

Biology Regents Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

Copyright © 2025 by Examzify - A Kaluba Technologies Inc. product.

ALL RIGHTS RESERVED.

No part of this book may be reproduced or transferred in any form or by any means, graphic, electronic, or mechanical, including photocopying, recording, web distribution, taping, or by any information storage retrieval system, without the written permission of the author.

Notice: Examzify makes every reasonable effort to obtain from reliable sources accurate, complete, and timely information about this product.

SAMPLE

Questions

SAMPLE

- 1. What role does DNA polymerase play during replication?**
 - A. To unwind the DNA helix**
 - B. To synthesize new DNA strands**
 - C. To repair damaged DNA**
 - D. To translate mRNA into proteins**
- 2. Why are root cells and leaf cells in plants not identical despite having the same genetic material?**
 - A. They use different genetic bases for the synthesis of DNA**
 - B. They use different parts of their genetic instructions**
 - C. Select different cells to express**
 - D. They delete different sections of their enzymes**
- 3. Which of the following is NOT one of the four main types of macromolecules?**
 - A. Carbohydrates**
 - B. Lipids**
 - C. Salts**
 - D. Nucleic acids**
- 4. What is the main purpose of meiosis in sexual reproduction?**
 - A. To create diploid cells for growth**
 - B. To produce genetically identical offspring**
 - C. To generate gametes with half the chromosome number**
 - D. To initiate the process of DNA replication**
- 5. Which statement best describes the characteristics a protein must have to function correctly?**
 - A. A protein is a long chain of amino acids folded into a specific shape.**
 - B. A protein is a long chain of simple sugars folded into a specific shape.**
 - C. A protein is made of amino acids synthesized into a short, circular chain.**
 - D. A protein is made of simple sugars synthesized into a short, circular chain.**

- 6. Which process explains the transfer of energy through a food chain?**
- A. Photosynthesis**
 - B. Decomposition**
 - C. Predation**
 - D. Respiration**
- 7. What impact does the hemlock wooly adelgid have on its ecosystem?**
- A. It increases biodiversity in New York State forests**
 - B. It provides food for native bird species**
 - C. It can carry diseases that can be spread to pets**
 - D. It disrupts habitats that native species depend upon**
- 8. Consumers who switch to modern lightbulbs are most likely**
- A. Spending more money for no good reason**
 - B. Trying to stop pollution of the oceans**
 - C. Trading a short-term cost for long-term savings**
 - D. Helping traditional lightbulb factories employ people**
- 9. What is the equation for cellular respiration?**
- A. Carbon Dioxide + Water → Glucose + Oxygen + Energy**
 - B. Glucose + Oxygen → Carbon Dioxide + Water + Energy**
 - C. Oxygen + Energy → Carbon Dioxide + Glucose + Water**
 - D. Glucose + Energy → Oxygen + Carbon Dioxide + Water**
- 10. Why might two organisms, such as sharks and dolphins, have similar body structures?**
- A. They evolved in similar environments and specific traits increased their chances of survival**
 - B. They were exposed to the same mutations in different environments**
 - C. They tried to adapt in the same ways regardless of their environments**
 - D. They ate similar foods affecting their growth and development**

Answers

SAMPLE

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

SAMPLE

Explanations

SAMPLE

1. What role does DNA polymerase play during replication?

- A. To unwind the DNA helix
- B. To synthesize new DNA strands**
- C. To repair damaged DNA
- D. To translate mRNA into proteins

DNA polymerase is a crucial enzyme in the process of DNA replication, where it plays the key role of synthesizing new DNA strands. During replication, DNA polymerase adds nucleotides one by one to the growing DNA strand, complementary to the template strand. This action is crucial for accurately copying the genetic information needed for cell division. As the DNA unwinds, the original strands serve as templates. DNA polymerase ensures that the new strands are synthesized in accordance with the base-pairing rules—adenine pairs with thymine, and cytosine pairs with guanine. This process not only enables the duplication of the genetic material but also maintains the integrity and accuracy of the DNA being passed to daughter cells. Understanding the specific role of DNA polymerase highlights its importance in cell division and in maintaining genetic continuity across generations of cells.

