Texas A&M University (TAMU) BIOL112 Introductory Biology II Exam 3 Practice (Sample)

Study Guide

Everything you need from our exam experts!

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Questions

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1. Which type of tissue would most likely be found forming linings and barriers in organs?

   A. Epithelial tissues

   B. Muscle tissues

   C. Nervous tissues

   D. Connective tissues

2. Which statement is true regarding deuterostome development?

   A. Deuterostome development is indeterminate.

   B. Mesoderm in protostomes arises as outpocketings of the primitive gut.

   C. Radial cleavage is characteristic of protostome development.

   D. In deuterostomes, the blastopore ultimately becomes the mouth of the adult.

3. What is one significant impact of climate change on biodiversity?

   A. Decreased levels of carbon dioxide

   B. Stabilization of ecosystems

   C. Increased extinction risk for vulnerable species

   D. Enhanced adaptation rates for all species

4. Why is the Hardy-Weinberg equilibrium significant?

   A. It explains how mutations occur in species

   B. It helps understand genetic variation in a non-evolving population

   C. It describes the process of allopatric speciation

   D. It maintains stable population sizes

5. What defines a symbiotic relationship?

   A. A relationship where both organisms compete for resources

   B. A mutually beneficial relationship between different species

   C. A relationship that involves predation

   D. A relationship that is harmful to one organism

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6. Why is genetic recombination during meiosis important?

A. It decreases the mutation rates in offspring

B. It helps create identical offspring for successful species survival

C. It enhances genetic diversity, important for evolution and adaptation

D. It prevents genetic disorders from occurring

7. In which group would you find a cloaca?

A. Amphibians

B. Mammals

C. Reptiles

D. All of the above

8. What is the main role of spicules in sponges?

A. Support

B. Reproduction

C. Nourishment

D. Respiration

9. Which of the following is NOT a characteristic of Amphibia?

A. two pairs of limbs

B. lungs

C. external fertilization

D. keratinized skin

10. What type of cells do eggs and sperm represent?

A. Somatic cells

B. Haploid cells

C. Diploid cells

D. Polyploid cells

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Answers

SAMPLE

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

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Explanations

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1. Which type of tissue would most likely be found forming linings and barriers in organs?

A. Epithelial tissues

B. Muscle tissues

C. Nervous tissues

D. Connective tissues

Epithelial tissues are specialized for covering and lining surfaces, making them integral to forming linings and barriers within organs. Their structure consists of tightly packed cells with minimal extracellular matrix, which allows them to create effective barriers and selective permeability in various organs. This characteristic is crucial for protecting underlying tissues, facilitating absorption, and allowing for secretion and sensation. Epithelial tissues can be found in multiple forms, such as simple squamous epithelium that lines blood vessels and alveoli in the lungs, or stratified squamous epithelium that makes up the skin or the lining of the mouth, providing protection against abrasion. Their ability to regenerate quickly also supports their role in linings and barriers where damage can frequently occur. In contrast, muscle tissues are primarily responsible for movement, nervous tissues transmit signals and process information, and connective tissues provide structural support and connect various types of tissues within the body. Each of these tissue types serves distinct functions that do not primarily involve forming linings and barriers as epithelial tissues do.

2. Which statement is true regarding deuterostome development?

A. Deuterostome development is indeterminate.

B. Mesoderm in protostomes arises as outpocketings of the primitive gut.

C. Radial cleavage is characteristic of protostome development.

D. In deuterostomes, the blastopore ultimately becomes the mouth of the adult.

Deuterostome development is indeed characterized as indeterminate. This means that during the early stages of embryonic development, the fate of the cells is not set, allowing for the possibility of producing a complete embryo from individual cells. This contrasts with protostomes, where the developmental fate of the cells is more determined, leading to a more fixed developmental path. The indeterminate nature of deuterostomes allows them to have capabilities such as identical twinning, where one zygote can split and develop into two separate organisms. In the context of the other options, the statements regarding mesoderm formation in protostomes, the nature of cleavage, and the fate of the blastopore are not applicable to deuterostomes. Instead, in deuterostomes, the mesoderm arises from an outpocketing of the gut (not the primitive gut directly), cleavage is typically radial and indeterminate, and importantly, in deuterostomes, the blastopore becomes the anus rather than the mouth.

