

Foundations of Quantum Physics

Quantum Physics · Answer Key · 18 Questions

1. Who is credited with introducing the concept of 'quanta' to explain the emission of light by a blackbody?

- A) Albert Einstein
- B) Niels Bohr
- C) Max Planck**
- D) Richard Feynman

2. Which scientist proposed that light can behave as both a wave and a particle (photons)?

- A) Max Planck
- B) Albert Einstein**
- C) Werner Heisenberg
- D) Erwin Schrödinger

3. What phenomenon, explained by the photoelectric effect, demonstrated the particle-like nature of light?

- A) Diffraction
- B) Interference
- C) Photoelectric effect**
- D) Compton scattering

4. Which scientist developed a model of the atom where electrons orbit the nucleus in specific energy levels?

- A) Ernest Rutherford
- B) Niels Bohr**
- C) J.J. Thomson
- D) Max Born

5. The wave-particle duality concept, stating that matter can exhibit wave-like properties, was proposed by which physicist?

- A) Max Planck
- B) Albert Einstein
- C) Louis de Broglie**
- D) Paul Dirac

6. What is the name of the fundamental equation in quantum mechanics that describes the wave function of a quantum system?

- A) Newton's Law of Gravitation
- B) Maxwell's Equations
- C) Schrödinger Equation**
- D) Heisenberg Uncertainty Principle

7. Which principle, formulated by Werner Heisenberg, states that certain pairs of physical properties, like position and momentum, cannot be known with perfect accuracy simultaneously?

- A) Pauli Exclusion Principle
- B) Uncertainty Principle**
- C) Superposition Principle
- D) Equivalence Principle

8. The discovery of the electron as a fundamental particle is credited to which scientist?

- A) Ernest Rutherford
- B) J.J. Thomson**
- C) Niels Bohr
- D) Marie Curie

9. What famous experiment demonstrated the wave-like nature of electrons, confirming de Broglie's hypothesis?

- A) Millikan Oil Drop Experiment
- B) Davisson-Germer Experiment
- C) Michelson-Morley Experiment
- D) Double-Slit Experiment (with electrons)**

10. Which scientist's work on statistical mechanics and quantum theory led to the understanding of specific heat at low temperatures?

- A) Niels Bohr
- B) Max Planck
- C) Albert Einstein
- D) Peter Debye**

11. The concept of 'spin' in quantum mechanics, an intrinsic angular momentum of particles, was first introduced by which physicists?

- A) Werner Heisenberg and Pascual Jordan
- B) Paul Dirac
- C) Wolfgang Pauli and Samuel Goudsmit**
- D) Enrico Fermi

12. What law, formulated by Wolfgang Pauli, states that no two identical fermions can occupy the same quantum state simultaneously?

- A) Hund's Rule
- B) Aufbau Principle
- C) Pauli Exclusion Principle**
- D) Bohr's Postulate

13. The probabilistic interpretation of the wave function, where its square represents the probability density of finding a particle, was developed by which physicist?

- A) Erwin Schrödinger
- B) Max Born**
- C) Werner Heisenberg
- D) Paul Dirac

14. Which scientist is known for his work on quantum electrodynamics (QED) and the prediction of the magnetic moment of the electron?

- A) Richard Feynman
- B) Julian Schwinger
- C) Shin'ichiro Tomonaga
- D) Paul Dirac**

15. The theory of quantum field theory, which unifies quantum mechanics and special relativity, was significantly advanced by the work of which physicist?

- A) Albert Einstein
- B) Erwin Schrödinger
- C) Paul Dirac**
- D) Max Planck

16. What phenomenon describes the ability of a quantum system to exist in multiple states simultaneously until measured?

- A) Entanglement
- B) Superposition**
- C) Tunneling
- D) Quantization

17. Which scientist is famous for his 'thought experiments' and the formulation of the Schrödinger equation?

- A) Werner Heisenberg
- B) Max Planck
- C) Erwin Schrödinger**
- D) Albert Einstein

18. The observation that atoms emit and absorb light in discrete packets (quanta) was a groundbreaking discovery made by whom?

- A) Albert Einstein
- B) Niels Bohr
- C) Max Planck**
- D) Ernest Rutherford