NCEA Level 3 Biology – Human Evolution (AS91606) Practice Exam (Sample)

Study Guide

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Questions

1. What does genetic drift refer to in the context of human evolution?

A. Selective breeding of desired traits

B. The random change in allele frequencies

C. The impact of environmental pressures on a population

D. The deliberate modification of DNA

2. What is the relationship between brain size and social complexity in hominins?

A. Smaller brains support more complex social structures

B. Larger brain sizes correlate with more intricate social relationships

C. There is no correlation between brain size and social complexity

D. Brain size affects physical strength rather than social structure

3. Which of the following represents a significant adaptation for bipedalism?

A. Narrow pelvis

B. Bowl-shaped pelvis

C. Longer arms than legs

D. Forward-facing eyes

4. What term describes populations that foraged wild plant foods and actively hunted animals?

A. Settled Farmers

B. Nomadic Foragers

C. Early Farmers

D. Pastoralists

5. How do environmental pressures shape human evolution?

A. They have little effect on evolution

B. They drive adaptations influencing development

C. They slow down the evolutionary process

D. They only affect physical characteristics

6. What role does the FOXP2 gene play in human evolution?

A. It is linked to physical endurance

B. It is associated with vision adaptations

C. It is involved in speech and language development

D. It regulates metabolic functions

7. What does evidence from burial practices indicate about cognitive complexity in early humans?

A. They lacked any form of social structure

B. They demonstrated understanding of life's finality

C. They were focused solely on survival behaviors

D. They ignored cultural expressions

8. Which adaptation was crucial for Homo neanderthalensis in glacial climates?

A. A small nose to minimize heat loss

B. A large nose to warm cold air

C. A smaller body size for agility

D. A reliance on gathering over hunting

9. What adaptations did Neanderthals exhibit for their environment?

A. Large brains for complex thinking

B. Robust bodies and a large nose for warmth

C. Advanced social communication skills

D. Enhanced eyesight for hunting

10. What is one way that cultural practices influenced early human communities?

A. They created environmental changes

B. They established social rules and roles

C. They restricted tool use

D. They affected migration patterns

Answers

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

Explanations

1. What does genetic drift refer to in the context of human evolution?

A. Selective breeding of desired traits

B. The random change in allele frequencies

C. The impact of environmental pressures on a population

D. The deliberate modification of DNA

Genetic drift refers to the random change in allele frequencies within a population over time due to chance events. This mechanism is particularly significant in small populations where random events can lead to large fluctuations in allele frequencies, thus affecting the genetic diversity of the population. As certain alleles may increase or decrease purely by chance rather than by selection pressure, genetic drift can lead to differences between populations and contribute to the evolutionary process. In the context of human evolution, genetic drift can explain why certain traits may become more or less common in isolated populations. Unlike selection, which favors traits that provide an advantage for survival or reproduction, genetic drift is not directional; it is entirely influenced by random changes, which can lead to unexpected outcomes in genetic traits. This randomness can have profound effects on the course of evolution, especially in small groups where the effects of drift can be magnified. Understanding genetic drift is crucial in proving how human populations can diverge genetically over time.

2. What is the relationship between brain size and social complexity in hominins?

A. Smaller brains support more complex social structures

B. Larger brain sizes correlate with more intricate social relationships

C. There is no correlation between brain size and social complexity

D. Brain size affects physical strength rather than social structure

The relationship between brain size and social complexity in hominins is best illustrated by the correlation where larger brain sizes are associated with more intricate social relationships. This connection is rooted in the idea that as hominins evolved, the demands of living in complex social groups led to greater cognitive abilities, which are often reflected in larger brain volumes. Larger brains provide increased capacity for processing information, problem-solving, and managing social interactions, which are key components of navigating complex social dynamics. For instance, species such as Homo sapiens exhibit significant social behaviors that involve communication, cooperation, and understanding social hierarchies, suggesting that our larger brain size has facilitated these developments. Therefore, the evidence points toward a positive relationship between brain size and the ability to engage in sophisticated social structures, reflecting the evolutionary pressures that shaped our cognitive traits.

3. Which of the following represents a significant adaptation for bipedalism?

A. Narrow pelvis

B. Bowl-shaped pelvis

C. Longer arms than legs

D. Forward-facing eyes

The bowl-shaped pelvis is a significant adaptation for bipedalism because it provides a stable base for the upper body, facilitating efficient upright walking. In species that walk on two legs, particularly humans, the shape of the pelvis supports the alignment of the legs under the body's center of gravity. This adaptation reduces the energy expenditure required for locomotion and enhances balance during upright movement, allowing for more efficient stride and stability when walking or running. A narrow pelvis would not effectively support bipedal locomotion as it could compromise balance and stability. Longer arms than legs would indicate a design more suited for locomotion in trees rather than on the ground. Forward-facing eyes contribute to depth perception and visual fields but are not specifically an adaptation directly related to the mechanics of bipedal walking. The bowl-shaped pelvis, on the other hand, is crucial for supporting the unique biomechanical requirements of bipedalism in human evolution.

4. What term describes populations that foraged wild plant foods and actively hunted animals?

A. Settled Farmers

B. Nomadic Foragers

C. Early Farmers

D. Pastoralists

The term that describes populations that foraged wild plant foods and actively hunted animals is "Nomadic Foragers." This designation reflects a lifestyle characterized by a reliance on gathering and hunting, rather than agriculture or settled farming. Nomadic foragers moved frequently in search of food sources, which enabled them to exploit a variety of ecosystems. This adaptability was essential for survival in environments where food availability fluctuated. Their diet was diverse, consisting of fruits, nuts, seeds, and various animal species, which they hunted using tools and cooperative strategies. In contrast, the other choices relate to different ways of subsisting. Settled farmers are those who cultivate crops and often remain in one geographic location for extended periods. Early farmers transitioned from foraging to agriculture, significantly affecting their lifestyle and community structure. Pastoralists primarily focus on herding and raising livestock rather than hunting or gathering wild resources. Therefore, "Nomadic Foragers" accurately captures the essence of populations engaged in both foraging and hunting as their primary means of subsistence.

