

HOSA Biomedical Laboratory Practice Test (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. Which structure is involved in protein synthesis within a cell?**
 - A. Golgi Apparatus**
 - B. Ribosome**
 - C. Vesicle**
 - D. Lysosome**
- 2. What is the primary role of the kidney concerning plasma?**
 - A. Maintain plasma pH levels**
 - B. Concentrate urine for waste removal**
 - C. Filter blood to produce urine**
 - D. Produce red blood cells and hormones**
- 3. Which bacterium is commonly used in genetics and biotechnology and is rod-shaped?**
 - A. Bacillus subtilis**
 - B. E. coli**
 - C. Staphylococcus aureus**
 - D. Streptococcus pneumoniae**
- 4. What do we call an organism that has two identical alleles for a particular gene?**
 - A. Heterozygous**
 - B. Homozygous**
 - C. Dominant**
 - D. Recessive**
- 5. What are acanthocytes characterized by?**
 - A. Multiple, irregular, club-shaped projections from the cell surface**
 - B. Evenly distributed spikes all over the cell**
 - C. Small size compared to normal RBCs**
 - D. Increased central pallor**

- 6. Decreased hemoglobin levels in red blood cells often lead to which condition?**
- A. Macrocytic anemia**
 - B. Hypochromic anemia**
 - C. Polycythemia**
 - D. Thrombocytopenia**
- 7. What is a simple carbohydrate composed of hydrogen, carbon, and oxygen called?**
- A. Starch**
 - B. Fiber**
 - C. Sugar**
 - D. Protein**
- 8. What is the process of synthesizing RNA using a DNA strand as a template called?**
- A. Replication**
 - B. Transcription**
 - C. Translation**
 - D. Mutation**
- 9. Which of the following best describes the term "anatomy"?**
- A. The study of cell structures**
 - B. The study of living organisms' processes**
 - C. The study of body structure and organization**
 - D. The study of genetic variation**
- 10. What does polychromasia indicate about red blood cells?**
- A. Normal RBC function**
 - B. Bone marrow response to anemia**
 - C. Presence of reticulocytes**
 - D. Iron overload in blood**

Answers

SAMPLE

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

SAMPLE

Explanations

SAMPLE

1. Which structure is involved in protein synthesis within a cell?

A. Golgi Apparatus

B. Ribosome

C. Vesicle

D. Lysosome

The correct answer, ribosome, plays a crucial role in the process of protein synthesis within a cell. Ribosomes are complex molecular machines made up of ribosomal RNA and proteins. They can be found free-floating in the cytoplasm or attached to the endoplasmic reticulum, creating what is known as rough ER. During protein synthesis, ribosomes facilitate the translation of messenger RNA (mRNA) into a polypeptide chain, which eventually folds into a functional protein. The ribosome reads the codons on the mRNA sequence and matches them to the appropriate transfer RNA (tRNA) that carries specific amino acids. This process is essential for the expression of genes into functional proteins that perform a multitude of tasks in the cell, from structural components to enzymes. The other structures mentioned, while important for various cellular functions, do not directly engage in the synthesis of proteins. The Golgi apparatus, for example, is primarily involved in modifying, sorting, and packaging proteins for secretion or delivery to other organelles. Vesicles are small membrane-bound sacs that transport materials within the cell but do not synthesize proteins. Lysosomes contain enzymes that digest cellular waste and macromolecules but are not involved in assembling amino acids into proteins.

2. What is the primary role of the kidney concerning plasma?

A. Maintain plasma pH levels

B. Concentrate urine for waste removal

C. Filter blood to produce urine

D. Produce red blood cells and hormones

The primary role of the kidney concerning plasma is to filter blood to produce urine. This process involves the kidneys removing waste products, excess substances, and toxins from the blood, which is crucial for maintaining homeostasis within the body. The kidneys filter approximately 120-150 quarts of blood daily, producing about 1-2 quarts of urine, which contains these filtered waste products and excess electrolytes. Through this filtration process, the kidneys help regulate various important parameters in the plasma, such as electrolyte balance, volume, and pressure. By filtering the blood, the kidneys ensure that harmful substances do not accumulate in the bloodstream, thus playing a vital role in overall bodily function and health. This function underscores the kidneys' importance in the excretion of not only waste but also in regulating plasma composition, contributing significantly to the body's ability to maintain a stable internal environment.

