

WJEC Biology Practice Exam (Sample)

Study Guide



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Questions

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- 1. What are key considerations in trials for biological control?**
 - A. Will it attract more pests?**
 - B. Will it survive the environment?**
 - C. How many pests will it eliminate?**
 - D. Will it enhance crop growth?**
- 2. How is ATP generated during cellular respiration?**
 - A. Through photosynthesis exclusively**
 - B. Through substrate-level phosphorylation and oxidative phosphorylation**
 - C. Through glycolysis only**
 - D. By fermentation processes**
- 3. What does variation within a population contribute to?**
 - A. Increased chances of extinction**
 - B. Enhanced genetic similarity**
 - C. Natural selection and adaptation**
 - D. Uniformity among individuals**
- 4. What defines an ecosystem?**
 - A. A community of organisms and their physical environment**
 - B. The sum of all living organisms in a given area**
 - C. The number of species in a habitat**
 - D. The interactions between biotic and abiotic factors**
- 5. Which process do plants primarily use to convert sunlight into energy?**
 - A. Respiration**
 - B. Photosynthesis**
 - C. Fermentation**
 - D. Transpiration**

- 6. How does a hypothesis differ from a theory in science?**
- A. A hypothesis is based entirely on assumptions**
 - B. A hypothesis is a testable prediction, while a theory is not**
 - C. A hypothesis is a well-substantiated explanation, while a theory is not**
 - D. A hypothesis is a testable prediction, while a theory is well-substantiated**
- 7. What are the building blocks of proteins?**
- A. Sugars**
 - B. Nucleotides**
 - C. Amino acids**
 - D. Fatty acids**
- 8. How many kingdoms are commonly recognized in biological classification?**
- A. Three**
 - B. Four**
 - C. Five**
 - D. Six**
- 9. Which statement about vascular tissue is true?**
- A. It mainly provides support to plants**
 - B. It is involved in the transport of water and nutrients**
 - C. It is responsible for photosynthesis in plants**
 - D. It stores energy in the form of starch**
- 10. Which statement correctly describes the role of the pancreas when blood glucose levels are elevated?**
- A. It releases glucagon**
 - B. It releases insulin**
 - C. It inhibits glucose absorption**
 - D. It stimulates sweat glands**

Answers

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

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Explanations

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1. What are key considerations in trials for biological control?

- A. Will it attract more pests?
- B. Will it survive the environment?**
- C. How many pests will it eliminate?
- D. Will it enhance crop growth?

In trials for biological control, one of the key considerations is whether the control agent will survive in the environment. For biological control to be effective, the introduced agent—such as a predator or pathogen—must be able to thrive in the conditions present in the target area. This means it should be able to withstand factors such as temperature, humidity, and availability of food sources. If the control agent cannot survive, it will not be able to establish itself and effectively reduce the pest population, rendering the biological control ineffective. The survival of the control agent is critical not only for immediate pest management but also for longer-term ecological balance and sustainability. If the agent does not survive, there may also be concerns about how this might disrupt local ecosystems or fail to provide a viable solution to the pest problem. Thus, assessing environmental compatibility and robustness of the control agent is fundamental in the design and implementation of biological control strategies.

2. How is ATP generated during cellular respiration?

- A. Through photosynthesis exclusively
- B. Through substrate-level phosphorylation and oxidative phosphorylation**
- C. Through glycolysis only
- D. By fermentation processes

ATP is generated during cellular respiration through two main mechanisms: substrate-level phosphorylation and oxidative phosphorylation. Substrate-level phosphorylation occurs in both glycolysis and the Krebs cycle, where a phosphate group is directly transferred to ADP from a high-energy substrate molecule, resulting in the formation of ATP. This process does not require oxygen and is a relatively quick method of generating ATP. On the other hand, oxidative phosphorylation takes place in the mitochondria, where it involves the electron transport chain and chemiosmosis. In this process, electrons are transferred through a series of protein complexes, leading to the pumping of protons across the mitochondrial membrane. This creates a proton gradient that drives ATP synthase to convert ADP and inorganic phosphate into ATP. Oxidative phosphorylation is efficient and produces the majority of ATP during cellular respiration, especially in the presence of oxygen. Thus, both substrate-level phosphorylation and oxidative phosphorylation work together to provide energy in the form of ATP during the cellular respiration process. Other options either focus on processes that are not directly involved in ATP generation during cellular respiration or describe limited aspects of energy production.

