

# Praxis II Biology (5235) Practice Test (Sample)

## Study Guide



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**SAMPLE**

## **Questions**

- 1. Why is the process referred to as C3 carbon fixation?**
  - A. It occurs in C4 plants**
  - B. It produces 3-C compounds as the first products**
  - C. It requires 3 cycles of the Calvin cycle**
  - D. It is the most efficient form of photosynthesis**
- 2. What role does the unique R group play in an amino acid?**
  - A. Determines the charge of the amino acid**
  - B. Dictates how the protein interacts with other substances**
  - C. Functions as an energy source**
  - D. Contributes to the solubility of the amino acid**
- 3. Which of the following is the correct taxonomic hierarchy for humans?**
  - A. Animalia, Mammalia, Hominidae, Homo, Homo sapiens**
  - B. Animalia, Cordata, Mammalia, Primates, Homo sapiens**
  - C. Animalia, Chordata, Mammalia, Primatae, Hominidae, Homo sapiens**
  - D. Animalia, Chordata, Reptilia, Primatae, Homo sapiens**
- 4. What is the composition of the plasma membrane?**
  - A. 30% lipid and 70% protein**
  - B. 40% lipid and 60% protein**
  - C. 50% lipid and 50% protein**
  - D. 60% lipid and 40% protein**
- 5. Klinefelter's Syndrome is caused by which chromosomal abnormality?**
  - A. An extra Y chromosome**
  - B. An extra X chromosome**
  - C. A missing Y chromosome**
  - D. Two Y chromosomes**

- 6. Which type of plants have male flowers and female flowers on separate plants?**
- A. Monoecious**
  - B. Dioecious**
  - C. Homoploid**
  - D. Unisexual**
- 7. What is actin's role in muscle contraction?**
- A. Forms the thin filament and interacts with myosin**
  - B. Acts as a stabilizer for myofibrils**
  - C. Serves as a storage protein for calcium**
  - D. Inhibits muscle contraction under resting conditions**
- 8. What do the branched projections of a neuron called dendrites do?**
- A. Transmit electrical impulses**
  - B. Conduct impulse away from the neuron**
  - C. Receive information from other neurons**
  - D. Store neuronal energy**
- 9. What happens during cyclic photophosphorylation?**
- A. Water is split to release oxygen**
  - B. PSI generates ATP while PSII is inactive**
  - C. Both PSI and PSII generate ATP and NADPH**
  - D. Ferredoxin transfers electrons to NADP+**
- 10. What structure divides the heart into two halves?**
- A. Aorta**
  - B. Septum**
  - C. Pericardium**
  - D. Valves**

## **Answers**

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

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## **Explanations**

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**1. Why is the process referred to as C3 carbon fixation?**

- A. It occurs in C4 plants**
- B. It produces 3-C compounds as the first products**
- C. It requires 3 cycles of the Calvin cycle**
- D. It is the most efficient form of photosynthesis**

The process is referred to as C3 carbon fixation because it produces three-carbon (3-C) compounds as the first stable products of the photosynthetic process. Specifically, during the Calvin cycle, carbon dioxide is fixed by a molecule called ribulose biphosphate (RuBP), resulting in the immediate formation of a three-carbon intermediate called 3-phosphoglycerate (3-PGA). This step is what distinguishes C3 photosynthesis from other types, like C4 and CAM, which have different initial products and adaptations for carbon fixation. In this context, the reference to C3 underscores the specific nature of the carbon compounds involved in the initial fixation step, highlighting the significance of the 3-carbon compounds in the photosynthetic pathway that characterizes this method.

**2. What role does the unique R group play in an amino acid?**

- A. Determines the charge of the amino acid**
- B. Dictates how the protein interacts with other substances**
- C. Functions as an energy source**
- D. Contributes to the solubility of the amino acid**

The unique R group, also known as the side chain, is a defining characteristic of each amino acid and plays a critical role in determining the properties and functions of proteins. This side chain can vary greatly in terms of size, shape, polarity, and charge, which ultimately influences how the amino acid interacts with other molecules, including other amino acids in a protein or various substrates. The specific chemical composition and structure of the R group can affect the folding of the protein, its stability, and its ability to bind to other proteins or small molecules. For example, polar R groups may facilitate interactions with water, making certain proteins soluble, while hydrophobic R groups may drive protein folding to avoid water. Additionally, some R groups may contain functional groups that allow for specific biochemical reactions. In contrast, while the R group can influence the charge and solubility of the amino acid, its primary and most crucial function lies in how it dictates protein interaction with other substances. Thus, understanding the diversity of R groups helps explain the vast array of protein functions found in biological systems.

