

Canadian National Institute of Health (CNIH) Entrance Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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Questions

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- 1. What does diffusion refer to in respiratory terms?**
 - A. Movement of gases from the lungs into the blood**
 - B. Movement of material from high concentration to low concentration**
 - C. Movement of oxygen from blood to tissues**
 - D. Movement of carbon dioxide from tissues to blood**
- 2. What describes the dependent variable in an experiment?**
 - A. It is the variable that is manipulated**
 - B. It is the variable being measured**
 - C. It remains constant throughout the experiment**
 - D. It is the control factor**
- 3. What role does the cell membrane play in a cell?**
 - A. Stores genetic information**
 - B. Controls what enters and exits the cell**
 - C. Produces energy from glucose**
 - D. Packages proteins for transport**
- 4. What is formed when atoms join together?**
 - A. Compound**
 - B. Molecule**
 - C. Mixture**
 - D. Ion**
- 5. Which part of the heart is responsible for the contraction that pushes blood out to the lungs and body?**
 - A. Atria**
 - B. Ventricles**
 - C. Valves**
 - D. Septum**

- 6. What keeps blood flowing in one direction through the heart and blood vessels?**
- A. Veins**
 - B. Valves**
 - C. Atria contraction**
 - D. Ventricular pressure**
- 7. Which type of amino acids must be obtained from the diet?**
- A. Non-essential amino acids**
 - B. Conditional amino acids**
 - C. Essential amino acids**
 - D. Substitutable amino acids**
- 8. What is the shape of bacilli bacteria?**
- A. Spiral shaped**
 - B. Rod shaped**
 - C. Round shaped**
 - D. Filamentous**
- 9. Which macronutrient includes carbohydrates, proteins, nucleic acids, and lipids?**
- A. Vitamins**
 - B. Minerals**
 - C. Macronutrients**
 - D. Micronutrients**
- 10. How do simple sugars relate to complex carbohydrates?**
- A. They are monomers building complex carbohydrates**
 - B. They are produced from complex carbohydrates**
 - C. They are the same as polysaccharides**
 - D. They are a type of protein**

Answers

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

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Explanations

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1. What does diffusion refer to in respiratory terms?

- A. Movement of gases from the lungs into the blood
- B. Movement of material from high concentration to low concentration**
- C. Movement of oxygen from blood to tissues
- D. Movement of carbon dioxide from tissues to blood

In respiratory terms, diffusion refers specifically to the movement of gases, which occurs due to concentration gradients. The definition provided in option B encapsulates the fundamental principle of diffusion, stating that it involves the movement of material from areas of high concentration to areas of low concentration. This is crucial in the respiratory process, as it allows for the exchange of gases such as oxygen and carbon dioxide. In the lungs, oxygen concentration is typically higher than in the blood, prompting oxygen to diffuse into the bloodstream. Conversely, the concentration of carbon dioxide is higher in the blood than in the lungs, leading carbon dioxide to diffuse out of the blood and into the lungs for exhalation. This process of gas exchange is vital for maintaining proper oxygen and carbon dioxide levels within the body and is facilitated by the principles of diffusion. Understanding this concept is key for comprehending how respiratory physiology works and how breathing facilitates gas exchange, ultimately supporting cellular respiration across all bodily tissues. While the other options describe important aspects of gas transport and exchange, they do not capture the broader mechanism of diffusion as clearly as option B does.

2. What describes the dependent variable in an experiment?

- A. It is the variable that is manipulated
- B. It is the variable being measured**
- C. It remains constant throughout the experiment
- D. It is the control factor

The dependent variable in an experiment is the variable that is being measured or observed to assess the effects of the independent variable. When researchers manipulate the independent variable, they do this with the expectation that it will cause a change in the dependent variable. Thus, the dependent variable provides data that helps answer the research question. In contrast, the independent variable is the one being manipulated, while control factors are kept constant to ensure that the results are due to the independent variable alone. These distinctions are crucial in designing an experiment effectively to determine cause-and-effect relationships.