2. Why are root cells and leaf cells in plants not identical despite having the same genetic material?

- A. They use different genetic bases for the synthesis of DNA
- B. They use different parts of their genetic instructions**
- C. Select different cells to express
- D. They delete different sections of their enzymes

Root cells and leaf cells in plants are not identical, despite sharing the same genetic material, because they utilize different parts of their genetic instructions. This phenomenon is a result of gene expression, where specific genes are activated or deactivated depending on the cell type and its function. Root cells and leaf cells have distinct roles in the plant; for example, root cells are primarily involved in nutrient and water absorption, while leaf cells conduct photosynthesis. Therefore, each type of cell expresses only the genes that are relevant to its function. Although the genetic material is the same in terms of DNA content, the specific patterns of gene expression lead to different protein production and ultimately different cell structures and functions. Understanding that cells can share genetic material but still develop into different cell types due to selective gene expression is fundamental to the study of biology. This concept is crucial for grasping how multicellular organisms maintain diverse functions and structures despite having a common genome.

3. Which of the following is NOT one of the four main types of macromolecules?

A. Carbohydrates

B. Lipids

C. Salts

D. Nucleic acids

The four main types of macromolecules essential to biological systems are carbohydrates, lipids, proteins, and nucleic acids. Carbohydrates are important for energy storage and providing structural support in cells. Lipids play crucial roles in storing energy, signaling, and forming cell membranes. Nucleic acids, like DNA and RNA, are vital for genetic information storage and transfer, as well as protein synthesis. Salts, while important in biological processes, particularly in maintaining ionic balance and nerve transmission, do not fall under the category of macromolecules. Macromolecules are large, complex molecules that are formed from smaller units called monomers. Salts, on the other hand, are ionic compounds formed from the combination of cations and anions and do not exhibit the same structural complexity or large size characteristic of macromolecules. Therefore, the correct option identifies a category that does not align with the four recognized main types of macromolecules.

4. What is the main purpose of meiosis in sexual reproduction?

A. To create diploid cells for growth

B. To produce genetically identical offspring

C. To generate gametes with half the chromosome number

D. To initiate the process of DNA replication

The main purpose of meiosis in sexual reproduction is to generate gametes with half the chromosome number, which is essential for maintaining the species' chromosomal integrity across generations. In sexual reproduction, two gametes, typically from different parents, fuse during fertilization to form a diploid zygote. If meiosis did not reduce the chromosome number, the zygote would end up with twice the normal number of chromosomes, leading to genetic instability. During meiosis, a single diploid cell undergoes two rounds of division, resulting in four haploid gametes. This halving of the chromosome number ensures that when two gametes combine, the resulting offspring has the correct diploid number of chromosomes. This process fosters genetic diversity as it involves recombination and random assortment of chromosomes, contributing to variation in traits among offspring, which is crucial for evolution and adaptation.

5. Which statement best describes the characteristics a protein must have to function correctly?

- A. A protein is a long chain of amino acids folded into a specific shape.**
- B. A protein is a long chain of simple sugars folded into a specific shape.**
- C. A protein is made of amino acids synthesized into a short, circular chain.**
- D. A protein is made of simple sugars synthesized into a short, circular chain.**

The correct answer highlights that a protein is composed of a sequence of amino acids, which are linked together in a specific order to form a long chain. This chain then undergoes essential folding to achieve a three-dimensional shape, which is crucial for its function. The specific shape that a protein assumes is directly related to its particular function in biological processes. For instance, enzymes, which are a type of protein, need to have an appropriate conformation to bind to their substrates effectively. In contrast, proteins are not made of simple sugars, so options that describe proteins as being composed of sugars or implying circular structures do not accurately represent protein structure. The primary structure of a protein is linear, and its functionality arises from the complex arrangements formed by its folding and interactions with the environment. Thus, the correct answer encapsulates the fundamental aspects of protein structure and its importance in biological functions.

6. Which process explains the transfer of energy through a food chain?

- A. Photosynthesis**
- B. Decomposition**
- C. Predation**
- D. Respiration**

The transfer of energy through a food chain is primarily explained by the process of predation. In a food chain, energy flows from one trophic level to the next as organisms consume one another. Predation is the interaction where one organism (the predator) hunts and eats another organism (the prey). This process is essential for energy transfer because it allows the energy stored in the prey (which has obtained its energy through photosynthesis or other means) to be passed on to the predator. When a predator consumes its prey, it assimilates the energy that the prey has accumulated. This continues up the food chain, with primary producers (like plants) forming the base and supporting herbivores, which in turn support carnivores. This mechanism highlights the dependencies within ecosystems and illustrates the flow of energy from producers to various levels of consumers, ultimately demonstrating the interconnectedness of various organisms in an ecological system.

