NCEA Level 3 Biology – Plant and Animal Responses (AS91602) Practice Exam (Sample)

Study Guide

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Questions

1. What is the term for the regulation of flowering due to a chilling period?

A. Circadian Rhythm

B. Vernalisation

C. Succession

D. Auxin

2. What is the significance of biodiversity in ecosystems?

A. It reduces competition among species

B. It contributes to ecosystem resilience and productivity

C. It simplifies ecological interactions

D. It limits the number of organisms in a habitat

3. Which type of relationship is characterized by one species benefiting while the other is not affected?

A. Commensalism

B. Mutualism

C. Predation

D. Competition

4. What aspect of orthokinesis is particularly significant?

A. Random movement based on food availability

B. Speed of movement tied to stimulus intensity

C. Turning behavior over distances

D. Directional movement toward a target

5. Which type of navigation is associated with using the magnetic field of the Earth?

A. Stellar navigation

B. Optical navigation

C. Magnetic navigation

D. Solar navigation

6. How do gibberellins affect plant growth?

A. By promoting leaf color changes

B. By affecting stem elongation and seed germination

C. By increasing flower size

D. By enhancing seed storage

7. What term describes the internal control system that regulates natural cycles in organisms?

A. Chrono clock

B. Biological clock

C. Circadian clock

D. Neuro clock

8. What term refers to the adaptive resemblance between unrelated species?

A. convergence

B. mimicry

C. adaptation

D. mutualism

9. Which behavior is characterized by an animal defending its territory?

A. Foraging

B. Migratory behavior

C. Territoriality

D. Parental investment

10. What is the process called when an organism's free-running cycle is altered to align with a different rhythm?

A. Synchronization

B. Phase shifting

C. Entrainment

D. Regulation

Answers

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

Explanations

1. What is the term for the regulation of flowering due to a chilling period?

A. Circadian Rhythm

B. Vernalisation

C. Succession

D. Auxin

The regulation of flowering due to a chilling period is called vernalisation. This process involves exposure to low temperatures for a specific period, which is essential for certain plants to transition from the vegetative phase to the flowering phase. Vernalisation is particularly important for biennial plants, which require this chilling period to effectively initiate flowering in response to changing environmental conditions. During vernalisation, changes occur at the genetic and biochemical levels that enable the plant to break dormancy and prepare for reproductive development. This response ensures that flowering occurs at the optimal time of year for successful pollination and seed production, often in spring when conditions are more favorable for growth. In contrast, other terms such as circadian rhythm relate to biological processes governed by the internal clock of organisms, while succession refers to ecological changes in ecosystems over time. Auxin is a plant hormone involved in various growth processes but does not specifically regulate flowering through chilling.

2. What is the significance of biodiversity in ecosystems?

A. It reduces competition among species

B. It contributes to ecosystem resilience and productivity

C. It simplifies ecological interactions

D. It limits the number of organisms in a habitat

Biodiversity plays a crucial role in enhancing both the resilience and productivity of ecosystems. High biodiversity ensures a variety of species are present, which leads to a wider array of interactions and relationships within an ecosystem. This variety allows ecosystems to better withstand disturbances, such as diseases, climate change, or human impacts, because some species can fill in roles left vacant by those affected. Additionally, a diverse range of species contributes to ecosystem productivity by enabling efficient resource use. For example, different plants can utilize sunlight, water, and nutrients in complementary ways, leading to higher overall biomass and greater food availability. Higher biodiversity also promotes genetic variety within species, which can enhance their adaptability to changing conditions. In contrast, the other choices do not accurately reflect the benefits of biodiversity. While reducing competition may occur in some contexts, it is not a defining factor of biodiversity's significance. Simplifying ecological interactions is counterproductive, as complex interactions contribute to ecosystem health. Limiting the number of organisms in a habitat contradicts the very essence of biodiversity as it encourages a greater variety of life. Thus, the correct answer captures the essential role of biodiversity in maintaining healthy, functioning ecosystems.

3. Which type of relationship is characterized by one species benefiting while the other is not affected?

A. Commensalism

B. Mutualism

C. Predation

D. Competition

The correct answer reflects a relationship known as commensalism, which is a specific type of interaction between two species. In commensalism, one organism benefits from the relationship, while the other species is neither helped nor harmed. This relationship can be illustrated with examples such as barnacles attaching to a whale; the barnacles gain a mode of transportation and access to food, while the whale is largely unaffected by their presence. In contrast, mutualism involves both species benefiting from the interaction, such as bees pollinating flowers while feeding on nectar. Predation is based on one organism benefiting (the predator) at the expense of another (the prey). Competition arises when two species vie for the same resources, which can be detrimental to both parties involved. Understanding these interactions helps to clarify the varied relationships species can have within an ecosystem.

4. What aspect of orthokinesis is particularly significant?

A. Random movement based on food availability

B. Speed of movement tied to stimulus intensity

C. Turning behavior over distances

D. Directional movement toward a target

The significance of speed of movement being tied to stimulus intensity in orthokinesis highlights a crucial adaptive behavior in organisms. Orthokinesis refers to a type of movement where the speed of an organism is influenced by the intensity of a stimulus in its environment. For instance, when an organism encounters a higher concentration of food, it tends to move more quickly, allowing it to exploit resources effectively. This mechanism enhances survival by optimizing foraging efficiency, especially in environments where resources are patchy or unevenly distributed. In contrast, other options such as random movement based on food availability or turning behavior over distances do not capture the core focus of orthokinesis, which is specifically about the relationship between movement speed and stimulus intensity rather than directional specificity or randomness in movement. Directional movement toward a target pertains more to taxis, where organisms move in response to a specific directional stimulus, rather than adjusting speed based on stimulus intensity.