3. What role does the cell membrane play in a cell?

- A. Stores genetic information
- B. Controls what enters and exits the cell**
- C. Produces energy from glucose
- D. Packages proteins for transport

The cell membrane, also known as the plasma membrane, serves a crucial function in maintaining the internal environment of the cell by controlling what enters and exits. It is selectively permeable, meaning it regulates the passage of substances based on their size, charge, and solubility. This selective permeability helps the cell maintain homeostasis, allowing it to retain necessary nutrients and expel waste products effectively. The cell membrane is composed of a phospholipid bilayer with embedded proteins that assist in the transport of materials across the membrane. Some proteins act as channels or carriers, facilitating the movement of specific ions and molecules, while other proteins serve as receptors that respond to signals from the environment. In contrast, the other roles listed in the choices do not pertain to the cell membrane. Storing genetic information is primarily the function of the nucleus and DNA. Producing energy from glucose is mainly carried out by the mitochondria, where cellular respiration occurs. Lastly, packing proteins for transport is a function of the endoplasmic reticulum and Golgi apparatus, which modify and prepare proteins for distribution within the cell or for export outside the cell. Thus, while all these cellular activities are vital, the cell membrane's primary responsibility is to regulate the internal and external cell environment.

4. What is formed when atoms join together?

- A. Compound
- B. Molecule**
- C. Mixture
- D. Ion

When atoms join together, they form a molecule. A molecule is a group of two or more atoms bonded together through chemical bonds. This bonding can occur in various ways, including covalent bonding, where atoms share electrons, or ionic bonding, where electrons are transferred between atoms. Molecules can consist of the same type of atom, like O₂, which is a molecule of oxygen, or different types of atoms, such as H₂O, which is a water molecule composed of hydrogen and oxygen. Understanding molecules is fundamental in chemistry, as they represent the smallest units of substances that retain the properties of those substances. Compounds, for instance, are specific types of molecules that contain at least two different types of elements chemically bonded together, which distinguishes them from simple molecules made up of identical atoms. Mixtures consist of two or more substances that are combined physically rather than chemically, meaning their individual chemical properties remain unchanged. Ions, on the other hand, are charged atoms or molecules that have either gained or lost electrons, and while ions can form compounds and molecules, they themselves are distinct entities. Therefore, the correct answer emphasizes the formation of molecules as a fundamental concept in understanding chemical interactions.

5. Which part of the heart is responsible for the contraction that pushes blood out to the lungs and body?

A. Atria

B. Ventricles

C. Valves

D. Septum

The ventricles are the key chambers of the heart responsible for pumping blood out to the lungs and the rest of the body. The heart consists of four chambers: the two upper chambers, known as the atria, and the two lower chambers, the ventricles. During the cardiac cycle, the ventricles contract in a phase called systole, which generates the necessary pressure to propel blood. The right ventricle sends deoxygenated blood to the lungs for oxygenation, while the left ventricle pumps oxygenated blood out to the systemic circulation. The atria, on the other hand, play a supporting role by receiving blood returning to the heart but do not have the strength needed for the significant contraction required to propel blood out. Valves are essential components of the heart that ensure unidirectional blood flow and prevent backflow but do not contribute to the contraction needed for blood ejection. The septum is a muscular wall that separates the right and left sides of the heart, maintaining the distinct pressure and flow of blood in each chamber, but again does not directly engage in the contraction that pushes blood from the heart. Thus, the ventricles are uniquely structured and functionally designed to handle the task of propelling blood throughout the body

6. What keeps blood flowing in one direction through the heart and blood vessels?

A. Veins

B. Valves

C. Atria contraction

D. Ventricular pressure

Blood flow in the heart and blood vessels is primarily regulated by valves, which are critical for ensuring that blood travels in a single direction. Valves are specialized structures located between the chambers of the heart and in the veins. Their primary function is to prevent the backflow of blood, thereby ensuring that the blood moves efficiently through the circulatory system. In the heart, there are four main valves: the tricuspid valve, pulmonary valve, mitral valve, and aortic valve. These valves open and close in response to the pressure changes during the cardiac cycle. When the heart contracts, the valves open to allow blood to flow into the next chamber or into the arteries, and they close to prevent blood from flowing backward when the heart relaxes. While other elements, such as veins, atria contraction, and ventricular pressure, play roles in the overall circulatory process, they do not directly control the direction of blood flow as valves do. Veins are responsible for returning blood to the heart, atria contraction helps fill the ventricles and move blood into them, and ventricular pressure contributes to the movement of blood into systemic and pulmonary circulation. However, it is the valves that are essential for maintaining unidirectional flow within the heart and throughout the