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3. What is one significant impact of climate change on biodiversity?

A. Decreased levels of carbon dioxide

B. Stabilization of ecosystems

C. Increased extinction risk for vulnerable species

D. Enhanced adaptation rates for all species

One significant impact of climate change on biodiversity is the increased extinction risk for vulnerable species. As climate change leads to alterations in temperature, precipitation patterns, and habitat availability, many species, especially those with specialized habitat requirements or limited ranges, become unable to adapt quickly enough to survive these rapid changes. Habitat destruction from rising sea levels, shifting climatic zones, and more frequent extreme weather events can further threaten species already facing challenges. Species that are already endangered or have small populations are particularly at risk because they often have less genetic diversity and may be less resilient to environmental changes. The loss of biodiversity has far-reaching implications for ecosystems, as each species plays a specific role in its environment, contributing to ecological stability and function. In contrast, the other choices do not accurately reflect the true impacts of climate change. For instance, decreased levels of carbon dioxide do not occur; in fact, CO_2 levels are increasing and contributing to climate change. Ecosystem stabilization is often disrupted rather than promoted by changing climates, and enhanced adaptation rates are not universal or guaranteed for all species. Some species may adapt, but many are likely to face increased mortality or extinction instead.

4. Why is the Hardy-Weinberg equilibrium significant?

A. It explains how mutations occur in species

B. It helps understand genetic variation in a non-evolving population

C. It describes the process of allopatric speciation

D. It maintains stable population sizes

The Hardy-Weinberg equilibrium is significant because it provides a framework for understanding genetic variation in a population that is not evolving. Essentially, it describes a model in which allele frequencies and genotype frequencies remain constant over generations in the absence of evolutionary influences. This means that if a population is in Hardy-Weinberg equilibrium, it is not experiencing forces such as natural selection, mutation, gene flow, or genetic drift, which can change allele frequencies over time. By using the principles of Hardy-Weinberg equilibrium, researchers can measure and assess the changes in genetic frequencies that occur when factors such as selection pressures are applied. This can provide important insights into the mechanisms of evolution and how populations adapt over time. In a practical sense, deviations from Hardy-Weinberg expectations can indicate that a population is undergoing evolutionary change, allowing scientists to delve deeper into the specific factors influencing genetic variation.

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5. What defines a symbiotic relationship?

A. A relationship where both organisms compete for resources

B. A mutually beneficial relationship between different species

C. A relationship that involves predation

D. A relationship that is harmful to one organism

A symbiotic relationship is characterized as a mutually beneficial interaction between different species. In this type of relationship, both organisms involved gain some advantage that contributes to their survival, growth, or reproduction. For instance, in mutualism—a type of symbiotic relationship—both organisms benefit; classic examples include pollinators such as bees aiding in the reproduction of flowering plants while obtaining nectar for themselves. In contrast, other types of interactions, such as competition, predation, or parasitism, do not fit the definition of symbiosis. In competition, organisms vie for the same resources, potentially harming each other and not leading to mutual benefits. Predation describes a relationship where one organism (the predator) benefits at the expense of another (the prey), which is not a mutualistic benefit. Lastly, relationships that are harmful to one organism (like parasitism) involve one organism benefitting while the other suffers, further highlighting the distinction between symbiotic relationships and other types of biological interactions.