7. What impact does the hemlock wooly adelgid have on its ecosystem?

- A. It increases biodiversity in New York State forests**
- B. It provides food for native bird species**
- C. It can carry diseases that can be spread to pets**
- D. It disrupts habitats that native species depend upon**

The hemlock wooly adelgid is a small insect that specifically targets hemlock trees, which are significant components of northeastern forests, including those in New York State. When these insects infest hemlock trees, they feed on the tree's sap, ultimately leading to the decline and death of the trees. The loss of hemlock trees has profound implications for the ecosystem. Hemlocks play a crucial role in their habitats by providing shade and maintaining soil moisture. Their presence supports various other species that rely on the unique conditions created by these trees. When hemlocks are removed or die off due to adelgid infestations, the structure of the forest changes. This alteration can lead to shifts in the composition of plant species, which in turn affects the animals that depend on those plants for food and shelter. In summary, the impact of the hemlock wooly adelgid significantly disrupts the habitats essential for many native species, making it a serious concern for biodiversity and ecological balance in affected areas.

8. Consumers who switch to modern lightbulbs are most likely

- A. Spending more money for no good reason**
- B. Trying to stop pollution of the oceans**
- C. Trading a short-term cost for long-term savings**
- D. Helping traditional lightbulb factories employ people**

Switching to modern lightbulbs, such as LED or CFL bulbs, typically involves a higher initial purchase price compared to traditional incandescent bulbs. However, these modern lightbulbs are designed to be more energy-efficient, which leads to lower electricity bills over time. Thus, consumers making this switch are engaging in a trade-off where they incur a short-term cost in exchange for significant long-term savings due to reduced energy consumption and a longer lifespan of the bulbs. This choice reflects a common understanding of sustainable consumer behavior, where individuals make decisions based on the overall lifetime costs and benefits rather than just the upfront expenses. Long-term savings can also contribute to environmental benefits since energy-efficient bulbs typically consume less power, which reduces the demand on power plants and can result in lower greenhouse gas emissions.

9. What is the equation for cellular respiration?

- A. Carbon Dioxide + Water → Glucose + Oxygen + Energy
- B. Glucose + Oxygen → Carbon Dioxide + Water + Energy**
- C. Oxygen + Energy → Carbon Dioxide + Glucose + Water
- D. Glucose + Energy → Oxygen + Carbon Dioxide + Water

The equation for cellular respiration accurately represented by the answer involves the transformation of glucose and oxygen into carbon dioxide and water, releasing energy in the process. In biological systems, this process occurs in cells to convert the energy stored in glucose into a form that can be readily used by organisms, primarily in the form of adenosine triphosphate (ATP). During cellular respiration, glucose is broken down through a series of chemical reactions that include glycolysis, the Krebs cycle, and the electron transport chain. These reactions occur in the mitochondria of eukaryotic cells. The glucose, which comes from food, reacts with oxygen inhaled from the environment. The products of this reaction are carbon dioxide and water, which are then exhaled or utilized in other biological processes. The energy released during these reactions is harnessed for various cellular activities. Understanding this process is crucial because it underscores the importance of cellular respiration in energy production and its role in sustaining life. Knowing that glucose and oxygen are the reactants and that the products are carbon dioxide, water, and energy helps illustrate the fundamental concept of how living organisms convert chemical energy into usable forms. This also highlights the interdependence of photosynthesis and cellular respiration in ecosystems, as the byproducts of

10. Why might two organisms, such as sharks and dolphins, have similar body structures?

- A. They evolved in similar environments and specific traits increased their chances of survival**
- B. They were exposed to the same mutations in different environments
- C. They tried to adapt in the same ways regardless of their environments
- D. They ate similar foods affecting their growth and development

The similarity in body structures between two organisms like sharks and dolphins can be attributed to the concept of convergent evolution. In this process, different species that occupy similar environments or ecological niches evolve analogous traits that enhance their chances of survival and reproduction. Although sharks are fish and dolphins are mammals, they both live in aquatic environments, which drives similar adaptations such as streamlined bodies, powerful tails, and fins for efficient movement in water. These traits arise not from a shared ancestry but from the adaptive responses to similar challenges posed by their environment, which promotes traits favoring locomotion and hunting strategies suited for a marine lifestyle. The other options do not accurately capture the reason for the structural similarities. The notion of exposure to the same mutations is less relevant because mutations can vary greatly and are dependent on specific environmental factors rather than being universally shared. The idea that they "tried to adapt" is misleading since evolutionary adaptations occur over many generations through natural selection, not through conscious effort by organisms. Lastly, while dietary habits can influence growth and development, they are not the primary drivers of the similar body structures observed in these animals. Instead, it's the environmental pressures that shape their evolutionary traits leading to the similarity noticed.