Markhor Junior Contest ®

Aspirant Level
(Class IX & X, O/A Level's) Science 2024

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

1. **Electromagnetic waves are classified according to their:**
   a) Amplitude
   b) Frequency
   c) Both A and B
   d) Neither A nor B

2. **The uncertainty principle states that it is impossible to know precisely:**
   a) The position and momentum of a particle simultaneously
   b) The energy and time of a particle simultaneously
   c) The charge and mass of a particle simultaneously
   d) The location and velocity of a star

3. **In a transistor, the flow of current between collector and emitter is controlled by the voltage applied to the:**
   a) Base
   b) Collector
   c) Emitter
   d) Gate

4. **The process by which rocks are formed from the accumulation of sediments is called:**
   a) Weathering
   b) Erosion
   c) Sedimentation
   d) Metamorphism

5. **Which of the following molecules is NOT a macromolecule?**
   a) Protein
   b) Glucose
   c) DNA
   d) Lipid

6. **The process by which plants convert light energy into chemical energy is called:**
   a) Cellular respiration
   b) Photosynthesis
   c) Mitosis
   d) Meiosis

7. **Which of the following is NOT a theory of evolution?**
   a) Lamarckism
   b) Natural selection
   c) Gradualism
   d) Punctuated equilibrium

8. **The noble gases are unreactive because:**
   a) They have a full valence shell
   b) They have a high melting point
   c) They are all metals
   d) They are all radioactive

9. **Which of the following is an example of an endothermic reaction?**
   a) Combustion of methane
   b) Dissolving salt in water
   c) Photosynthesis
   d) Neutralization reaction

10. **The pH of a solution is a measure of the concentration of:**
    a) Hydrogen ions (H+)
    b) Hydroxide ions (OH-)
    c) Salt ions
    d) Water molecules

11. **Which of the following is NOT a fundamental force in physics?**
    a) Strong nuclear force
    b) Electromagnetic force
    c) Gravitational force
    d) Vital force

12. **The work done on an object is equal to the product of:**
    a) Force and distance
    b) Mass and acceleration
    c) Power and time
    d) Momentum and velocity

13. **Lichens, a symbiotic relationship between a fungus and an alga/cyanobacteria, are considered pioneer species because they:**
    a) Can tolerate harsh environments
    b) Reproduce asexually very rapidly.
    c) Are keystone predators in their ecosystem.
    d) Fix nitrogen from the atmosphere.

14. Homeostasis is crucial for maintaining a stable internal environment. Which of the following is NOT directly involved in thermoregulation in humans?

a) Sweating to release excess heat.
b) Shivering to generate heat.
c) Dilation of blood vessels in the skin to lose heat.
d) Increased metabolic rate to generate heat.

15. Fullerenes are fascinating carbon cages with unique properties. Buckminsterfullerene (C60) is a good conductor of electricity. This unexpected behavior is likely due to:

a) The presence of multiple double bonds in the structure.
b) Delocalization of electrons within the cage
c) High melting point of the molecule.
d) Spherical shape of the C60 molecule.

16. Dark matter is a mysterious component of the universe with significant gravitational influence. However, we cannot directly observe it because:

a) It is located far away in distant galaxies.
b) It does not emit or absorb light.
c) It is composed of very small particles.
d) It exists in a different dimension.

17. Quantum mechanics challenges our classical understanding of the world. According to the Heisenberg uncertainty principle, it is impossible to know precisely:

a) The position and momentum of a particle simultaneously.
b) The mass and energy of a particle.
c) The charge and spin of a particle.
d) The location and velocity of a planet.

18. In operons, the lac operon in E. coli for example, what regulatory molecule can bind to the operator region and prevent transcription of the downstream genes?

a) Activator protein
b) RNA polymerase
c) Repressor protein
d) mRNA

19. In nuclear magnetic resonance (NMR) spectroscopy, which factor MOST influences the chemical shift of a particular nucleus within a molecule?

a) The number of neutrons in the nucleus
b) The electronegativity of surrounding atoms
c) The type of bond the nucleus participates in
d) The mass of the molecule

20. According to the theory of relativity, what happens to the mass of an object as its velocity approaches the speed of light?

a) It remains constant.
b) It decreases.
c) It increases towards infinity.
d) It becomes zero.

21. What is the main product formed during the breakdown of ATP (adenosine triphosphate) to ADP (adenosine diphosphate) and inorganic phosphate (Pi)?

a) Glucose
b) Water
c) Carbon dioxide
d) Energy (in the form of a high-energy phosphate bond)

22. How can the degeneracy of an energy level in a molecule be lifted?

a) By increasing temperature
b) By applying an electric field
c) By exposing the molecule to light
d) All of the above

23. What is the characteristic feature that distinguishes fermions from bosons?

a) Fermions have half-integer spin, while bosons have integer spin.
b) Fermions obey the Pauli exclusion principle, while bosons do not.
c) Fermions are made of quarks, while bosons are fundamental particles.
d) Fermions are involved in the strong nuclear force, while bosons are not.

24. In a double-slit experiment, what effect does increasing the slit separation have on the observed fringe pattern?

a) The fringes become narrower.
b) The fringes become wider.
c) The central maximum becomes brighter.
d) The overall intensity of the pattern decreases.

25. What is the primary mechanism by which enzymes increase the rate of a chemical reaction?

a) By providing an alternative reaction pathway with a lower activation energy
b) By lowering the overall energy change of the reaction
c) By increasing the concentration of reactants
d) By changing the equilibrium constant of the reaction