StraighterLine Microbiology Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. The two major groups of helminths are?

A. Flatworms and parasites

B. Acanthocephalans and roundworms

C. Roundworms and flatworms

D. Cestodes and nematodes

2. A reducing medium contains which type of substances?

A. Substances that promote growth

B. Substances that remove oxygen

C. Substances that provide nutrients

D. Substances that stimulate fermentation

3. What is the time interval from parent cell to the formation of two new daughter cells called?

A. Replication time

B. Division time

C. Generation time

D. Growth phase

4. Glycolysis and the Krebs cycle yield how many molecules of NADH per molecule of glucose during respiration?

A. 8

B. 10

C. 12

D. 5

5. Which term refers to the energy-releasing reactions in cellular metabolism?

A. Endergenic

B. Exergenic

C. Photogenic

D. Catabolic

6. What does semiconservative replication refer to in DNA synthesis?

A. Two newly synthesized strands forming a new DNA molecule

B. Both strands of DNA are completely new

C. An original parent DNA strand and one newly synthesized strand

D. Replication with error correction mechanisms

7. Which organism is commonly associated with causing cellulitis?

A. Escherichia coli

B. Staphylococcus aureus

C. Clostridium perfringens

D. Streptococcus pneumoniae

8. Which of the following is not a function of the eukaryotic glycocalyx?

A. Protection

B. Cell recognition

C. Attachment to surfaces

D. Movement

9. An organism that can exist in both oxygen and oxygen-free environments is a?

A. Aerobe

B. Microaerophile

C. Facultative anaerobe

D. Obligate anaerobe

10. Which term best describes an organism that is photosynthetic but can also use organic compounds for energy in the absence of light?

A. Photoautotroph

B. Photoheterotroph

C. Chemoautotroph

D. Chemoheterotroph

Answers

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

Explanations

1. The two major groups of helminths are?

A. Flatworms and parasites

B. Acanthocephalans and roundworms

C. Roundworms and flatworms

D. Cestodes and nematodes

The correct identification of the two major groups of helminths is based on their anatomical and functional characteristics. Helminths are categorized into three primary groups based on their morphology: flatworms, roundworms, and thorny-headed worms (acanthocephalans). Flatworms encompass two specific classes: cestodes (tapeworms) and trematodes (flukes), while roundworms are represented by nematodes. Thus, the two major groups referred to in the question are encompassed by the terms "flatworms" and "roundworms," making this option accurate in summarizing the primary classifications within the helminth category. While options referencing specific types of helminths, such as cestodes and nematodes, do denote distinct groups, they do not provide the broader classification of flatworms and roundworms as a whole. Therefore, recognizing flatworms and roundworms as the overarching groups offers a comprehensive understanding of helminthology, which is essential for studying the diversity and characteristics of these parasitic organisms.

2. A reducing medium contains which type of substances?

A. Substances that promote growth

B. Substances that remove oxygen

C. Substances that provide nutrients

D. Substances that stimulate fermentation

A reducing medium is specifically designed to create an environment that is low in oxygen. This is accomplished by incorporating various reducing agents that chemically react with oxygen, effectively removing it from the medium. Such environments are particularly beneficial for the cultivation of anaerobic organisms, which thrive in the absence of oxygen. These microorganisms rely on fermentation or anaerobic respiration for their energy needs, making reducing media essential for their study and growth. While substances that promote growth, provide nutrients, or stimulate fermentation are important in many types of media, they do not specifically define what a reducing medium is. The key characteristic of a reducing medium lies in its ability to keep oxygen levels low, which is critical for the growth of anaerobes and certain other sensitive microorganisms.

