VCE Biology Practice Test (Sample)

Study Guide

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Questions

1. **What is an example of artificial passive immunity?**

    A. Vaccination

    B. Breastfeeding

    C. Receiving antivenom for a snakebite

    D. Natural exposure to pathogens

2. **How does genetic variation contribute to selective breeding?**

    A. It limits the selection of desirable traits.

    B. It ensures that all traits are expressed equally.

    C. It allows for improvements in desired traits across generations.

    D. It promotes the extinction of non-desirable traits.

3. **What year was Homo luzonensis discovered?**

    A. 2015

    B. 2019

    C. 2020

    D. 2017

4. **How is accuracy defined in scientific measurements?**

    A. As how well the results align with the expected outcome

    B. As the consistency of repeated results

    C. As the ease of obtaining the results

    D. As how close the results are to the truth

5. **What is the initial binding point for mRNA during translation?**

    A. 3' end of mRNA

    B. 5' end of mRNA

    C. Ribosomal RNA

    D. tRNA molecules

6. **How can enzyme inhibition affect photosynthesis?**
    A. It boosts the rate of photosynthesis
    B. It makes the process more efficient
    C. It can reduce photosynthesis rates
    D. It is beneficial for enzyme activity

7. **Which of the following defines a silent mutation?**
    A. A modification resulting in a different amino acid
    B. A mutation causing an early stop in translation
    C. A substitution that has no effect on the resulting amino acid
    D. A change that disrupts the reading frame of the gene

8. **Which option represents a method for diagnosing diseases before they become severe?**
    A. Treating Individuals
    B. Screening
    C. Improvement of Hygiene
    D. Isolation/Quarantine

9. **What distinguishes immunotherapy from traditional cancer treatment?**
    A. Immunotherapy kills all cells indiscriminately
    B. Immunotherapy is more specific in targeting cancer cells
    C. Immunotherapy is less effective
    D. Immunotherapy does not involve the immune system

10. **What is the primary function of gel electrophoresis in DNA analysis?**
    A. To amplify DNA samples
    B. To separate DNA fragments by size
    C. To visualize proteins
    D. To sequence DNA

Answers

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

Explanations

1. What is an example of artificial passive immunity?

A. Vaccination

B. Breastfeeding

C. Receiving antivenom for a snakebite

D. Natural exposure to pathogens

Artificial passive immunity occurs when pre-formed antibodies are transferred to an individual, providing immediate but temporary protection against specific pathogens. Receiving antivenom for a snakebite represents this type of immunity because antivenom contains antibodies that neutralize venom, providing immediate defense against the harmful effects of the snake bite. In this case, the antibodies are produced in another organism (such as horses) and transferred to the individual experiencing the snakebite, giving them prompt immunity without requiring the individual's immune system to produce the antibodies itself. This contrasts with other forms of immunity, such as vaccination, where the body is exposed to a harmless antigen to stimulate its own immune response, or breastfeeding, where antibodies are passed naturally through breast milk.

2. How does genetic variation contribute to selective breeding?

A. It limits the selection of desirable traits.

B. It ensures that all traits are expressed equally.

C. It allows for improvements in desired traits across generations.

D. It promotes the extinction of non-desirable traits.

Genetic variation is fundamental to the process of selective breeding because it provides the raw material for breeders to select from when aiming to enhance specific traits in a population. When genetic diversity exists, it means there are different versions of genes (alleles) present, which can lead to a range of traits among individuals. This diversity allows breeders to choose individuals that exhibit preferred characteristics, such as better yield, disease resistance, or improved aesthetics. As breeders mate individuals with desirable traits over multiple generations, the frequency of these traits can increase within the population, leading to enhancements and improvements in the overall qualities of the organisms. This process ultimately allows for the continued evolution and refinement of species, making it possible to develop new and improved varieties or breeds.

3. What year was Homo luzonensis discovered?

A. 2015

B. 2019

C. 2020

D. 2017

The discovery of Homo luzonensis was officially announced in 2019, following the excavation of bones and teeth from Callao Cave in the Philippines. This species is significant because it adds to the understanding of human evolution and the diversity of hominins that existed. Researchers were able to identify distinct features in the remains that led them to classify this species as separate from others, such as Homo floresiensis and modern humans. The year 2019 marks a pivotal moment in paleoanthropology as it highlights ongoing discoveries that challenge our understanding of human ancestry and migration patterns in Southeast Asia.

4. How is accuracy defined in scientific measurements?

A. As how well the results align with the expected outcome

B. As the consistency of repeated results

C. As the ease of obtaining the results

D. As how close the results are to the truth

Accuracy in scientific measurements is defined as how close the measured values are to the true value or the accepted standard. This concept is fundamental in scientific practices because it reflects the reliability and credibility of the results. When measurements are accurate, it indicates that the data obtained closely matches the actual or expected results.   This is crucial in experiments and research where precise values can significantly influence outcomes and interpretations. For instance, in experiments where quantitative data is essential, such as measuring the concentration of a solution, achieving accuracy ensures that the conclusions drawn are valid and can be generalized or applied appropriately.   In contrast, the other options highlight different aspects related to measurement. Alignment with expected outcomes, consistency in repeated results, and ease of obtaining results are important but do not specifically address the closeness to the true value, which is the essence of accuracy.

