

Natural Science 2 (NAS 2) Challenge Practice Exam (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 nucleic acids are essential for life?**
 - A. RNA and DNA**
 - B. Glucose and Glycogen**
 - C. Insulin and Hemoglobin**
 - D. Proteins and Lipids**
- 2. Which term refers to the limbs of the body?**
 - A. Appendicular**
 - B. Axial**
 - C. Distal**
 - D. Medial**
- 3. In which stage of mitosis do chromosomes condense and the nucleolus disappears?**
 - A. Prophase**
 - B. Metaphase**
 - C. Anaphase**
 - D. Telophase**
- 4. Which term is used to describe a structure farther from the midline?**
 - A. Medial**
 - B. Lateral**
 - C. Superficial**
 - D. Deep**
- 5. The term superficial refers to what aspect of body orientation?**
 - A. Close to the surface of the body**
 - B. Farther from the midline**
 - C. Away from the surface of the body**
 - D. Near the back of the body**

- 6. Which component of the compound light microscope connects the eyepiece to the objective lenses?**
- A. Head**
 - B. Arm**
 - C. Base**
 - D. Stage**
- 7. What does the atomic number of an element indicate?**
- A. The number of neutrons**
 - B. The number of protons**
 - C. The total number of particles**
 - D. The total mass of an atom**
- 8. Which optical system is essential for achieving maximum light-gathering capability in a compound light microscope?**
- A. Condenser lens**
 - B. Objective lens**
 - C. Ocular lens**
 - D. Aperture**
- 9. Which type of bond is formed between two ions with opposite charges, where one atom gives up one or more electrons?**
- A. Covalent bond**
 - B. Ionic bond**
 - C. Hydrogen bond**
 - D. Metallic bond**
- 10. What is contained within the pericardial cavity?**
- A. Lungs**
 - B. Heart**
 - C. Stomach**
 - D. Spine**

Answers

SAMPLE

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

SAMPLE

Explanations

SAMPLE

1. Which nucleic acids are essential for life?

A. RNA and DNA

B. Glucose and Glycogen

C. Insulin and Hemoglobin

D. Proteins and Lipids

Nucleic acids, specifically RNA (ribonucleic acid) and DNA (deoxyribonucleic acid), are fundamental molecules necessary for all forms of life. DNA serves as the hereditary material that carries genetic information crucial for the growth, development, and reproduction of organisms. It provides the instructions for building proteins through the process of transcription and translation, which are key functions in cellular processes. On the other hand, RNA plays several vital roles, including the synthesis of proteins as messenger RNA (mRNA) and playing critical roles in ribosomes as ribosomal RNA (rRNA) and as transfer RNA (tRNA), which help in translating the genetic code into functional proteins. Additionally, RNA can have other roles, such as in gene regulation and catalyzing biochemical reactions. The other options consist of biomolecules that, while important for various functions in living organisms, do not fall under the category of nucleic acids. Glucose and glycogen are carbohydrates related to energy storage and metabolism, while insulin and hemoglobin are proteins involved in regulatory and transport functions in the body. Lastly, proteins and lipids are essential macromolecules, but they do not comprise nucleic acids themselves. This highlights the unique and indispensable roles that RNA and DNA

2. Which term refers to the limbs of the body?

A. Appendicular

B. Axial

C. Distal

D. Medial

The term that refers to the limbs of the body is "appendicular." This term is used in anatomy to describe the parts of the skeletal system that include the limbs (arms and legs) as well as the structures that connect them to the trunk, specifically the pelvis and shoulders. The appendicular skeleton is essential for movement, as it facilitates a wide range of motions in the limbs. In contrast, the other terms do not specifically refer to the limbs. The axial term refers to the central part of the body, including the skull, vertebral column, and rib cage. Distal describes a position that is further away from the trunk or point of origin, while medial pertains to something being closer to the midline of the body. Understanding these definitions clarifies the role of the appendicular skeleton in the overall anatomy of the body.

3. In which stage of mitosis do chromosomes condense and the nucleolus disappears?

A. Prophase

B. Metaphase

C. Anaphase

D. Telophase

The correct answer is prophase, as this is the stage in mitosis where several key events occur that are crucial for the successful division of the cell. During prophase, the chromatin—the loose material that makes up chromosomes—begins to condense into visible, distinct chromosomes. This condensation makes it easier to separate the genetic material during later stages of mitosis. Additionally, during prophase, the nucleolus, which is the site of ribosome synthesis within the nucleus, disappears. This dissolution is significant as it marks the beginning of the cell's transition from interphase—when the cell is preparing for division—to the active division phase of mitosis. The disappearance of the nucleolus is an indicator that the cell is moving toward the segregation of its genetic material. This stage also involves the formation of the mitotic spindle, which is crucial for the movement of chromosomes. Understanding prophase is fundamental as it sets the stage for the subsequent actions of metaphase, anaphase, and telophase, which all build on the events initiated in prophase.

4. Which term is used to describe a structure farther from the midline?

A. Medial

B. Lateral

C. Superficial

D. Deep

The term that describes a structure that is farther from the midline of the body is "lateral." In anatomical terminology, the midline refers to the imaginary vertical line that divides the body into equal right and left halves. Structures that are located towards the side, or away from this midline, are referred to as lateral. For example, in human anatomy, the arms are lateral to the chest. Knowing this terminology is essential for describing the relative positions of different body parts accurately. The other terms have specific definitions that refer to different orientations. "Medial" refers to something that is closer to the midline, while "superficial" and "deep" describe the relative depth of structures either towards the surface of the body or further away from it. Thus, lateral is the correct term for indicating something that is positioned away from the midline.

