

Cosmic Queries: Advanced Physics for Young Minds

Advanced Physics · Answer Key · 15 Questions

1. What is the name of the smallest known fundamental particle that makes up all matter and forces, as described by the Standard Model of particle physics?

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

2. According to Einstein's theory of special relativity, what is the ultimate speed limit in the universe, which nothing with mass can reach?

- A) The speed of sound
- B) The speed of light**
- C) The escape velocity of a black hole
- D) The speed of a rocket

3. Which fundamental force is responsible for holding the nucleus of an atom together, overcoming the repulsion between positively charged protons?

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

4. What phenomenon, explained by quantum mechanics, describes how particles can exist in multiple states or locations simultaneously until measured?

- A) Wave-particle duality
- B) Quantum entanglement
- C) Superposition**
- D) Quantum tunneling

5. What are the extremely dense remnants of massive stars that have exploded as supernovae, from which not even light can escape their gravitational pull?

- A) Nebulae
- B) White dwarfs
- C) Neutron stars
- D) Black holes**

6. What is the principle in quantum mechanics that states it's impossible to know both the exact position and the exact momentum of a particle at the same time?

A) Pauli Exclusion Principle

B) Heisenberg Uncertainty Principle

C) Bohr Model

D) Schrödinger's Cat

7. In general relativity, what causes gravity? Is it a force or a curvature of spacetime?

A) A force exerted by massive objects

B) The expansion of the universe

C) The curvature of spacetime caused by mass and energy

D) Electromagnetic interactions between particles

8. What subatomic particle, discovered in 2012, is responsible for giving other fundamental particles mass?

A) Neutrino

B) Photon

C) Higgs boson

D) Gluon

9. What is the term for the phenomenon where two or more particles become linked and share the same fate, regardless of the distance separating them, as described by quantum mechanics?

A) Superposition

B) Quantum entanglement

C) Quantum tunneling

D) Wave-particle duality

10. What is the name of the extremely hot and dense state of matter that existed in the first few microseconds after the Big Bang?

A) Plasma

B) Superfluid

C) Quark-gluon plasma

D) Bose-Einstein condensate

11. According to the theory of general relativity, what happens to time for an observer moving at speeds close to the speed of light compared to a stationary observer?

- A) Time speeds up
- B) Time slows down**
- C) Time stops
- D) Time remains the same

12. Which of the following is NOT a fundamental force of nature?

- A) Strong nuclear force
- B) Electromagnetic force
- C) Friction**
- D) Gravitational force

13. What is the term for light that has been bent by the gravity of massive objects, such as galaxies, as predicted by Einstein's theory of general relativity?

- A) Refraction
- B) Diffraction
- C) Gravitational lensing**
- D) Scattering

14. What is the name given to the hypothetical particles that are thought to make up dark matter, which interact very weakly with normal matter and light?

- A) Tachyons
- B) WIMPs**
- C) Monopoles
- D) Axions

15. In the context of quantum mechanics, what is the minimum amount of energy that can be gained or lost by an atom or molecule, often referred to as a 'packet' of energy?

- A) Amplitude
- B) Frequency
- C) Wavelength
- D) Quantum**