5. What is the initial binding point for mRNA during translation?

A. 3' end of mRNA

B. 5' end of mRNA

C. Ribosomal RNA

D. tRNA molecules

During the process of translation, the initial binding point for mRNA is at the 5' end of the mRNA strand. This end of the mRNA contains a cap structure that is crucial for the recognition and proper binding of the ribosome. The ribosomal subunits then assemble around the mRNA starting at this cap, allowing the ribosomes to scan along the mRNA strand in the 5' to 3' direction until they reach the start codon (AUG).   The 5' end serves as the primary site for the ribosome to attach and begin translation, ensuring that the correct reading frame is established for protein synthesis. By beginning at this end, translation can proceed efficiently, synthesizing proteins accurately based on the encoded genetic information.

6. How can enzyme inhibition affect photosynthesis?

A. It boosts the rate of photosynthesis

B. It makes the process more efficient

C. It can reduce photosynthesis rates

D. It is beneficial for enzyme activity

Enzyme inhibition can significantly affect photosynthesis because enzymes play crucial roles in the biochemical reactions involved in this process. Photosynthesis relies on enzymes to catalyze reactions such as the conversion of carbon dioxide and water into glucose and oxygen. If an enzyme is inhibited, it cannot function properly, which can decrease the overall rate of these reactions. This reduction in enzyme activity can lead to lower production of essential compounds like glucose, ultimately impairing the plant's ability to perform photosynthesis efficiently. Consequently, the plant may struggle to produce the energy it needs for growth and maintenance, leading to decreased rates of photosynthesis. Thus, enzyme inhibition can have a detrimental effect on the efficiency and productivity of photosynthetic processes, corroborating the idea that it can significantly reduce the rates of photosynthesis.

7. Which of the following defines a silent mutation?

A. A modification resulting in a different amino acid

B. A mutation causing an early stop in translation

C. A substitution that has no effect on the resulting amino acid

D. A change that disrupts the reading frame of the gene

A silent mutation is defined as a substitution in the DNA sequence that does not result in a change to the amino acid sequence of the resulting protein. This typically occurs due to the redundancy in the genetic code, where multiple codons can encode the same amino acid. For example, if a codon for an amino acid is altered to a different codon that still codes for that same amino acid, the overall protein structure and function remain unchanged, which is why it is termed "silent." In contrast, the other options describe different types of mutations with notable impacts. Modifications that lead to different amino acids or cause early termination of translation lead to changes in protein structure and function, while alterations that disrupt the reading frame can lead to dramatic changes in the entire downstream protein sequence. These types of mutations can have significant effects on the organism, making silent mutations unique in their benign nature.

8. Which option represents a method for diagnosing diseases before they become severe?

A. Treating Individuals

B. Screening

C. Improvement of Hygiene

D. Isolation/Quarantine

Screening is a vital method for diagnosing diseases before they progress to severe stages. This approach involves systematic tests and examinations conducted on populations or individuals who may not yet show symptoms of a disease. By identifying potential health issues early, screening facilitates timely intervention, which can significantly improve treatment outcomes and reduce the risk of complications related to the disease. For example, screening programs for conditions like diabetes, certain cancers, and infectious diseases enable healthcare providers to detect these issues at manageable stages, thereby allowing for preventative measures and early treatment strategies. The focus of screening is on prevention and early detection, contrasting with options that revolve around addressing problems once they occur or after symptoms manifest.

9. What distinguishes immunotherapy from traditional cancer treatment?

A. Immunotherapy kills all cells indiscriminately

B. Immunotherapy is more specific in targeting cancer cells

C. Immunotherapy is less effective

D. Immunotherapy does not involve the immune system

Immunotherapy is distinguished from traditional cancer treatments primarily due to its targeted approach in harnessing the body's own immune system to fight cancer. Unlike conventional methods such as chemotherapy or radiation, which can affect both cancerous and healthy cells indiscriminately, immunotherapy specifically aims to enhance or restore the immune system's ability to recognize and eliminate cancer cells. This specificity arises from immunotherapy's design, which often involves using agents like monoclonal antibodies, checkpoint inhibitors, or vaccines that target unique antigens associated with cancer cells, thus leading to a more focused attack against the malignant cells. This targeted mechanism can potentially yield fewer side effects compared to conventional treatments and may result in longer-lasting responses as the immune system is trained to remember and combat tumor cells in the future.

10. What is the primary function of gel electrophoresis in DNA analysis?

A. To amplify DNA samples

B. To separate DNA fragments by size

C. To visualize proteins

D. To sequence DNA

The primary function of gel electrophoresis in DNA analysis is to separate DNA fragments by size. This technique utilizes an electric field to move DNA fragments through a gel matrix, typically made of agarose or polyacrylamide. Since DNA is negatively charged, it migrates towards the positive electrode. Smaller fragments of DNA can navigate through the gel matrix more easily than larger ones, leading to a separation based on size. This ability to effectively separate and visualize DNA fragments makes gel electrophoresis a critical tool in various applications, such as checking the results of PCR (polymerase chain reaction) amplification, assessing the size of restriction enzyme digests, and preparing samples for further analysis or sequencing.