5. How do environmental pressures shape human evolution?

A. They have little effect on evolution

B. They drive adaptations influencing development

C. They slow down the evolutionary process

D. They only affect physical characteristics

Environmental pressures play a crucial role in shaping human evolution by driving adaptations that influence development and survival. When populations face varying conditions such as climate change, food availability, disease, and habitat alterations, individuals within those populations that possess traits better suited to those conditions are more likely to survive and reproduce. This process, known as natural selection, leads to the gradual shift in traits over generations. For instance, in response to climate, humans have developed varying skin pigmentation, which is an adaptation to different levels of UV radiation. In areas with high UV exposure, darker skin protects against damage, while lighter skin in lower UV areas allows for better vitamin D synthesis. These adaptations illustrate how environmental pressures can lead to significant changes in human physiology and behavior over time. In contrast, the other options do not accurately reflect the comprehensive influence of environmental pressures on human evolution. Some suggest that environmental factors have minimal impact or focus only on physical characteristics, which disregards the complexity of evolution, where behavioral and psychological adaptations also play significant roles.

6. What role does the FOXP2 gene play in human evolution?

A. It is linked to physical endurance

B. It is associated with vision adaptations

C. It is involved in speech and language development

D. It regulates metabolic functions

The FOXP2 gene is crucial for the development of speech and language in humans. It encodes a transcription factor that influences neuronal development in an area of the brain that is important for the coordination of movements needed for speech. Research has shown that alterations in this gene can lead to language impairments, underscoring its specific role in facilitating the complex motor skills involved in human communication. The importance of FOXP2 in the context of human evolution also highlights how changes in this gene may have contributed to the cognitive abilities that enable language, setting humans apart from other species. This suggests that the development and use of language are pivotal in the advancement of human societies and cultures, reinforcing the idea that FOXP2 has played a significant role in shaping human evolutionary history. The other options refer to unrelated functions of biological genes; they do not connect to the specific role of FOXP2 in language and speech development.

7. What does evidence from burial practices indicate about cognitive complexity in early humans?

A. They lacked any form of social structure

B. They demonstrated understanding of life's finality

C. They were focused solely on survival behaviors

D. They ignored cultural expressions

Evidence from burial practices in early humans points to a sophisticated understanding of life and death, particularly the concept of life's finality. The act of burying the dead often suggests that early humans recognized a separation between the living and the deceased, indicating that they might have contemplated the significance of mortality. This behavior also reflects cognitive complexity, as it requires a level of abstract thinking and cultural expression beyond basic survival instincts. Burial practices can involve rituals, the use of grave goods, or specific placement of the body, all of which imply that these early humans engaged with their cultural beliefs and possibly even spiritual considerations regarding death and the afterlife. Such practices point towards a social structure that includes shared beliefs, values, and possibly even a community's understanding of human existence and its transient nature. Therefore, interpreting burial practices as evidence of awareness about mortality aligns with the recognition of cognitive abilities that extend beyond mere survival activities.

8. Which adaptation was crucial for Homo neanderthalensis in glacial climates?

A. A small nose to minimize heat loss

B. A large nose to warm cold air

C. A smaller body size for agility

D. A reliance on gathering over hunting

The adaptation that was crucial for Homo neanderthalensis in glacial climates is a large nose to warm cold air. In extremely cold environments, having a larger nasal cavity can be advantageous because it allows for a greater surface area to warm the frigid air inhaled. This adaptation is significant as it helps to prevent cold air from cooling the lungs and causing respiratory issues, which would be vital for survival in harsh climates. The larger nose not only aids in warming the air but can also enhance moisture retention, preventing the airways from drying out, which is essential when living in glacial and arid environments. This is particularly important for Neanderthals, who were well adapted to life in Ice Age Europe and needed efficient ways to regulate their body temperature and maintain respiratory efficiency while dealing with extreme cold. Their robust body structure, which includes a wider nasal aperture, suggests that they had adaptations that specifically propelled their ability to thrive in such conditions.

9. What adaptations did Neanderthals exhibit for their environment?

A. Large brains for complex thinking

B. Robust bodies and a large nose for warmth

C. Advanced social communication skills

D. Enhanced eyesight for hunting

Neanderthals exhibited robust bodies and a large nose as adaptations to their cold, harsh environments. Their physical build was stocky and muscular, which likely helped to conserve heat — a crucial adaptation for survival in the frigid climates they inhabited during the Ice Age. The large nasal passages of Neanderthals are believed to have played a significant role in warming and humidifying the cold, dry air they breathed, further aiding their capacity to thrive in such challenging conditions. This combination of physical traits facilitated their ability to withstand lower temperatures and contributed to their overall survival strategies in the Pleistocene epoch.

10. What is one way that cultural practices influenced early human communities?

A. They created environmental changes

B. They established social rules and roles

C. They restricted tool use

D. They affected migration patterns

Cultural practices had a profound impact on early human communities by establishing social rules and roles. These social structures governed how individuals interacted with each other, determining responsibilities, power dynamics, and collaboration within groups. For example, cultural norms could dictate who hunted, who gathered, and how tasks were divided among members of a community. This organization would foster cooperation and cohesion, which were vital for survival in challenging environments. While other options may also have some relevance to early human communities, they do not primarily highlight the direct influence of culture in establishing a framework for social interaction and community structure that is evident in B.