

Biology 30 Diploma Practice Test (Sample)

Study Guide



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Questions

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- 1. During which phase of the growth curve does the population stabilize and cease to grow?**
 - A. Death phase**
 - B. Growth phase**
 - C. Lag phase**
 - D. Stationary phase**
- 2. What is the function of the centromere in cell division?**
 - A. To separate chromosomes**
 - B. To hold chromatids together**
 - C. To form spindle fibers**
 - D. To initiate DNA replication**
- 3. What hormone is responsible for stimulating milk production?**
 - A. Prolactin**
 - B. Oxytocin**
 - C. ADH**
 - D. ACTH**
- 4. Which term describes the gradual reduction of a population's growth rate?**
 - A. Stationary phase**
 - B. Exponential phase**
 - C. Death phase**
 - D. Growth phase**
- 5. What does the follicle produce and release during the menstrual cycle?**
 - A. Progesterone**
 - B. LH**
 - C. Estrogen**
 - D. Testosterone**

- 6. The mesoderm is responsible for which of the following tissues?**
- A. Skin and sense organs**
 - B. Nerves and brain**
 - C. Muscles and skeleton**
 - D. Glands and linings**
- 7. What is the primary distinction between haploid and diploid cells?**
- A. Diploid cells have half the number of chromosomes as haploid cells**
 - B. Haploid cells are formed through mitosis while diploid cells are formed through meiosis**
 - C. Haploid cells are represented as n (gametes) while diploid cells are represented as $2n$ (somatic)**
 - D. Diploid cells are non-reproductive while haploid cells are reproductive**
- 8. What is the primary function of luteinizing hormone (LH) in the female reproductive system?**
- A. Promotes follicle development**
 - B. Stimulates uterine contractions**
 - C. Triggers ovulation and estrogen/progesterone secretion**
 - D. Facilitates the relaxation of the pelvis**
- 9. What is the main difference between the somatic and autonomic nervous systems?**
- A. Voluntary processes vs involuntary processes**
 - B. Central vs peripheral nervous system**
 - C. Sympathetic vs parasympathetic responses**
 - D. Motor control vs sensory processing**
- 10. What characteristic distinguishes grey matter from white matter?**
- A. Presence of myelin sheath**
 - B. Ability to repair**
 - C. Location in the nervous system**
 - D. Unmyelinated and lack repair capability**

Answers

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

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Explanations

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1. During which phase of the growth curve does the population stabilize and cease to grow?

- A. Death phase**
- B. Growth phase**
- C. Lag phase**
- D. Stationary phase**

The stationary phase is characterized by a stabilization of the population size where the birth rate equals the death rate. During this phase, the growth rate approaches zero, meaning that the overall number of individuals remains relatively constant over time. This stabilization occurs after the population has gone through initial growth and any resources are fully utilized, leading to limited growth capacity. At this stage, environmental factors such as nutrient availability, space, and competition begin to balance the reproductive rates of the organisms, resulting in a steady state of population density. In contrast, other phases like the lag phase involve a slow initial growth as organisms adapt to their environment, whereas the growth phase is marked by rapid population increase. The death phase, on the other hand, occurs when the population starts to decline due to factors like resource depletion or increased mortality. Thus, the distinctive nature of the stationary phase is its focus on balance and stabilization in population dynamics.

2. What is the function of the centromere in cell division?

- A. To separate chromosomes**
- B. To hold chromatids together**
- C. To form spindle fibers**
- D. To initiate DNA replication**

The function of the centromere in cell division is primarily to hold sister chromatids together. During cell division, specifically in processes like mitosis and meiosis, chromosomes are duplicated and consist of two identical halves known as sister chromatids. The centromere is the region of the chromosome where these chromatids are tightly linked, creating a structural connection that is crucial for their movement and separation later in the process. When a cell prepares to divide, it relies on the centromere to ensure that each daughter cell receives the correct number of chromosomes. During metaphase, spindle fibers attach to the centromeres via structures called kinetochores, which help to pull the sister chromatids apart during anaphase. This separation is essential for maintaining genetic stability, as each daughter cell requires a full set of chromosomes. Therefore, the role of the centromere as a cohesive point is vital for the accurate division and allocation of genetic material during cell division.