3. What is the time interval from parent cell to the formation of two new daughter cells called?

A. Replication time

B. Division time

C. Generation time

D. Growth phase

The time interval from a parent cell to the formation of two new daughter cells is referred to as generation time. This term specifically denotes the period required for a single cell to divide and produce two cells, effectively measuring how quickly a population of cells can double under specific conditions. In microbiology, understanding generation time is crucial for predicting population growth rates, assessing microbial dynamics, and optimizing conditions for culture growth. Factors influencing generation time include nutrient availability, environmental conditions, and the species of the microorganism itself. The other terms listed relate to different concepts: for instance, replication time refers specifically to the time it takes for DNA to replicate, while division time is often used interchangeably with generation time but can have specific nuances based on context. Growth phase describes distinct stages in the growth curve of a microbial population, such as lag, exponential, stationary, and death phases, rather than measuring the time taken for division.

4. Glycolysis and the Krebs cycle yield how many molecules of NADH per molecule of glucose during respiration?

A. 8

B. 10

C. 12

D. 5

The yield of NADH during glycolysis and the Krebs cycle for one molecule of glucose is a critical aspect of cellular respiration. During glycolysis, which occurs in the cytoplasm, one molecule of glucose is broken down into two molecules of pyruvate. This process generates a total of two molecules of NADH. Following glycolysis, each pyruvate enters the mitochondria and is converted into acetyl-CoA, which produces an additional molecule of NADH for each pyruvate formed. Since two pyruvate molecules are produced from one glucose molecule, this results in two more NADH molecules, bringing the subtotal from glycolysis and the conversion to acetyl-CoA to four NADH. Next, in the Krebs cycle (also known as the citric acid cycle or TCA cycle), each acetyl-CoA that enters the cycle results in three molecules of NADH. Since two acetyl-CoA molecules are derived from one glucose molecule (as one glucose produces two pyruvate), the Krebs cycle produces a total of six NADH (3 NADH per acetyl-CoA times 2 acetyl-CoA). When you combine the NADH produced from both glycolysis and the Krebs cycle, you obtain a total of

5. Which term refers to the energy-releasing reactions in cellular metabolism?

A. Endergenic

B. Exergenic

C. Photogenic

D. Catabolic

In cellular metabolism, the term that refers to energy-releasing reactions is indeed associated with the concept of exergonic reactions. These reactions are characterized by a release of energy, typically in the form of ATP (adenosine triphosphate), which can then be utilized for various cellular processes. During exergonic reactions, such as cellular respiration, complex molecules are broken down into simpler products, resulting in a net release of free energy. This is pivotal for cells, as it powers functions necessary for survival, including movement, biosynthesis, and maintaining homeostasis. While the term "catabolic" also describes some energy-releasing processes, it specifically refers to the breakdown of larger molecules into smaller ones. All catabolic reactions are, by their nature, exergonic; however, the term exergonic directly emphasizes the thermodynamic aspect of energy release in broader contexts, not limited to only catabolic reactions. The other terms provided do not fit the context as closely. "Endergenic" refers to reactions that require energy input, "photogenic" is typically not used in this context but can refer to processes involving light energy, and thus do not accurately define energy-releasing reactions.

6. What does semiconservative replication refer to in DNA synthesis?

A. Two newly synthesized strands forming a new DNA molecule

B. Both strands of DNA are completely new

C. An original parent DNA strand and one newly synthesized strand

D. Replication with error correction mechanisms

Semiconservative replication is a fundamental concept in molecular biology that describes the process by which DNA is replicated. In this process, each of the two strands of the original DNA double helix serves as a template for the formation of a new complementary strand. As a result, each newly formed DNA molecule consists of one original (parent) strand and one newly synthesized strand. This mechanism ensures that the genetic information is accurately preserved through generations of cells. This model of replication supports genetic fidelity, as the parent strand—having existed prior to the replication—provides a reliable guide for synthesizing the new complementary strand. This is crucial for maintaining the integrity of the genetic code across cell divisions. The process of semiconservative replication was famously demonstrated by the Meselson-Stahl experiment, which provided clear evidence supporting this model. The other options do not accurately reflect the nature of semiconservative replication. For example, the idea of two newly synthesized strands forming a new DNA molecule overlooks the parental strand's critical role in the process. Similarly, stating that both strands of DNA are completely new contradicts the essence of semiconservative replication. Lastly, while replication with error correction mechanisms is an important aspect of DNA synthesis, it does not define the semiconservative nature

