

Australian Year 10 Biology Practice Test (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

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- 1. What type of cells does mitosis produce?**
 - A. Genetically diverse cells**
 - B. Genetically identical cells**
 - C. Somatic cells only**
 - D. Sex cells only**
- 2. What is the main distinction between autotrophs and heterotrophs?**
 - A. Autotrophs produce their own food, while heterotrophs rely on consuming other organisms**
 - B. Autotrophs have specialized reproductive systems, while heterotrophs do not**
 - C. Autotrophs are unicellular, while heterotrophs are multicellular**
 - D. Autotrophs are always larger than heterotrophs**
- 3. Which of the following processes is considered a mechanism of evolution?**
 - A. Natural selection**
 - B. Cloning**
 - C. Fertilization**
 - D. Cell division**
- 4. What term describes an allele that is masked when a dominant allele is present?**
 - A. Dominant allele**
 - B. Recessive allele**
 - C. Heterozygous allele**
 - D. Autosomal allele**
- 5. What does genetic drift refer to in biological terms?**
 - A. A structured change in population size**
 - B. A non-random selection of traits**
 - C. A random change in allele frequencies**
 - D. An increase in genetic variation**

- 6. Which of the following organs would be classified as an endocrine gland?**
- A. Thyroid**
 - B. Liver**
 - C. Heart**
 - D. Lung**
- 7. Which structures are key components of the human circulatory system?**
- A. Lungs, trachea, and diaphragm**
 - B. Heart, blood vessels, and blood**
 - C. Brain, nerves, and spinal cord**
 - D. Liver, kidneys, and pancreas**
- 8. Which organelle is involved in energy production?**
- A. Nucleus**
 - B. Mitochondria**
 - C. Ribosome**
 - D. Endoplasmic reticulum**
- 9. Which characteristic is essential for natural selection to occur?**
- A. Genetic variation**
 - B. Large population size**
 - C. Symbiotic relationships**
 - D. Identical genetic makeup**
- 10. Which of the following is an example of a dominant trait?**
- A. Blue eyes**
 - B. Hazel eyes**
 - C. Brown eyes**
 - D. Green eyes**

Answers

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

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Explanations

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1. What type of cells does mitosis produce?

- A. Genetically diverse cells
- B. Genetically identical cells**
- C. Somatic cells only
- D. Sex cells only

Mitosis produces genetically identical cells, which is a key characteristic of this type of cell division. During mitosis, a single cell divides to create two daughter cells that have the same genetic material as the original cell. This process is essential for growth, development, and tissue repair in multicellular organisms. The reason why the cells are genetically identical is that DNA is replicated prior to mitosis, ensuring that both daughter cells receive an exact copy of the genetic information. This ensures continuity and stability of the genetic material across cells, which is crucial for maintaining the functions of tissues and organs. While somatic cells, which are all the non-reproductive cells in an organism, are produced by mitosis, this process is not limited to them. Mitosis can occur in any somatic cells throughout the organism's lifetime, thus contributing to growth and healing. In contrast, meiosis, another form of cell division, is responsible for producing sex cells or gametes, which are genetically diverse due to the processes of recombination and independent assortment that take place during meiosis. Therefore, the correct answer highlights the principle that mitosis results in clones or genetically identical copies of the original cell.

2. What is the main distinction between autotrophs and heterotrophs?

- A. Autotrophs produce their own food, while heterotrophs rely on consuming other organisms**
- B. Autotrophs have specialized reproductive systems, while heterotrophs do not
- C. Autotrophs are unicellular, while heterotrophs are multicellular
- D. Autotrophs are always larger than heterotrophs

The main distinction between autotrophs and heterotrophs lies in their method of obtaining energy and nutrients. Autotrophs are organisms that can produce their own food through processes like photosynthesis or chemosynthesis. They use inorganic substances, such as carbon dioxide and sunlight, to create organic compounds, which serve as their energy source. This ability enables them to be self-sustaining and form the base of the food chain. Heterotrophs, on the other hand, cannot produce their own food and must obtain energy by consuming other organisms, whether they are plants, animals, or decomposing organic matter. This dependence on other living things for energy classifies them as consumers in the ecological system. The other options do not correctly convey the essential difference between autotrophs and heterotrophs. While reproductive systems or cellular structure may differ among various species, these characteristics do not fundamentally define the distinction between these two categories of organisms. Furthermore, the size comparison mentioned does not hold true as autotrophs (like some algae) can be microscopic, while some heterotrophs (like large mammals) can be quite large. Hence, the focus on food production clearly captures the primary distinction between autotrophs and heterotrophs.