5. The term superficial refers to what aspect of body orientation?

- A. Close to the surface of the body**
- B. Farther from the midline**
- C. Away from the surface of the body**
- D. Near the back of the body**

The term "superficial" is used in anatomy to describe a location that is close to the surface of the body. When discussing body orientation, understanding terms like superficial and deep is essential for accurately describing the relative positions of various structures. In this context, "superficial" indicates layers or structures that are nearer to the outside of the body, as opposed to those that are deeper within. This terminology is crucial for medical professionals and students in accurately conveying information about bodily structures and their relationships, such as during surgery, imaging, or physical examination. The other options do not align with the definition of "superficial" in anatomical terminology.

6. Which component of the compound light microscope connects the eyepiece to the objective lenses?

- A. Head**
- B. Arm**
- C. Base**
- D. Stage**

The component of the compound light microscope that connects the eyepiece to the objective lenses is the arm. The arm provides structural support and houses the components that allow the light to travel from the objective lenses to the eyepiece, where the image is magnified for the viewer. This part of the microscope is integral to the overall functionality as it also aids in carrying and positioning the microscope. The head, which is sometimes confused with the arm, is actually the part that holds the objective lenses and eyepiece but does not connect them directly. The base serves as the foundation of the microscope, providing stability and support, while the stage is the platform where the specimen slide is placed for observation. Each of these components plays a role in the operation of the microscope, but the arm is specifically the element that facilitates the connection between the eyepiece and objectives.

7. What does the atomic number of an element indicate?

- A. The number of neutrons
- B. The number of protons**
- C. The total number of particles
- D. The total mass of an atom

The atomic number of an element is a fundamental concept in chemistry and physics, representing the number of protons present in the nucleus of an atom of that element. This is crucial because the atomic number defines the identity of the element; for example, an atom with an atomic number of 6 is carbon, as it has six protons. The atomic number also determines the chemical properties of the element and its place in the periodic table. Elements are organized in the periodic table by increasing atomic number, which reflects their proton count. This organization helps in understanding trends in element behavior and reactivity. While neutrons and electrons contribute to an atom's mass and overall charge, they are not indicated by the atomic number. The total number of particles in the nucleus (which includes protons and neutrons) is given by the mass number, and the total mass of an atom takes into account the masses of protons, neutrons, and any electrons that may be present. Thus, the atomic number specifically highlights the number of protons in an element's nucleus, making it a key identifier for elements.

8. Which optical system is essential for achieving maximum light-gathering capability in a compound light microscope?

- A. Condenser lens**
- B. Objective lens
- C. Ocular lens
- D. Aperture

The condenser lens is essential for achieving maximum light-gathering capability in a compound light microscope because it focuses light from the microscope's light source onto the specimen being observed. This lens is crucial for illuminating the sample evenly and efficiently, which in turn enhances the resolution and contrast of the image produced by the microscope. The condenser lens helps to concentrate the light rays into a cone that illuminates the specimen, allowing for greater detail to be visible than would be possible with less effective illumination. This control over the light allows for improved visibility of fine details, which is critical in microscopic analysis. Other components like the objective lens and ocular lens play vital roles in image formation and viewing but do not directly influence the amount of light that can be gathered from the specimen itself. The aperture can influence the light that passes through when observing, but it is the condenser that primarily focuses and optimizes this light-gathering process.

9. Which type of bond is formed between two ions with opposite charges, where one atom gives up one or more electrons?

A. Covalent bond

B. Ionic bond

C. Hydrogen bond

D. Metallic bond

An ionic bond is formed between two ions with opposite charges when one atom donates one or more electrons to another atom. This transfer of electrons leads to the formation of positively charged cations and negatively charged anions. The electrostatic attraction between these oppositely charged ions creates a strong bond, resulting in the formation of an ionic compound. In contrast, covalent bonds involve the sharing of electrons between atoms, rather than the transfer. Hydrogen bonds are weak intermolecular forces that typically occur between molecules, particularly those containing hydrogen. Metallic bonds involve a sea of delocalized electrons that are shared among a lattice of metal atoms. Therefore, the characteristic of transferring electrons and the resulting attraction between charged ions uniquely define ionic bonds, making them the correct answer in this context.

10. What is contained within the pericardial cavity?

A. Lungs

B. Heart

C. Stomach

D. Spine

The pericardial cavity specifically contains the heart. This cavity is a fluid-filled space that surrounds the heart and is encased by a double-layered sac known as the pericardium. The primary function of the pericardial cavity is to allow the heart to move freely as it beats, while providing a protective environment that reduces friction between the heart and surrounding structures. The fluid within the cavity also helps to cushion the heart, preventing damage during the contraction and relaxation phases of the heartbeat. The other options listed, such as the lungs, stomach, and spine, are located in different anatomical cavities. The lungs are situated within the thoracic cavity but are enclosed by the pleural cavities, while the stomach is found within the abdominal cavity. The spine is part of the vertebral column and is housed within the spinal cavity. Each of these structures is associated with different protective membranes and spaces that serve their unique functions, which distinguishes them from the pericardial cavity dedicated entirely to the heart.