Advanced Physics Concepts

Physics · Answer Key · 12 Questions

1. According to Einstein's theory of special relativity, what happens to the mass of an object as its velocity approaches the speed of light?

A) It decreases proportionally.
B) It remains constant.
C) It increases infinitely.
D) It becomes imaginary.

2. Which fundamental force is responsible for holding the protons and neutrons together within the nucleus of an atom?

A) Electromagnetic force
B) Gravitational force
C) Weak nuclear force
D) Strong nuclear force

3. In quantum mechanics, the Heisenberg Uncertainty Principle states that it is impossible to simultaneously know with perfect accuracy both the position and which of the following properties of a particle?

A) Spin
B) Charge
C) Momentum
D) Energy

4. The photoelectric effect, which demonstrates the particle-like nature of light, was explained by Albert Einstein using the concept of:

A) Wave-particle duality
B) Electromagnetic waves
C) Photons
D) Quantum entanglement

5. According to the second law of thermodynamics, in any natural process, the total entropy of an isolated system:

A) Always decreases.
B) Always remains constant.
C) Can increase or decrease.
D) Always increases or stays the same.

6. Which subatomic particle carries a negative electric charge and orbits the nucleus of an atom?

A) Proton
B) Neutron
C) Electron
D) Quark

7. The bending of light as it passes from one medium to another is known as:

A) Diffraction
B) Reflection
C) Refraction
D) Interference

8. In nuclear physics, what is the process called when a heavy atomic nucleus splits into two or more lighter nuclei, releasing a large amount of energy?

A) Fusion
B) Fission
C) Radioactivity
D) Transmutation

9. The inverse square law for gravity states that the gravitational force between two objects is proportional to the product of their masses and inversely proportional to:

A) The sum of their masses.
B) The square of the distance between their centers.
C) The cube of the distance between their centers.
D) The square root of the distance between their centers.

10. What is the fundamental unit of electric charge, approximately equal to the charge of a single proton or electron?

A) Joule
B) Ampere
C) Coulomb
D) Volt

11. According to Archimedes' Principle, the buoyant force on an object submerged in a fluid is equal to:

A) The volume of the object.
B) The density of the fluid.
C) The weight of the fluid displaced by the object.
D) The weight of the object.

12. Which phenomenon describes the tendency of an object to resist changes in its state of motion?

A) Acceleration
B) Velocity
C) Momentum
D) Inertia