Arizona State University (ASU) BIO345 Evolution Exam 1 Practice (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 would increase the rate of evolution in a population?

- **A. Low mutation rate**
- **B. Large selection coefficient**
- **C. Long generation time**
- **D. Lack of heritability of a trait**

2. What does molecular phylogenetics utilize to infer evolutionary relationships?

- **A. Physical characteristics of fossils**
- **B. DNA sequences from various species**
- **C. Geological records of earth movements**
- **D. Behavioral traits observed in living species**

3. How does interbreeding between black and white mice affect allelic diversity in an environment favoring white mice?

- **A. Diversity decreases as black mice are less suited.**
- **B. Diversity remains unchanged as both types adapt.**
- **C. Diversity increases due to the introduction of new alleles.**
- **D. Diversity remains constant as all black mice perish.**

4. Which of the following is most closely associated with speciation?

- **A. Stabilizing selection**
- **B. Directional selection**
- **C. Disruptive selection**
- **D. Sexual selection**

5. What is coevolution?

- **A. Evolution of a single species over time**
- **B. When two or more species influence each other's evolution**
- **C. The process of extinction of species**
- **D. A method of natural selection**

6. What defines a derived character in evolutionary biology?

- **A. A character that is similar to another character**
- **B. A character that is a copy of another character**
- **C. A new character that evolved on a lineage**
- **D. The ancestral**

7. What is the definition of evolution in a biological context?

- **A. The change in heritable characteristics of individual organisms over their lifetime**
- **B. The change in heritable characteristics of biological populations over successive generations**
- **C. The introduction of new species into an ecosystem**
- **D. The extinction of species in a specific environment**

8. Which type of selection reduces phenotypic variance by favoring individuals near the population's mean?

- **A. Stabilizing Selection**
- **B. Disruptive Selection**
- **C. Correlational Selection**
- **D. Directional Selection**

9. How does comparative anatomy support the theory of evolution?

- **A. By showing that all species have the same anatomical structure**
- **B. By demonstrating evolutionary history through homologous structures**
- **C. By illustrating the functional differences among species**
- **D. By focusing solely on extinct species**

10. How does polygenic inheritance contribute to evolution?

- **A. By reducing the number of contributing genes to a trait**
- **B. By creating continuous variation that can be acted upon by natural selection**
- **C. By limiting genetic diversity in a population**
- **D. By promoting isolated traits within a species**

Answers

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

Explanations

1. What would increase the rate of evolution in a population?

A. Low mutation rate

B. Large selection coefficient

C. Long generation time

D. Lack of heritability of a trait

The selection coefficient measures the strength of natural selection acting on a particular trait. A large selection coefficient indicates that individuals with a certain trait have a significantly higher or lower fitness compared to others. When the selection coefficient is large, the differences in survival and reproduction rates among individuals in the population become pronounced. This enhances the effectiveness of natural selection, allowing beneficial traits to spread more rapidly through the gene pool. Consequently, a higher selection pressure accelerates the adaptation process, leading to an increased rate of evolution. In contrast, a low mutation rate would slow the introduction of new genetic variation into the population, hindering potential evolutionary changes. Long generation times can also reduce the rate of evolution since fewer generations occur in a given timeframe, resulting in slower accumulation of changes. Lastly, if a trait lacks heritability, it cannot be passed down to offspring, making it impossible for natural selection to favor or disfavor that trait across generations. Each of these factors can limit the rate at which a population evolves, reinforcing the importance of a large selection coefficient in driving evolutionary change.

2. What does molecular phylogenetics utilize to infer evolutionary relationships?

A. Physical characteristics of fossils

B. DNA sequences from various species

C. Geological records of earth movements

D. Behavioral traits observed in living species

Molecular phylogenetics uses DNA sequences from various species as the primary data to infer evolutionary relationships. This approach relies on comparing the genetic material—nucleotides and genes—across different organisms to determine how closely related they are and to construct trees that depict their evolutionary histories. The advantage of using molecular data is its ability to provide precise genetic information, allowing scientists to track changes over time at a molecular level that may correspond to divergence events in their evolutionary paths. This method can reveal relationships that may not be evident through morphological analyses alone, as DNA can sometimes indicate connections that have altered due to environmental changes or adaptive traits. In summary, the focus on DNA sequences enables a rigorous quantification of genetic similarity and divergence, resulting in robust hypotheses about the evolutionary connections among species.