5. Which type of navigation is associated with using the magnetic field of the Earth?

A. Stellar navigation

B. Optical navigation

C. Magnetic navigation

D. Solar navigation

Magnetic navigation refers to the ability to orient oneself and navigate using the Earth's magnetic field. Many animals, such as birds, turtles, and certain species of fish, possess this remarkable capability, allowing them to determine their position and direction relative to the magnetic poles. This adaptation is vital for long-distance migration and navigation in environments where visual cues may be limited. In the context of navigation types, signs of magnetic navigation can include behaviors such as the ability to detect the Earth's magnetic field through specialized receptors, which may involve magnetite-based compounds in the organs of these animals. Their navigation abilities might be influenced by seasonal changes in the Earth's magnetic field or the presence of landmarks. Other navigation types, like stellar, optical, and solar navigation, rely on visual cues from celestial bodies or the sun, not on the Earth's magnetic field. Thus, the correct option uniquely highlights the specific method animals use to orient themselves in relation to magnetic forces.

6. How do gibberellins affect plant growth?

A. By promoting leaf color changes

B. By affecting stem elongation and seed germination

C. By increasing flower size

D. By enhancing seed storage

Gibberellins are a class of plant hormones that play a crucial role in regulating various aspects of plant growth and development. One of the key functions of gibberellins is their effect on stem elongation and seed germination. They promote stem elongation by stimulating cell division and elongation, which leads to taller plants that can compete more effectively for sunlight. This elongation allows for more efficient photosynthesis, which is vital for the plant's overall growth. During seed germination, gibberellins help initiate the process by breaking dormancy. They activate enzymes that mobilize stored nutrients within the seed, providing the necessary energy for growth as the seedling begins to emerge from the soil. This action is essential for ensuring that seeds can germinate when conditions are favorable. In contrast, while other options like promoting leaf color changes, increasing flower size, and enhancing seed storage may affect overall plant health and reproduction, they are not primary actions associated with gibberellins. The most direct and noteworthy effects are indeed on stem elongation and seed germination, making the second choice the most accurate representation of gibberellin function in plant growth.

7. What term describes the internal control system that regulates natural cycles in organisms?

A. Chrono clock

B. Biological clock

C. Circadian clock

D. Neuro clock

The term that describes the internal control system regulating natural cycles in organisms is the biological clock. This concept encompasses the various physiological and behavioral processes that follow a regular, periodic rhythm, reflecting the influence of intrinsic timing mechanisms. These rhythms are critical for maintaining homeostasis, coordinating activities like sleep-wake cycles, hormone release, and other metabolic processes that align with environmental changes such as day and night. The biological clock operates through feedback loops involving genes, hormones, and environmental cues, ensuring that an organism can adapt to its surroundings effectively. While the circadian clock is a specific type of biological clock that operates on a roughly 24-hour cycle, the term biological clock is broader and includes various types of rhythmic cycles beyond just the circadian, such as ultradian and infradian rhythms. This makes it the most encompassing term among the options presented.

8. What term refers to the adaptive resemblance between unrelated species?

A. convergence

B. mimicry

C. adaptation

D. mutualism

The term that refers to the adaptive resemblance between unrelated species is convergence. This phenomenon occurs when different species independently evolve similar traits or adaptations, often as a result of facing similar environmental challenges or ecological niches. These adaptations can lead to physical similarities or similar behaviors despite the species not being closely related. For example, both bats and birds have developed wings for flight, even though they belong to different evolutionary lineages. This process of convergent evolution highlights how natural selection can lead to similar solutions to the challenges posed by the environment, despite the lack of a shared ancestry. Mimicry specifically refers to one species evolving to imitate the appearance or behavior of another species, often for protection or to gain some advantage, rather than being a general term for resemblance. Adaptation refers to the broader process by which a species becomes better suited to its environment, and mutualism is a type of symbiotic relationship where both species benefit from the interaction.

9. Which behavior is characterized by an animal defending its territory?

A. Foraging

B. Migratory behavior

C. Territoriality

D. Parental investment

Territoriality is defined as a behavior in which an animal defends a specific area against others of its species, ensuring access to resources such as food, mates, and nesting sites. This behavior is crucial for the survival and reproductive success of individuals, as it helps reduce competition for limited resources and can provide an advantage in breeding. In this context, while foraging pertains to the behavior of searching for and gathering food, migratory behavior refers to the seasonal movement of animals from one habitat to another, and parental investment relates to the care and raising of offspring, none of these involve the active defense of a specific territory. Territoriality represents a distinct behavioral strategy focused on the protection and maintenance of an area that is vital for an animal's survival and reproductive success.

10. What is the process called when an organism's free-running cycle is altered to align with a different rhythm?

A. Synchronization

B. Phase shifting

C. Entrainment

D. Regulation

The process of aligning an organism's free-running cycle with a different rhythm is known as entrainment. Entrainment refers to the synchronization of an organism's internal biological clock with external environmental cues, such as light and temperature changes. This adjustment allows organisms to align their physiological processes, like sleep-wake cycles and breeding patterns, with the natural cycles in their environment, ultimately enhancing their survival and reproductive success. This phenomenon is particularly important in species that rely on environmental cues to determine their behavior and physiological states. For instance, many animals exhibit entrainment to the light-dark cycle of the day, adjusting their internal clocks to optimize their activity during daylight hours and rest at night. The other possible answers reflect concepts related to biological rhythms but do not specifically address the mechanism of aligning an internal cycle with an external rhythm. Synchronization and regulation pertain to the general process of maintaining rhythm but do not convey the specific action of adjusting a free-running cycle. Phase shifting describes a change in the timing of biological rhythms but does not encompass the broader process of aligning with external environmental signals as entrainment does.