**3. Which of the following is the correct taxonomic hierarchy for humans?**

- A. Animalia, Mammalia, Hominidae, Homo, Homo sapiens**
- B. Animalia, Cordata, Mammalia, Primates, Homo sapiens**
- C. Animalia, Chordata, Mammalia, Primatae, Hominidae, Homo sapiens**
- D. Animalia, Chordata, Reptilia, Primatae, Homo sapiens**

The correct taxonomic hierarchy for humans identifies the levels of classification that categorize humans within the broader context of biological organization. The hierarchy begins at the domain, progresses to kingdom, phylum, class, order, family, genus, and species. In the correct answer, the hierarchy listed is as follows: Animalia (kingdom), Chordata (phylum), Mammalia (class), Primates (order), Hominidae (family), Homo (genus), and finally Homo sapiens (species). This sequence accurately reflects the classification of humans, emphasizing that they belong to the kingdom of animals, possess a backbone as chordates, are warm-blooded mammals, are part of the order of primates, belong to the family Hominidae which includes great apes and humans, and are classified specifically under the genus Homo with the species designation of sapiens. Other choices contain inaccuracies in either the classification ranks or naming. For example, option A lacks the family level and incorrectly lists the class order. Meanwhile, options B and D contain misclassifications concerning phylum and order, with D incorrectly placing humans in the Reptilia class, which does not apply. Understanding these classifications clarifies the biological positioning of humans within the

**4. What is the composition of the plasma membrane?**

- A. 30% lipid and 70% protein**
- B. 40% lipid and 60% protein**
- C. 50% lipid and 50% protein**
- D. 60% lipid and 40% protein**

The composition of the plasma membrane is often approximated to be around 40% lipid and 60% protein. This ratio reflects the crucial role that both lipids and proteins play in the membrane's structure and function. The lipid portion primarily consists of phospholipids, which form a bilayer that provides a flexible structure indispensable for cellular integrity and compartmentalization. These lipids create a barrier that separates the internal environment of the cell from the external environment, allowing for selective permeability. The protein component is vital for a variety of functions, including transport, signaling, and cell recognition. Membrane proteins can be integral, spanning the membrane, or peripheral, attached to the surface, facilitating communication and interaction with external signals and substances. The balance of lipids and proteins is important, as it influences the fluidity, flexibility, and overall functionality of the plasma membrane. This composition enables cells to maintain homeostasis and respond to changes in their environment effectively.

**5. Klinefelter's Syndrome is caused by which chromosomal abnormality?**

- A. An extra Y chromosome**
- B. An extra X chromosome**
- C. A missing Y chromosome**
- D. Two Y chromosomes**

Klinefelter's Syndrome is indeed characterized by the presence of an extra X chromosome in males, leading to a karyotype typically represented as 47,XXY. This additional genetic material can disrupt normal sexual development and is associated with various symptoms, such as reduced testosterone levels, breast development (gynecomastia), and infertility. The condition results from the nondisjunction of chromosomes during meiosis, where the chromosomes fail to separate properly, therefore leading to a gamete that has an extra X chromosome when it fertilizes. The clinical presentation can vary, but the presence of the extra X chromosome is the key factor in the expression of Klinefelter's Syndrome.

**6. Which type of plants have male flowers and female flowers on separate plants?**

- A. Monoecious**
- B. Dioecious**
- C. Homoploid**
- D. Unisexual**

Dioecious plants are characterized by having male flowers and female flowers on separate individual plants. This means that for reproduction to occur, both a male and a female plant are needed in proximity for pollination to take place. In dioecious species, you can find distinct plants that produce only one type of flower, either male or female. In contrast, monoecious plants have both male and female flowers on the same plant. This allows for self-pollination or cross-pollination depending on the species' reproductive structure and environmental factors. Homoploid and unisexual are terms that do not specifically refer to the separation of male and female flowers on different plants; therefore, they do not appropriately describe the condition where male and female flowers are on separate individual plants.