3. Which bacterium is commonly used in genetics and biotechnology and is rod-shaped?

- A. *Bacillus subtilis*
- B. *E. coli***
- C. *Staphylococcus aureus*
- D. *Streptococcus pneumoniae*

Escherichia coli, commonly known as *E. coli*, is a rod-shaped bacterium that plays a significant role in genetics and biotechnology. This microorganism is extensively utilized as a model organism in molecular biology due to its well-characterized genetics and rapid growth rate. *E. coli* is particularly valuable for cloning, gene expression, and protein production because it can easily take up plasmid DNA and express foreign genes. In addition, *E. coli*'s genome has been fully sequenced, which allows researchers to manipulate its genetic structure for various experiments. Its ability to grow quickly and produce large quantities of proteins makes it ideal for laboratory use, especially in recombinant DNA technology. This makes *E. coli* a cornerstone of genetic engineering and biotechnology applications, making it an essential tool for scientists working in these fields. Other bacteria listed do have their uses in other contexts but do not match the specific criteria of being rod-shaped and having extensive application in genetics and biotechnology to the extent that *E. coli* does.

4. What do we call an organism that has two identical alleles for a particular gene?

- A. Heterozygous
- B. Homozygous**
- C. Dominant
- D. Recessive

An organism that has two identical alleles for a particular gene is referred to as homozygous. This means that both copies of the gene, one inherited from each parent, are the same. For instance, if the alleles for a gene are represented as "AA" or "aa," the organism is homozygous for that particular gene. This genetic configuration can play a significant role in determining the organism's traits since homozygous individuals will consistently express the same trait associated with those identical alleles. In contrast, heterozygous organisms possess two different alleles for a gene (e.g., "Aa"), which can lead to a variety of traits depending on the dominance of the alleles involved. The terms "dominant" and "recessive" are used to describe the relationship between different alleles rather than the relationship between the alleles themselves. A dominant allele masks the effect of a recessive one in a heterozygous pairing. Hence, understanding these terms and definitions is crucial for interpreting genetic information accurately.

5. What are acanthocytes characterized by?

- A. Multiple, irregular, club-shaped projections from the cell surface**
- B. Evenly distributed spikes all over the cell**
- C. Small size compared to normal RBCs**
- D. Increased central pallor**

Acanthocytes are indeed characterized by multiple, irregular, club-shaped projections from the cell surface. These projections, also known as spicules or spikes, are unevenly distributed, giving acanthocytes their distinctive appearance. The irregular shape of these projections results from alterations in the lipid composition of the red blood cell membrane, often associated with conditions such as abetalipoproteinemia or liver disease. This unique morphology contrasts with other abnormal red blood cell shapes, such as echinocytes, which have evenly distributed spine-like projections. The size of acanthocytes tends to be similar to that of normal red blood cells rather than being smaller, and they typically do not exhibit increased central pallor, as this feature pertains more to other types of cells affected by conditions like hypochromic anemia. Thus, the defining characteristic of acanthocytes is their irregular, club-shaped projections, making them easily identifiable under a microscope in pathological specimens.

6. Decreased hemoglobin levels in red blood cells often lead to which condition?

- A. Macrocytic anemia**
- B. Hypochromic anemia**
- C. Polycythemia**
- D. Thrombocytopenia**

Decreased hemoglobin levels in red blood cells are often associated with hypochromic anemia. This condition is characterized by the presence of red blood cells that have less color than normal, which is a direct result of reduced hemoglobin content. Hemoglobin is the protein responsible for carrying oxygen in the blood, and when levels are insufficient, it leads to a decrease in the oxygen-carrying capacity of red blood cells, making them appear paler (hypochromic). Hypochromic anemia can arise from various causes, such as iron deficiency, where the body lacks the necessary iron to produce adequate hemoglobin. As iron is crucial for hemoglobin synthesis, a deficiency leads to both decreased hemoglobin levels and the hypochromic appearance of red blood cells. The other conditions listed do not directly correlate with decreased hemoglobin levels in the same way. Macrocytic anemia, for example, is characterized by larger than normal red blood cells and is typically linked to vitamin B12 or folate deficiencies. Polycythemia, on the other hand, involves an increase in red blood cell mass, which is opposite to the scenario presented. Thrombocytopenia refers to a low platelet count, which is unrelated to hemoglobin levels in