3. What does variation within a population contribute to?

- A. Increased chances of extinction**
- B. Enhanced genetic similarity**
- C. Natural selection and adaptation**
- D. Uniformity among individuals**

Variation within a population plays a critical role in natural selection and adaptation. This diversity among individuals means that some possess traits that may make them better suited for survival in their specific environments. When environmental pressures are present—such as changes in climate, availability of resources, or the presence of predators—those individuals with advantageous traits are more likely to survive and reproduce. Over time, these traits become more common in the population, leading to adaptation. Natural selection acts on the variation within a population, allowing species to evolve and thrive in changing conditions. This process is fundamental to the theory of evolution, as it explains how species can change over generations in response to their environment. Therefore, variation is essential for a population's resilience and ability to adapt to new challenges, enhancing its overall chances of survival.

4. What defines an ecosystem?

- A. A community of organisms and their physical environment**
- B. The sum of all living organisms in a given area**
- C. The number of species in a habitat**
- D. The interactions between biotic and abiotic factors**

An ecosystem is defined as a community of organisms and their physical environment interacting as a system. This definition highlights the integral relationship between living organisms (biotic factors) and their physical surroundings (abiotic factors). In an ecosystem, organisms are not only coexisting but also depend on each other and their environment for survival, which includes factors like water, soil, and climate. This interaction is crucial for the flow of energy and nutrients, and it emphasizes the interdependence of species and their habitats. Understanding an ecosystem in this way helps to appreciate its complexity, as it encompasses various interactions, including competition, predation, and symbiosis among species, as well as how these living beings influence and are influenced by their non-living environment. Other options, while relevant elements of ecological studies, do not capture this broad and integrative perspective of an ecosystem as well as this answer does.

5. Which process do plants primarily use to convert sunlight into energy?

- A. Respiration**
- B. Photosynthesis**
- C. Fermentation**
- D. Transpiration**

Plants primarily use photosynthesis to convert sunlight into energy. This process occurs in the chloroplasts of plant cells, where chlorophyll, the green pigment, captures light energy from the sun. During photosynthesis, plants take in carbon dioxide from the air and water from the soil. Using the light energy, they convert these raw materials into glucose (a type of sugar) and oxygen. The glucose produced serves as an energy source for the plant, supporting growth, reproduction, and other vital functions. The importance of photosynthesis cannot be overstated, as it not only fuels plant life but also contributes significantly to the Earth's atmosphere by producing oxygen, which is vital for the survival of most living organisms. This process is essential for the ecosystems as well since it forms the base of the food chain, providing energy for herbivores and, in turn, carnivores. In contrast, respiration refers to the process by which both plants and animals convert glucose and oxygen into energy, along with carbon dioxide and water as byproducts, and is reliant on the energy produced by photosynthesis. Fermentation is an anaerobic process that occurs in the absence of oxygen, often in certain microorganisms, and is not the primary means by which plants derive energy. Transpiration

6. How does a hypothesis differ from a theory in science?

- A. A hypothesis is based entirely on assumptions**
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A hypothesis serves as a foundational step in the scientific method; it is a testable statement or prediction that can be investigated through experimentation and observation. This means that a hypothesis is formulated based on existing knowledge and observations but has not yet undergone extensive testing or validation. On the other hand, a theory is a comprehensive explanation of some aspect of the natural world that has been substantiated through a significant amount of empirical evidence and testing over time. Theories draw from multiple hypotheses that have been repeatedly tested and confirmed, leading to a greater understanding of the subject matter. This distinction highlights that while a hypothesis is an initial statement requiring testing, a theory represents a broader understanding backed by substantial evidence that has stood the test of time in the scientific community. Thus, the correct answer accurately reflects this critical difference between a hypothesis and a theory in scientific discourse.