## 7. What is actin's role in muscle contraction?

- A. Forms the thin filament and interacts with myosin**
- B. Acts as a stabilizer for myofibrils**
- C. Serves as a storage protein for calcium**
- D. Inhibits muscle contraction under resting conditions**

Actin plays a crucial role in muscle contraction primarily by forming the thin filament and interacting with myosin. In skeletal muscle, contraction occurs through the sliding filament model, where actin filaments slide over myosin filaments, leading to muscle shortening. This process is facilitated by the binding of myosin heads to the actin filaments, which generates the force required for contraction. During muscle contraction, the myosin heads attach to specific binding sites on the actin filaments. Once attached, the myosin heads pivot, pulling the actin filaments toward the center of the sarcomere—the fundamental unit of muscle contraction. This interaction is regulated by the presence of calcium ions and the proteins troponin and tropomyosin, which position on the actin filaments and modulate the interaction between actin and myosin. This explanation highlights how actin is not only integral to the structural framework of muscle fibers but also essential for the dynamic process of muscle contraction itself, emphasizing the importance of its interaction with myosin.

## 8. What do the branched projections of a neuron called dendrites do?

- A. Transmit electrical impulses**
- B. Conduct impulse away from the neuron**
- C. Receive information from other neurons**
- D. Store neuronal energy**

Dendrites are specialized structures on neurons that play a crucial role in neural communication. Their main function is to receive information from other neurons and sensory receptors. This is achieved through the dendritic branches, which have numerous synaptic receptors that can bind neurotransmitters released from the axon terminals of adjacent neurons. As these neurotransmitters bind to the receptors, they can cause changes in the electrical potential of the dendrite, leading to the generation of a nerve impulse if the signal is strong enough. The design of dendrites, with their extensive branching patterns, increases the surface area available for receiving signals, making them highly efficient in gathering information from multiple sources. This allows the neuron to integrate input information before determining whether to propagate an action potential down its axon. Thus, dendrites are essential for the communication networks in the nervous system.

## 9. What happens during cyclic photophosphorylation?

- A. Water is split to release oxygen
- B. PSI generates ATP while PSII is inactive**
- C. Both PSI and PSII generate ATP and NADPH
- D. Ferredoxin transfers electrons to NADP+

During cyclic photophosphorylation, photosystem I (PSI) is the primary focus, while photosystem II (PSII) remains inactive. This process involves the transfer of electrons within PSI, where light energy is captured and used to energize electrons. As these energized electrons move through a series of proteins in the electron transport chain, they help pump protons across the thylakoid membrane, creating a proton gradient. This gradient ultimately drives ATP synthesis through ATP synthase. Cyclic photophosphorylation does not involve the splitting of water, which is a characteristic of non-cyclic photophosphorylation. The splitting of water provides electrons for PSII and leads to the production of oxygen, but this is not part of cyclic photophosphorylation. Additionally, cyclic photophosphorylation does not generate NADPH; this is produced during non-cyclic photophosphorylation when electrons from PSII ultimately reduce NADP+. Therefore, the essence of cyclic photophosphorylation is centered on PSI generating ATP when PSII is not functioning, which aligns perfectly with the noted answer.

## 10. What structure divides the heart into two halves?

- A. Aorta
- B. Septum**
- C. Pericardium
- D. Valves

The structure that divides the heart into two halves is the septum. The septum is a muscular wall that separates the left and right sides of the heart, consisting of the interatrial septum, which separates the atria, and the interventricular septum, which separates the ventricles. This division is crucial for maintaining a two-circuit system in the circulatory system—one for oxygenated blood to the body and one for deoxygenated blood to the lungs. By keeping the oxygen-rich blood and oxygen-poor blood separate, the septum plays an essential role in the efficient functioning of the heart, ensuring that the circulatory system operates effectively and that oxygenation of blood is maximized.