7. Which organism is commonly associated with causing cellulitis?

A. Escherichia coli

B. Staphylococcus aureus

C. Clostridium perfringens

D. Streptococcus pneumoniae

Cellulitis is a common, potentially serious bacterial skin infection that primarily affects the deeper layers of the skin and the underlying tissue. Staphylococcus aureus is particularly well-known for being a major pathogen involved in cellulitis. This bacteria is capable of penetrating the skin through breaks or wounds, leading to infection. Staphylococcus aureus can cause localized inflammation, redness, swelling, and pain, which are characteristic symptoms of cellulitis. Additionally, it is an opportunistic pathogen, meaning it can exploit pre-existing conditions such as skin breaks or chronic illnesses, which further facilitates its ability to cause infections like cellulitis. While other organisms can also be involved in skin infections, Staphylococcus aureus is the most prevalent cause due to its virulence factors and ability to adhere to and invade tissues. This highlights its role as a primary culprit in the onset of cellulitis, making it the correct choice in this question.

8. Which of the following is not a function of the eukaryotic glycocalyx?

A. Protection

B. Cell recognition

C. Attachment to surfaces

D. Movement

The glycocalyx in eukaryotic cells is a gelatinous coating that surrounds the cell membrane and serves several essential functions. It primarily provides protection to the cell, helping to shield it from physical damage and immune system attacks. Additionally, the glycocalyx plays a role in cell recognition, allowing cells to communicate and identify each other through specific receptor interactions. Furthermore, it aids in attachment to surfaces, which can be critical for cells forming tissues or establishing colonies. Movement, however, is not a function associated with the glycocalyx. Eukaryotic cells typically achieve movement through structures such as flagella and cilia, which are made up of microtubules and are distinct from the glycocalyx. Therefore, while the glycocalyx contributes to various vital processes, it does not facilitate movement, making this the correct conclusion.

9. An organism that can exist in both oxygen and oxygen-free environments is a?

A. Aerobe

B. Microaerophile

C. Facultative anaerobe

D. Obligate anaerobe

The correct answer is that an organism capable of existing in both oxygen and oxygen-free environments is classified as a facultative anaerobe. This is because facultative anaerobes are versatile organisms that can utilize oxygen for aerobic respiration when it is available but can also switch to anaerobic processes, such as fermentation, in the absence of oxygen. This adaptability allows them to thrive in a variety of environments, whether oxygen-rich or oxygen-poor. Other types of organisms mentioned in the choices include aerobes, which require oxygen for growth, and obligate anaerobes, which cannot survive in the presence of oxygen. Microaerophiles, on the other hand, require a lower concentration of oxygen than what is present in the atmosphere for optimal growth. Each of these groups has specific oxygen requirements and limitations, whereas facultative anaerobes are defined by their ability to adapt to varying oxygen levels.

10. Which term best describes an organism that is photosynthetic but can also use organic compounds for energy in the absence of light?

A. Photoautotroph

B. Photoheterotroph

C. Chemoautotroph

D. Chemoheterotroph

The term that best describes an organism that is photosynthetic but can also utilize organic compounds for energy in the absence of light is "photoheterotroph." Photoheterotrophs can harness light energy to drive their metabolic processes but have the flexibility to absorb organic compounds when light is not available. This dual capability allows them to thrive in varying environmental conditions, using light for energy when it's available and organic sources when it is not. In contrast, photoautotrophs primarily use light energy to convert inorganic substances, such as carbon dioxide, into organic compounds, relying heavily on photosynthesis to generate their energy and building blocks. Chemoautotrophs obtain energy by oxidizing inorganic compounds and do not rely on light or organic compounds. Chemoheterotrophs, on the other hand, acquire both energy and carbon from organic compounds but do not utilize photosynthesis at all. Thus, "photoheterotroph" is the most accurate term for organisms that require both sunlight and organic compounds for energy.