3. What hormone is responsible for stimulating milk production?

- A. Prolactin**
- B. Oxytocin**
- C. ADH**
- D. ACTH**

Prolactin is the hormone specifically responsible for stimulating milk production in mammals. It is produced by the anterior pituitary gland and plays a crucial role in the development of mammary glands and the initiation of lactation following childbirth. Prolactin levels rise during pregnancy, preparing the breast tissue for milk production, and they continue to be elevated during breastfeeding to maintain milk supply. Oxytocin, although related to lactation, primarily functions in the ejection of milk from the mammary glands rather than its production. ADH (antidiuretic hormone) regulates water balance in the body and has no direct role in lactation. ACTH (adrenocorticotropic hormone) mainly stimulates the adrenal glands to produce cortisol and is not involved in milk production. Thus, the focus on prolactin emphasizes its unique and direct role in promoting lactation.

4. Which term describes the gradual reduction of a population's growth rate?

- A. Stationary phase**
- B. Exponential phase**
- C. Death phase**
- D. Growth phase**

The term that describes the gradual reduction of a population's growth rate is the stationary phase. During this phase, the growth rate of the population slows down significantly as it approaches the carrying capacity of the environment. This occurs because resources such as food, space, and nutrients become limited, leading to increased competition among individuals and a reduction in reproduction rates. In the stationary phase, the number of individuals becomes more stable, and the population may fluctuate around a relatively constant size, indicating that the growth rate has declined as environmental resistance factors influence the population dynamics. In contrast, the other phases listed refer to different aspects of population growth. The exponential phase refers to the period of rapid population increase when resources are plentiful, while the death phase typically describes a situation where mortality rates exceed birth rates, leading to a decline in population size. The growth phase is similar to the exponential phase, signifying a period of increasing numbers without limits. None of these terms specifically capture the gradual slowing of growth as accurately as the stationary phase does.

5. What does the follicle produce and release during the menstrual cycle?

- A. Progesterone**
- B. LH**
- C. Estrogen**
- D. Testosterone**

During the menstrual cycle, the follicle primarily produces and releases estrogen, making this choice the correct answer. In the first half of the menstrual cycle, known as the follicular phase, developing follicles in the ovaries produce increasing amounts of estrogen as they mature. This hormone plays a crucial role in regulating the cycle, particularly in preparing the endometrium (the lining of the uterus) for a potential implantation of a fertilized egg. As estrogen levels rise, it stimulates the thickening of the uterine lining and the release of luteinizing hormone (LH) from the pituitary gland. A surge in LH triggers ovulation, leading to the release of the egg. Therefore, the main function of the follicle in this context is the production of estrogen, which has significant effects on both reproductive and overall health.

6. The mesoderm is responsible for which of the following tissues?

- A. Skin and sense organs**
- B. Nerves and brain**
- C. Muscles and skeleton**
- D. Glands and linings**

The mesoderm is one of the three primary germ layers formed during embryonic development, the others being the ectoderm and endoderm. It plays a crucial role in forming many of the body's internal structures and systems. Specifically, the mesoderm is responsible for developing connective tissues, muscles, and the skeletal system. Muscle tissue, including skeletal, smooth, and cardiac muscles, originates from the mesoderm. Moreover, the bones and cartilage that make up the skeleton also derive from this layer. This layer is integral to the formation of several vital structures that allow movement, support, and protection of vital organs. In contrast, the ectoderm develops into the skin and its appendages, as well as the nervous system, while the endoderm forms the linings of internal organs and structures including glands. Therefore, the mesoderm's specific contribution to muscles and the skeleton distinctly supports the identification of its role in these tissues.