3. How does interbreeding between black and white mice affect allelic diversity in an environment favoring white mice?

A. Diversity decreases as black mice are less suited.

B. Diversity remains unchanged as both types adapt.

C. Diversity increases due to the introduction of new alleles.

D. Diversity remains constant as all black mice perish.

Interbreeding between black and white mice can lead to an increase in allelic diversity in a population, particularly when the environment favors white mice. This occurs because the mixing of alleles from two different color variants—black and white—can introduce new genetic material into the gene pool. The resulting offspring from interbreeding may carry a combination of alleles from both parents, which can enhance genetic variation within the population. In environments where selection pressures favor white mice, the black mice might not survive as well, but their alleles still contribute to the overall genetic diversity of the population. The presence of these alleles—despite the lower survival rate of the black mice—can increase the adaptive potential of the population in varying environmental conditions. Hence, interbreeding doesn't just reinforce the traits favored by natural selection; it can also provide valuable genetic resources that might be beneficial if environmental conditions change. Furthermore, this increase in allelic diversity can offer the population resilience against diseases or changes in the environment, allowing for better chances of survival in the long run. This understanding of genetic variation is vital in evolutionary biology as it illustrates how gene flow between different morphs can influence the overall genetic composition of a species, leading to increased adaptive potential.

4. Which of the following is most closely associated with speciation?

A. Stabilizing selection

B. Directional selection

C. Disruptive selection

D. Sexual selection

Disruptive selection is closely associated with speciation because it favors extreme phenotypes at both ends of the spectrum, rather than the average phenotype. This type of selection can lead to increased variability within a population, making it more likely for different subpopulations to adapt to differing environmental conditions and potentially lead to reproductive isolation. Over time, these changes can result in the emergence of new species as the extremes diverge from one another, reducing gene flow between the groups. In contrast, stabilizing selection tends to favor intermediate phenotypes and reduces variation, which may inhibit the process of speciation. Directional selection favors one extreme phenotype over others, which can lead to adaptation in a single direction but does not necessarily promote divergence necessary for speciation. Sexual selection focuses on traits that improve mating success, which may influence reproductive isolation and mating preferences but does not directly contribute to speciation as strongly as disruptive selection does.

5. What is coevolution?

A. Evolution of a single species over time

B. When two or more species influence each other's evolution

C. The process of extinction of species

D. A method of natural selection

Coevolution refers to the process where two or more species interact in such a way that they influence each other's evolutionary trajectories. This mutual influence can occur through various forms of interaction, such as predation, competition, parasitism, or mutualism. For instance, when a predator evolves new hunting strategies, its prey may concurrently evolve better defense mechanisms. This dynamic interaction between the species creates a co-dependent evolutionary relationship, leading to adaptations that are shaped by one another's presence and behaviors. This concept is critical in understanding ecological relationships and how species adapt over time in response to one another. The intricate balance of these interactions often leads to increased biodiversity and the development of specialized traits that enhance survival and reproduction. Coevolution is a central theme in evolutionary biology because it exemplifies the interconnectedness of life and how changes in one species can have far-reaching effects on others within the ecosystem.

6. What defines a derived character in evolutionary biology?

A. A character that is similar to another character

B. A character that is a copy of another character

C. A new character that evolved on a lineage

D. The ancestral

A derived character in evolutionary biology refers to a feature that has evolved and is distinguishing within a specific lineage, setting it apart from the ancestor from which it descended. This concept is essential in the study of phylogenetics, the branch of biology that deals with the evolutionary history and relationships among individuals or groups of organisms. When considering what defines a derived character, it is crucial to understand that such characters arise after a divergence point in evolutionary time. They represent adaptations or traits that have been modified from the ancestral form as species evolve to meet new environmental challenges or to adapt to different niches. This distinction highlights the evolutionary changes that have occurred over time, enabling scientists to classify organisms into lineages based on shared derived characteristics, also known as synapomorphies. This understanding is foundational in constructing evolutionary trees, or phylogenies, which visually depict how different species are related through their evolutionary history, based on both derived and ancestral characters. This helps in identifying evolutionary relationships and lineage-based speciation events, which are central concepts in evolutionary biology.