7. What is a simple carbohydrate composed of hydrogen, carbon, and oxygen called?

- A. Starch**
- B. Fiber**
- C. Sugar**
- D. Protein**

A simple carbohydrate is a type of carbohydrate that consists of sugar molecules, specifically monosaccharides or disaccharides, which are made up of hydrogen, carbon, and oxygen atoms in specific ratios. The simplest form among carbohydrates is glucose, which is a monosaccharide. Other examples include fructose and galactose. Sugars, which fall under the category of simple carbohydrates, are quickly absorbed by the body and provide a rapid source of energy. This makes them distinct from more complex carbohydrates, like starch and fiber, which are made up of longer chains of sugar molecules. Starch is a complex carbohydrate composed of many glucose units, while fiber, also a complex carbohydrate, is made up of non-digestible polysaccharides. Proteins, on the other hand, consist of amino acids and contain nitrogen in addition to carbon, hydrogen, and oxygen, which distinguishes them from carbohydrates. Overall, the identification of sugar as the correct answer is rooted in its fundamental structure as a simple carbohydrate, differentiating it from the other types of macromolecules listed.

8. What is the process of synthesizing RNA using a DNA strand as a template called?

- A. Replication**
- B. Transcription**
- C. Translation**
- D. Mutation**

The process of synthesizing RNA using a DNA strand as a template is called transcription. During transcription, an enzyme known as RNA polymerase binds to the DNA at a specific region and unwinds the double helix. This allows the enzyme to read the sequence of nucleotides on the DNA template strand and synthesize a complementary RNA strand. The RNA produced during this process can be messenger RNA (mRNA), transfer RNA (tRNA), or ribosomal RNA (rRNA), depending on the specific needs of the cell. This process is fundamental to gene expression, where the information encoded in DNA is translated into functional molecules, primarily proteins. Understanding transcription is crucial for many areas of molecular biology, genetics, and biochemistry, as it serves as the first step in the flow of genetic information from DNA to RNA to protein. Other options, such as replication, involve copying DNA for cell division; translation refers to the conversion of mRNA into a protein; and mutation denotes changes in the DNA sequence, which are unrelated to the synthesis of RNA.

9. Which of the following best describes the term "anatomy"?

- A. The study of cell structures**
- B. The study of living organisms' processes**
- C. The study of body structure and organization**
- D. The study of genetic variation**

The term "anatomy" is best described as the study of body structure and organization. This encompasses the examination of the various components that make up the body, including individual organs, systems, and their relationships to one another. Understanding anatomy is crucial for biomedical professionals, as it provides foundational knowledge for areas such as medicine, surgery, and various health sciences. The other choices reflect different biological concepts: the study of cell structures pertains to cytology, the study of living organisms' processes relates to physiology, and the study of genetic variation is focused on genetics. While these areas are important in the field of biology, they do not specifically define anatomy, which is fundamentally about the physical layout and composition of the body's parts. Thus, the correct answer highlights the primary focus of anatomy in understanding the structural aspects of living organisms.

10. What does polychromasia indicate about red blood cells?

- A. Normal RBC function**
- B. Bone marrow response to anemia**
- C. Presence of reticulocytes**
- D. Iron overload in blood**

Polychromasia refers to the presence of red blood cells (RBCs) that exhibit a varied staining color when viewed under a microscope, indicating that these cells are not fully mature. This condition suggests that the bone marrow is responding to a demand for more red blood cells, often in the context of anemia. When anemia occurs, the bone marrow is stimulated to produce more red blood cells, leading to the release of younger, less mature cells into the bloodstream. These immature RBCs, which are often slightly larger and may retain more RNA than their fully mature counterparts, exhibit a basophilic (blue hue) color change due to the presence of reticulocytes, which are the precursor cells to mature red blood cells. Therefore, a finding of polychromasia is interpreted as a sign of the bone marrow's adaptive response to anemia, where it is trying to compensate for a lower-than-normal count of healthy RBCs.