

Markhor Junior Contest ®

Aspirant Level (Class IX & X, O/A Level) Science 2023

There are 25 questions, and each question carries two marks.

1. What is the process called when plants make their own food?
 - a) Respiration
 - b) Photosynthesis**
 - c) Decomposition
 - d) Fermentation

2. Which part of the human body regulates body temperature?
 - a) Brain
 - b) Heart
 - c) Lungs
 - d) Hypothalamus**

3. Which scientist discovered the principle of buoyancy?
 - a) Archimedes**
 - b) Galileo
 - c) Newton
 - d) Einstein

4. What is the chemical symbol for gold?
 - a) Ag
 - b) Au**
 - c) Hg
 - d) Pb

5. What is the process called when water moves through a plant, from roots to leaves?
 - a) Transpiration**
 - b) Respiration
 - c) Photosynthesis
 - d) Osmosis

6. Which type of radiation has the highest energy?
 - a) Alpha
 - b) Beta
 - c) Gamma**
 - d) Ultraviolet

Markhor Junior Contest ®

7. What is the equation for cellular respiration?
- a) $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$
 - b) $6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$**
 - c) $6\text{H}_2\text{O} + 6\text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
 - d) $6\text{CO}_2 + 6\text{O}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$
8. What is the term for the minimum energy required for a chemical reaction to occur?
- a) Activation energy**
 - b) Reaction rate
 - c) Catalyst
 - d) Enthalpy
9. Which type of bond is responsible for the structure of DNA?
- a) Hydrogen bond**
 - b) Covalent bond
 - c) Ionic bond
 - d) Peptide bond
10. What is the process called when an electron gains energy and moves to a higher energy level?
- a) Ionization
 - b) Excitation**
 - c) Ionization energy
 - d) Electron affinity
11. What is the equation for the force of gravity between two objects?
- a) $F = G \frac{m_1 \times m_2}{r^2}$**
 - b) $F = G \frac{m_1 \times m_2}{r}$
 - c) $F = G \frac{m_1 + m_2}{r^2}$
 - d) $F = G \frac{m_1 - m_2}{r^2}$
12. Which scientist proposed the theory of continental drift?
- a) Alfred Wegener**
 - b) Charles Darwin
 - c) Galileo Galilei
 - d) Isaac Newton

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13. What is the term for the study of the structure of the Earth's crust?
- a) Geomorphology
 - b) Geology**
 - c) Geophysics
 - d) Stratigraphy
14. What is the function of the mitochondria in cells?
- a) To generate energy**
 - b) To synthesize proteins
 - c) To store genetic information
 - d) To regulate cell growth
15. Which type of rock is formed from the compression of sediments?
- a) Igneous
 - b) Sedimentary**
 - c) Metamorphic
 - d) Foliated
16. What is the process called when an object's velocity increases as it moves closer to a source of gravitational pull?
- a) Gravitational acceleration**
 - b) Centripetal acceleration
 - c) Angular momentum
 - d) Escape velocity
17. In a quantum mechanical system, which of the following is NOT a valid combination of quantum numbers for an electron in a hydrogen atom?
- a) $n = 3, l = 2, m_l = 0, m_s = +1/2$
 - b) $n = 4, l = 3, m_l = -2, m_s = -1/2$
 - c) $n = 2, l = 2, m_l = 1, m_s = +1/2$**
 - d) $n = 5, l = 0, m_l = 0, m_s = -1/2$
18. Which of the following statements about enzyme kinetics is correct?
- a) K_m is the substrate concentration at which the reaction rate is at its maximum
 - b) V_{max} is the substrate concentration at which the reaction rate is half of its maximum
 - c) A competitive inhibitor increases the apparent K_m but does not affect V_{max}**
 - d) An allosteric activator typically decreases the apparent K_m

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19. In an adiabatic expansion of an ideal gas, which of the following is true?

- a) The temperature of the gas increases
- b) The internal energy of the gas remains constant
- c) **The entropy of the gas decreases**
- d) Work is done on the gas

20. Which of the following molecules exhibits the highest dipole moment?

- a) CCl_4
- b) **CHCl_3**
- c) CH_2Cl_2
- d) CH_3Cl

21. Which of the following statements about molecular orbital theory is incorrect?

- a) The number of molecular orbitals formed equals the number of atomic orbitals combined
- b) Antibonding molecular orbitals always have higher energy than bonding molecular orbitals
- c) The electronic configuration of O_2 explains its paramagnetism
- d) **In homonuclear diatomic molecules, all molecular orbitals must be either purely bonding or purely antibonding**

22. A particle moves in a circular path of radius 2 m with a constant speed of 4 m/s. What is the magnitude of its acceleration vector?

- a) 0 m/s^2
- b) 4 m/s^2
- c) **8 m/s^2**
- d) 16 m/s^2

23. In a third-order reaction, if the initial concentration of the reactant is doubled, how will the reaction rate change?

- a) It will double
- b) It will quadruple
- c) It will increase by a factor of 6
- d) **It will increase by a factor of 8**

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24. Which of the following phenomena cannot be explained by the wave nature of light?

- a) Diffraction
- b) Interference
- c) Polarization
- d) **Photoelectric effect**

25. What is the concept that states that the total entropy of a closed system always increases over time?

- a) **Second Law of Thermodynamics**
- b) First Law of Thermodynamics
- c) Zeroth Law of Thermodynamics
- d) Conservation of Energy