7. Which type of amino acids must be obtained from the diet?

- A. Non-essential amino acids
- B. Conditional amino acids
- C. Essential amino acids**
- D. Substitutable amino acids

Essential amino acids are those that cannot be synthesized by the body and therefore must be obtained through dietary sources. There are nine amino acids classified as essential for adults, which include leucine, isoleucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine, and histidine. These amino acids play crucial roles in protein synthesis, tissue repair, and various metabolic processes. In contrast, non-essential amino acids can be produced by the body, meaning they do not need to be consumed through the diet. Conditional amino acids may become essential under certain physiological conditions or stress but are generally not required in the diet under normal circumstances. Substitutable amino acids is not a widely recognized classification in nutrition, and therefore does not pertain to the need for dietary intake of amino acids. Understanding the distinction between essential and non-essential amino acids is vital for nutritional science, as it underscores the importance of a balanced diet to meet the body's needs for amino acids that support overall health and function.

8. What is the shape of bacilli bacteria?

- A. Spiral shaped
- B. Rod shaped**
- C. Round shaped
- D. Filamentous

Bacilli bacteria are characterized by their rod-shaped structure. This form is a defining feature of bacilli and distinguishes them from other bacterial shapes. The rod shape allows for a greater surface area relative to volume, which can be beneficial for nutrient absorption and growth. In addition to being rod-shaped, bacilli can vary in size and arrangement. They may occur singly, in pairs, or in chains, providing a diverse range of morphological characteristics within the bacillus classification. The rod shape is crucial for their classification in microbiology and helps in the identification and understanding of their physiology and behavior in various environments. Other shapes of bacteria, such as spiral (associated with spirilla or spirochetes), round (cocci), and filamentous (which can represent certain types of actinobacteria or fungi), do not apply to bacilli specifically. Hence, the identification of bacilli as rod-shaped is essential for proper classification and understanding of bacterial morphology.

9. Which macronutrient includes carbohydrates, proteins, nucleic acids, and lipids?

A. Vitamins

B. Minerals

C. Macronutrients

D. Micronutrients

The category of macronutrients encompasses essential nutrients that are required in larger amounts for the body to function properly. This group includes carbohydrates, proteins, nucleic acids, and lipids, each playing vital roles in bodily processes. Carbohydrates serve as a primary energy source, proteins are crucial for growth and repair of tissues, nucleic acids (such as DNA and RNA) are fundamental for genetic information storage and transfer, and lipids (fats and oils) are important for energy storage, insulation, and cellular structure. Together, these macronutrients are integral to maintaining health and supporting metabolic processes. In contrast, vitamins and minerals fall under the category of micronutrients, which are needed in smaller amounts but are still critical for various physiological functions. Vitamins support a range of biochemical reactions, while minerals are key in numerous structural and regulatory functions within the body's systems. Thus, the answer accurately reflects the correct grouping of these fundamental nutrients.

10. How do simple sugars relate to complex carbohydrates?

A. They are monomers building complex carbohydrates

B. They are produced from complex carbohydrates

C. They are the same as polysaccharides

D. They are a type of protein

Simple sugars, also known as monosaccharides, serve as the fundamental building blocks for complex carbohydrates, which include oligosaccharides and polysaccharides. Complex carbohydrates are formed when multiple monosaccharides are linked together through glycosidic bonds in a process called polymerization. For instance, when two monosaccharides join, they create a disaccharide, and when many monosaccharides join, they can form long chains that are categorized as polysaccharides, such as starch, glycogen, and cellulose. This construction emphasizes the connection between simple sugars and complex carbohydrates, illustrating how the former is essential for the formation of the latter. Other options do not accurately represent the relationship between simple sugars and complex carbohydrates. For example, simple sugars are not produced from complex carbohydrates; instead, complex carbohydrates can be broken down into simple sugars through digestion. Additionally, simple sugars and polysaccharides are distinctly different, with polysaccharides being much larger and more complex structures composed of many monosaccharide units. Lastly, simple sugars are carbohydrates, not proteins, further clarifying their classification within macronutrients. This context reinforces why the understanding of simple sugars as the monomers that build complex carbohydrates is key in nutrition and biochemistry.