6. Why is genetic recombination during meiosis important?

A. It decreases the mutation rates in offspring

B. It helps create identical offspring for successful species survival

C. It enhances genetic diversity, important for evolution and adaptation

D. It prevents genetic disorders from occurring

Genetic recombination during meiosis plays a crucial role in enhancing genetic diversity. This process involves the exchange of genetic material between homologous chromosomes, leading to the creation of new allele combinations in the resulting gametes. Such diversity is vital for several reasons. Firstly, genetic variation is a fundamental component of evolution. It provides a population with a range of traits upon which natural selection can act. When environmental conditions change, individuals with advantageous traits are more likely to survive and reproduce. This adaptability is key to the long-term survival of species. Additionally, increased genetic diversity can enhance a population's resilience against diseases and environmental changes. A genetically varied population is less likely to be wiped out by a single pathogen or adverse condition, as some individuals may possess traits that allow them to survive. Overall, genetic recombination is a fundamental biological process that contributes to the evolutionary success and adaptability of populations, making it an essential mechanism in the context of meiosis.

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7. In which group would you find a cloaca?

A. Amphibians

B. Mammals

C. Reptiles

D. All of the above

A cloaca is a single posterior opening that serves multiple functions, including excretion and reproduction, and is present in several groups of animals. In amphibians, the cloaca plays a role in expelling waste and gametes during reproductive activities. Reptiles also possess a cloaca that serves similar functions, allowing for the expulsion of urine and feces, as well as the exit for reproductive materials. Mammals generally do not have cloacas, with the exception of monotremes, which are egg-laying mammals like the platypus. Thus, while mammals typically have separate openings, the statement can still hold true when considering the broader classification of mammals, especially when including monotremes. Therefore, all of these groups exhibit the presence of a cloaca, affirming that the correct answer encompasses amphibians, reptiles, and certain mammals.

8. What is the main role of spicules in sponges?

A. Support

B. Reproduction

C. Nourishment

D. Respiration

Spicules play a crucial role in providing structural support to sponges. These small, often needle-like structures are composed of either silica or calcium carbonate, and they form a skeletal framework that maintains the shape and integrity of the sponge. This support is essential because sponges lack true tissues and organs, relying instead on their porous structure to filter water and acquire nutrients. The arrangement of spicules not only supports the body but also aids in the sponge's ability to withstand external pressures and environmental challenges, contributing to its overall stability. This structural function is foundational to the sponge's survival and efficiency as a filter feeder in aquatic environments.

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9. Which of the following is NOT a characteristic of Amphibia?

A. two pairs of limbs

B. lungs

C. external fertilization

D. keratinized skin

Amphibians, such as frogs, toads, and salamanders, exhibit several defining characteristics that distinguish them from other vertebrate groups. They commonly possess two pairs of limbs, which facilitate movement both in water and on land. Additionally, while many amphibians undergo a life cycle that includes an aquatic larval stage with gills, they typically develop lungs as adults to breathe atmospheric oxygen. External fertilization is also a characteristic of many amphibians, particularly during breeding season in aquatic environments, where eggs are laid in water and fertilized externally by males. In contrast, keratinized skin is not a characteristic of amphibians. While amphibians do have some level of moisture-retaining skin that may contain keratin, it is not extensively keratinized like that of reptiles. Amphibians generally have permeable skin that is adapted for cutaneous respiration, allowing them to absorb water and respiratory gases directly through their skin, which is critical for their survival, especially in moist environments. Therefore, the presence of keratinized skin is more typical of reptiles and serves to prevent water loss, a necessity for their more terrestrial lifestyle.

10. What type of cells do eggs and sperm represent?

A. Somatic cells

B. Haploid cells

C. Diploid cells

D. Polyploid cells

Eggs and sperm are classified as haploid cells because they contain only one set of chromosomes. In humans and many other organisms, somatic cells, which are all the other body cells except for the reproductive cells, are diploid, meaning they contain two sets of chromosomes. The process of meiosis produces haploid gametes, which are key to sexual reproduction because they ensure that when fertilization occurs, the resulting zygote will have the proper diploid number of chromosomes. In contrast, diploid cells have two complete sets of chromosomes (one from each parent), while polyploid cells have more than two sets. Since eggs and sperm are specifically designed for reproduction, they must be haploid to successfully combine during fertilization and restore the diploid state in the offspring. This fundamental distinction is critical for understanding genetics and reproductive biology.

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