3. Which of the following processes is considered a mechanism of evolution?

A. Natural selection

B. Cloning

C. Fertilization

D. Cell division

Natural selection is considered a mechanism of evolution because it describes the process through which certain traits become more or less common in a population based on their advantages or disadvantages for survival and reproduction in a given environment. It explains how species adapt to their environments over time, leading to the gradual evolution of populations. Organisms with advantageous traits are more likely to survive, reproduce, and pass those traits on to the next generation, thus influencing the genetic makeup of the population. The other processes listed do not directly facilitate evolution. Cloning refers to the asexual reproduction of organisms, producing genetically identical individuals without the genetic variances that natural selection acts upon. Fertilization is a reproductive process that combines genetic material from two parents to form a new individual, but it does not itself drive evolutionary change. Cell division, specifically mitosis or meiosis, is essential for growth and reproduction but does not inherently lead to evolutionary adaptations unless it is coupled with processes that generate genetic variation, such as mutations.

4. What term describes an allele that is masked when a dominant allele is present?

A. Dominant allele

B. Recessive allele

C. Heterozygous allele

D. Autosomal allele

The term that describes an allele that is masked when a dominant allele is present is known as a recessive allele. In genetics, alleles are variants of a gene that can produce different traits. When an individual has one dominant allele and one recessive allele for a particular trait, the dominant allele will determine the phenotype, or observable characteristics, while the effect of the recessive allele will not be expressed in the presence of the dominant one. This is a fundamental concept in Mendelian inheritance, where the expression of dominant and recessive traits can be observed in offspring. For example, if an organism inherits a dominant allele for a trait, such as tall height in plants, and a recessive allele for short height, the organism will exhibit the tall phenotype because the dominant allele overshadows the effects of the recessive allele. Understanding this distinction helps explain how traits are passed on and expressed in different generations.

5. What does genetic drift refer to in biological terms?

- A. A structured change in population size**
- B. A non-random selection of traits**
- C. A random change in allele frequencies**
- D. An increase in genetic variation**

Genetic drift refers to a process by which allele frequencies within a population change over time due to random sampling events, rather than through natural selection. This means that certain alleles may become more or less common simply by chance. Such changes can have significant effects on the genetic makeup of a population, particularly in small populations where random events can lead to large shifts in the genetic structure. In essence, genetic drift can lead to the reduction of genetic variation, as some alleles may be completely lost while others can become fixed in the population, purely by chance. This process can eventually influence evolution, especially when combined with other mechanisms such as natural selection and gene flow. This understanding is crucial as it highlights the randomness inherent in evolution, distinguishing it from processes driven by selective advantages.

6. Which of the following organs would be classified as an endocrine gland?

- A. Thyroid**
- B. Liver**
- C. Heart**
- D. Lung**

The thyroid gland is classified as an endocrine gland because it produces and secretes hormones directly into the bloodstream, which then travel to various tissues and organs in the body to regulate metabolism, growth, and development. The primary hormones produced by the thyroid, such as thyroxine (T4) and triiodothyronine (T3), play crucial roles in controlling the rate of metabolism and influencing many body functions. Endocrine glands, like the thyroid, are characterized by their ductless structure, meaning they do not have ducts to release their hormones; instead, they rely on the circulatory system for hormone distribution. This distinguishes them from exocrine glands, which secrete their products through ducts to specific sites, such as the salivary glands or sweat glands. The liver, heart, and lungs, while vital organs that perform significant functions, do not primarily serve as endocrine glands. The liver does play a role in hormone metabolism and releases certain factors into the bloodstream, but its main functions revolve around metabolism and detoxification rather than producing hormones to regulate body processes. The heart and lungs are involved in pumping blood and gas exchange, respectively, and do not predominantly produce hormones. Thus, the thyroid stands out as the only organ in the