7. What are the building blocks of proteins?

- A. Sugars
- B. Nucleotides
- C. Amino acids**
- D. Fatty acids

Proteins are composed of smaller units known as amino acids, which serve as their building blocks. Each amino acid has a specific structure that includes an amino group, a carboxylic acid group, and a variable side chain known as an R group. The sequence and arrangement of these amino acids determine the structure and function of the resulting protein. When amino acids link together through peptide bonds, they form polypeptides, which can fold into complex three-dimensional shapes — an essential feature for their role in biological functions ranging from catalyzing metabolic reactions as enzymes to providing structural support in cells. In contrast, sugars are carbohydrates that serve primarily as energy sources or structural components, nucleotides are the building blocks of nucleic acids like DNA and RNA, and fatty acids are components of lipids, which make up cell membranes and serve various other roles in biology. Thus, the distinct role of amino acids as the fundamental units of protein synthesis underlines why they are recognized as the building blocks of proteins.

8. How many kingdoms are commonly recognized in biological classification?

- A. Three
- B. Four
- C. Five**
- D. Six

The classification of living organisms has evolved over time, and the five-kingdom system is one of the most widely accepted frameworks for organizing life forms. This system, proposed by Robert Whittaker in 1969, includes the following kingdoms: Animalia (animals), Plantae (plants), Fungi (fungi), Protista (a diverse group of mostly unicellular organisms), and Monera (bacteria). The recognition of these five kingdoms helps biologists categorize organisms based on their fundamental characteristics such as cellular structure, mode of nutrition, and reproduction. For instance, animals are typically multicellular and heterotrophic, while plants are multicellular and autotrophic. Fungi have unique cell walls made of chitin and obtain nutrients through external digestion, while protists encompass a diverse variety of unicellular organisms, some of which may exhibit characteristics of plants or animals. Monera includes prokaryotic organisms which lack a defined nucleus. This five-kingdom system provides a comprehensive view that addresses the diversity of life on Earth and facilitates better understanding and communication among scientists regarding the relationships between different groups of organisms. Though other systems, such as the three-domain system (eukarya, bacteria, and archaea), exist, the five-

9. Which statement about vascular tissue is true?

- A. It mainly provides support to plants**
- B. It is involved in the transport of water and nutrients**
- C. It is responsible for photosynthesis in plants**
- D. It stores energy in the form of starch**

Vascular tissue is primarily known for its role in the transport of water, nutrients, and food throughout the plant. This tissue consists of two main components: xylem, which transports water and dissolved minerals from the roots to other parts of the plant, and phloem, which carries the products of photosynthesis, such as sugars, from the leaves to the rest of the plant. This transport system is essential for maintaining plant health, enabling growth, and facilitating various physiological processes. The function of vascular tissue in facilitating efficient transport distinguishes it from other functions like support, photosynthesis, or energy storage. The other options, while related to plant functions, do not accurately describe the primary role of vascular tissue. Support is provided more effectively through structures like collenchyma and sclerenchyma, photosynthesis occurs mainly in chloroplasts within leaf cells, and energy storage largely takes place in tissues such as parenchyma where starch is stored.

10. Which statement correctly describes the role of the pancreas when blood glucose levels are elevated?

- A. It releases glucagon**
- B. It releases insulin**
- C. It inhibits glucose absorption**
- D. It stimulates sweat glands**

The pancreas plays a crucial role in regulating blood glucose levels, particularly when they are elevated following a meal or glucose intake. In this situation, the pancreas releases insulin, a hormone that helps lower blood glucose levels. Insulin facilitates the uptake of glucose by body cells, encouraging them to use glucose for energy or store it as glycogen in the liver and muscles. This process effectively reduces the amount of glucose in the bloodstream, maintaining homeostasis. The secretion of insulin in response to high blood glucose is part of a feedback loop to ensure that glucose levels remain within a healthy range. In contrast, glucagon, which is released when blood glucose levels are low, has the opposite effect by promoting the release of glucose into the blood from glycogen stores. The other options listed do not directly relate to the primary action of the pancreas in response to high blood glucose levels, as they do not reflect the hormonal response necessary to decrease glucose concentration in the blood.