7. What is the definition of evolution in a biological context?

A. The change in heritable characteristics of individual organisms over their lifetime

B. The change in heritable characteristics of biological populations over successive generations

C. The introduction of new species into an ecosystem

D. The extinction of species in a specific environment

In a biological context, evolution is defined as the change in heritable characteristics of biological populations over successive generations. This definition underscores that evolution is not about individual organisms changing during their lifetimes, but rather about the genetic changes that occur within populations over time. These changes can lead to the adaptation of populations to their environment, speciation, and the development of biodiversity. The focus on populations emphasizes the role of genetic variation, natural selection, mutation, and genetic drift as mechanisms driving evolutionary change. By understanding evolution in this way, it becomes clear that it is a gradual process that unfolds over many generations, influencing the traits present in a population and potentially leading to new species. This definition effectively captures the essence of evolutionary theory, which is central to understanding the dynamics of life on Earth and the relationships between species.

8. Which type of selection reduces phenotypic variance by favoring individuals near the population's mean?

A. Stabilizing Selection

B. Disruptive Selection

C. Correlational Selection

D. Directional Selection

Stabilizing selection is a process that favors the average individuals in a population, thereby reducing the phenotypic variance. This type of natural selection occurs when environmental pressures favor the intermediate traits, leading to a decline in the frequency of extreme phenotypes. For example, in terms of human birth weight, infants of average weight have higher survival rates than those who are very small or very large. As a result, stabilizing selection maintains the status quo of traits within the population by acting against individuals at both extremes, ultimately promoting the traits that are best adapted to the environment while minimizing variation around the mean.

9. How does comparative anatomy support the theory of evolution?

A. By showing that all species have the same anatomical structure

B. By demonstrating evolutionary history through homologous structures

C. By illustrating the functional differences among species

D. By focusing solely on extinct species

Comparative anatomy supports the theory of evolution primarily through the demonstration of evolutionary history via homologous structures. Homologous structures are anatomical features that share a common ancestry but may serve different functions across various species. For example, the forelimbs of mammals, birds, and reptiles exhibit similar bone structures, indicating that these species evolved from a common ancestor. This similarity in structure, despite variations in functionality—such as a human arm, a whale's flipper, and a bat's wing—provides compelling evidence of how evolutionary processes can lead to diversification in form and function while retaining underlying anatomical traits from a shared lineage. By analyzing such homologous structures, scientists can trace evolutionary lineages and better understand the relationships among different species, which is a core principle in the study of evolution. This comparative approach allows researchers to infer patterns of descent, examine the mechanisms of natural selection, and explore the adaptive changes that occur over time. Therefore, the presence of homologous structures serves as a significant testament to the shared evolutionary heritage of life on Earth.

10. How does polygenic inheritance contribute to evolution?

A. By reducing the number of contributing genes to a trait

B. By creating continuous variation that can be acted upon by natural selection

C. By limiting genetic diversity in a population

D. By promoting isolated traits within a species

Polygenic inheritance plays a significant role in evolution by creating continuous variation in traits, which is crucial for the process of natural selection. In polygenic inheritance, multiple genes contribute to a single trait, resulting in a smooth distribution of phenotypes rather than distinct categories. This continuous variation allows populations to exhibit a range of traits, such as height or skin color, which can be advantageous for survival and reproduction in changing environments. Natural selection acts more effectively on traits that show a range of variation. When individuals in a population possess different phenotypes, selection can favor certain variations over others, ultimately leading to changes in allele frequencies over time. This dynamic process can enhance a population's ability to adapt to environmental pressures, drive speciation, and shape the evolutionary trajectory of a species. Therefore, polygenic inheritance facilitates the raw material that natural selection can work with, asserting its vital contribution to the evolutionary process.

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-bio345exam1.examzify.com

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