7. Which structures are key components of the human circulatory system?

- A. Lungs, trachea, and diaphragm**
- B. Heart, blood vessels, and blood**
- C. Brain, nerves, and spinal cord**
- D. Liver, kidneys, and pancreas**

The human circulatory system is fundamentally designed to transport blood throughout the body, which carries essential substances such as oxygen, nutrients, and hormones to the cells and removes waste products like carbon dioxide. The heart is the central organ of this system, functioning as a pump that propels blood through a network of blood vessels, which include arteries, veins, and capillaries. The blood itself is crucial as it serves as the medium that contains red blood cells, white blood cells, platelets, and plasma; each component plays a specific role in maintaining homeostasis and the immune response. In contrast, the other choices consist of structures that belong to different systems in the body. The lungs, trachea, and diaphragm are part of the respiratory system, focused on gas exchange rather than circulation. The brain, nerves, and spinal cord are components of the nervous system, coordinating body functions and responses to stimuli. Likewise, the liver, kidneys, and pancreas are organs included in the digestive system, playing vital roles in digestion, metabolism, and waste management rather than directly in blood circulation.

8. Which organelle is involved in energy production?

- A. Nucleus**
- B. Mitochondria**
- C. Ribosome**
- D. Endoplasmic reticulum**

The mitochondria are often referred to as the "powerhouses" of the cell because they are the primary organelles responsible for energy production through the process of cellular respiration. In mitochondria, glucose and oxygen are converted into adenosine triphosphate (ATP), which serves as the main energy currency in cells. This process not only provides energy necessary for various cellular activities but also produces carbon dioxide and water as byproducts. Mitochondria contain their own DNA and are involved in a variety of metabolic processes. Their ability to produce ATP makes them essential for high-energy-demanding cells, such as muscle cells and neurons, highlighting their critical role in maintaining cellular functions and overall organism vitality. Other organelles, such as the nucleus, ribosomes, and endoplasmic reticulum, play significant roles in cellular function but are not responsible for energy production. The nucleus houses genetic material and manages cellular activities, ribosomes synthesize proteins, and the endoplasmic reticulum is involved in protein and lipid synthesis. Thus, the mitochondria stand out as the key organelle in energy conversion and production within the cell.

9. Which characteristic is essential for natural selection to occur?

- A. Genetic variation**
- B. Large population size**
- C. Symbiotic relationships**
- D. Identical genetic makeup**

Genetic variation is essential for natural selection to occur because it provides the raw material upon which natural selection can act. In a population, individuals exhibit variations in their traits, which may affect their survival and reproductive success. This variation often arises through mutations, gene flow, and sexual reproduction, leading to differences in characteristics such as size, color, behavior, and resistance to diseases. When the environment changes or when a new selective pressure is applied, certain traits may give some individuals a better chance of survival and reproduction. Over time, these advantageous traits become more common in the population, as those individuals are more likely to survive and pass on their genes to the next generation. Without genetic variation, all individuals would be genetically identical, leading to uniformity that can make a population more vulnerable to extinction if the environment changes, since there would be no beneficial traits to favor under new conditions. Thus, genetic variation is the cornerstone of the process of natural selection, enabling evolution to shape the characteristics of populations over time.

10. Which of the following is an example of a dominant trait?

- A. Blue eyes**
- B. Hazel eyes**
- C. Brown eyes**
- D. Green eyes**

Brown eyes are an example of a dominant trait because they are commonly inherited in a way that means the presence of the brown eye allele can overshadow alleles for other eye colors, such as blue or green. The dominance of the brown eye allele means that if a person has at least one allele for brown eyes, they will exhibit that color, while other colors like blue and green usually require two copies of their respective alleles to be expressed. This genetic principle is rooted in Mendelian inheritance, where dominant traits are expressed in the phenotype over recessive traits when both are present.