gene flow. The mixing of alleles within a single population pertains more to genetic drift or selective pressures rather than gene flow between distinct groups, while mutations are changes at the genetic level that occur within a population but do not involve the movement of genes. The survival of beneficial traits describes natural selection and is focused on the adaptation of species over time rather than the movement of alleles between populations.

6. What does evolution through adaptation typically result in?

A. Maintaining genetic diversity

B. Improvement in fitness related to an environment

C. Increased reproductive isolation

D. Decreasing organismal size

Evolution through adaptation primarily results in an improvement in fitness related to an environment. This process occurs when organisms with traits better suited to their environment have a higher likelihood of surviving and reproducing. Over time, these advantageous traits become more common in the population, leading to a greater overall fitness for that group in the specific environmental context. Adaptation involves natural selection, where individuals with favorable traits are selected for, thereby increasing their reproductive success. This concept illustrates how organisms become better equipped to thrive within their ecological niches, whether through physical changes, behavioral adjustments, or physiological enhancements. The focus is on how these adaptations enhance survival and reproduction, emphasizing the connection between environmental pressures and the evolution of traits that promote fitness. While maintaining genetic diversity, increasing reproductive isolation, and changes in organismal size can all play roles in evolutionary processes, they do not directly capture the essence of adaptation's primary outcome, which is the enhancement of fitness in response to environmental challenges.

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7. Which concept describes changes in species due to mate choice preferences?

A. Genetic drift

B. Sexual selection

C. Natural selection

D. Ecosystem succession

The concept that describes changes in species due to mate choice preferences is sexual selection. Sexual selection occurs when individuals with certain traits are favored in the mating process, leading to those traits becoming more prevalent in the population over generations. This process can manifest in various forms, including the development of elaborate secondary sexual characteristics, such as bright plumage in birds or large antlers in deer, which serve to attract mates. Mate choice preferences can lead to a divergence in populations, as individuals select mates based on specific traits, resulting in the reinforcement of those traits through reproductive success. This phenomenon fundamentally shapes the evolution of species by influencing gene frequency through selective mating, distinguishing it from other processes such as genetic drift (random changes in allele frequencies) or natural selection (survival of the fittest based on environmental pressures). Ecosystem succession refers to the gradual process of change in species composition in a given area over time and does not pertain specifically to mate choice.

8. What is an example of altruism among prairie dogs?

A. Leaving a foraging area to find food

B. Giving up foraging to watch for predators

C. Sharing food with family

D. Taking risks to defend the group

An example of altruism among prairie dogs is the behavior of giving up foraging to watch for predators. This behavior illustrates altruism because the prairie dog sacrificing its own chance to gather food is actively helping the group by providing a lookout. This type of vigilance benefits the whole colony, as it enhances the survival chances of others by alerting them to the presence of predators. Such selfless acts, where an individual prioritizes the safety of others over its own immediate needs, exemplify altruistic behavior in a social species. By having individuals engage in sentinel behavior, prairie dogs increase the collective security of their community, reinforcing the idea of cooperation and mutual benefit in the context of evolution.

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9. Which of the following statements demonstrates a misconception about biological development?

A. Ontogeny recapitulates phylogeny

B. All developmental stages are crucial

C. Environmental influences shape development

D. Development shows variability among species

The statement "Ontogeny recapitulates phylogeny" reflects a historical perspective on development, originally proposed by German zoologist Ernst Haeckel in the 19th century. This concept suggests that the development of an organism (ontogeny) goes through stages that resemble the adult forms of its evolutionary ancestors (phylogeny), inferring a direct relationship between evolutionary history and embryonic development. However, this idea is a misconception because it simplifies and misrepresents the complexities of both biological development and evolutionary processes. Modern biology recognizes that while there are some connections between the two, ontogeny does not literally recapitulate phylogeny. Instead, developmental processes are influenced by a combination of genetic, environmental, and evolutionary factors, leading to unique developmental pathways that do not strictly follow the sequence of evolutionary events. In contrast, the other statements highlight fundamental concepts recognized in biology: the significance of all developmental stages, the impact of environmental factors on development, and the variability in developmental processes among different species—all of which align with current scientific understanding.

10. At which position in a codon are mutations most likely to be selectively neutral?

A. First position

B. Second position

C. Third position

D. None of the above

Mutations are most likely to be selectively neutral at the third position of a codon due to the properties of the genetic code and the phenomenon known as codon degeneracy. Each codon, which consists of three nucleotides, corresponds to a specific amino acid or a stop signal during protein synthesis. The genetic code is often described as being redundant or degenerate, meaning that several different codons can code for the same amino acid. At the third position of a codon, changes in nucleotide sequence frequently do not lead to a change in the amino acid that is incorporated into the protein. This is because multiple codons can encode the same amino acid, and substitutions or mutations that occur at this position are less likely to affect the overall function of the protein. Thus, mutations here are less likely to be harmful or advantageous, rendering them selectively neutral. In contrast, mutations at the first or second positions of a codon are more likely to result in a different amino acid being incorporated into the protein, which can significantly impact the structure and function of the resultant protein. This change can lead to a fitness consequence, making these mutations less likely to be neutral. Consequently, the third position is recognized as the most common site for selectively neutral mutations in the

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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://asu-bio345exam2.examzify.com

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

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