7. What is the primary distinction between haploid and diploid cells?
- A. Diploid cells have half the number of chromosomes as haploid cells
 - B. Haploid cells are formed through mitosis while diploid cells are formed through meiosis
 - C. Haploid cells are represented as n (gametes) while diploid cells are represented as $2n$ (somatic)**
 - D. Diploid cells are non-reproductive while haploid cells are reproductive

The primary distinction between haploid and diploid cells lies in their chromosome number, and option C correctly articulates this by stating that haploid cells are represented as n , which corresponds to gametes (sperm and egg cells), while diploid cells are represented as $2n$, which refers to somatic cells (the body cells of an organism). In humans, for example, gametes contain 23 chromosomes (haploid), while somatic cells contain 46 chromosomes (diploid). This distinction is crucial for understanding sexual reproduction, where haploid gametes combine during fertilization to form a diploid zygote, restoring the chromosome number. This representation of chromosome number is a fundamental concept in genetics, effectively illustrating the difference between the two cell types and their roles in biology.

8. What is the primary function of luteinizing hormone (LH) in the female reproductive system?
- A. Promotes follicle development
 - B. Stimulates uterine contractions
 - C. Triggers ovulation and estrogen/progesterone secretion**
 - D. Facilitates the relaxation of the pelvis

Luteinizing hormone (LH) plays a crucial role in the female reproductive system, particularly in the menstrual cycle and reproductive functions. Its primary function is to trigger ovulation, which is the release of an egg from the ovary. This process is essential for reproduction as it allows the opportunity for fertilization. In addition to triggering ovulation, LH also stimulates the ovarian follicles to produce hormones such as estrogen and progesterone. After ovulation, the ruptured follicle transforms into the corpus luteum, which produces these hormones that are vital for maintaining the early stages of pregnancy and regulating the menstrual cycle. The secretion of estrogen and progesterone also prepares the uterus for potential implantation of a fertilized egg. Therefore, LH is integral to the regulation of the menstrual cycle and fertility, making its role in triggering ovulation and the secretion of these hormones the primary focus of its function in the female reproductive system.

9. What is the main difference between the somatic and autonomic nervous systems?

A. Voluntary processes vs involuntary processes

B. Central vs peripheral nervous system

C. Sympathetic vs parasympathetic responses

D. Motor control vs sensory processing

The main difference between the somatic and autonomic nervous systems lies in their control over bodily functions. The somatic nervous system is responsible for regulating voluntary movements, such as those involved in walking or picking up an object. This system allows individuals to consciously control their skeletal muscles and respond to their environment through deliberate actions. In contrast, the autonomic nervous system governs involuntary processes, which operate without conscious thought. These processes include the regulation of heart rate, digestion, and respiratory rate. The autonomic nervous system is further divided into the sympathetic and parasympathetic divisions, which control the body's 'fight or flight' responses and 'rest and digest' functions, respectively. Understanding this distinction is crucial for grasping how the body maintains homeostasis and responds to internal and external stimuli. The somatic nervous system focuses on actions we consciously initiate, while the autonomic nervous system manages processes that keep us functioning without active control.

10. What characteristic distinguishes grey matter from white matter?

A. Presence of myelin sheath

B. Ability to repair

C. Location in the nervous system

D. Unmyelinated and lack repair capability

The distinguishing characteristic of grey matter is that it is primarily composed of unmyelinated neurons and their cell bodies, which is not the case for white matter. Grey matter contains neuronal cell bodies, dendrites, and unmyelinated axons, while white matter is characterized by myelinated axons that facilitate faster signal transmission. The presence of myelin sheath is specific to white matter, where myelin wraps around the axons to enhance the speed of electrical conduction. This difference in myelination is fundamental because it reflects the different functions and roles of grey and white matter within the nervous system. The ability to repair typically refers to the regenerative capabilities of nervous tissue, which can vary but is not a defining characteristic that distinguishes grey matter from white matter. Location in the nervous system can describe where grey and white matter are found, but it does not define the fundamental differences between their compositions and functions. Overall, the unmyelinated nature of grey matter is crucial for its role in processing and integrating information, while the myelinated axons in white matter are more involved in transmitting signals over longer distances.