Milestones in Cosmological Understanding

Cosmology · Practice Test · 19 Questions

1. Which ancient Greek philosopher first proposed a geocentric model of the universe with celestial spheres?

A) Democritus
B) Aristotle
C) Plato
D) Pythagoras

2. What crucial observation did Edwin Hubble make in 1929 that provided strong evidence for the expansion of the universe?

A) Discovery of the cosmic microwave background radiation
B) Measuring the redshift of distant galaxies and relating it to their distance
C) Identifying the first exoplanet
D) Observing the bending of starlight by the Sun

3. Who is credited with developing the first widely accepted heliocentric model of the solar system in the 16th century?

A) Galileo Galilei
B) Johannes Kepler
C) Nicolaus Copernicus
D) Isaac Newton

4. The discovery of which phenomenon in 1964 by Arno Penzias and Robert Wilson provided strong observational support for the Big Bang theory?

A) Pulsars
B) Quasars
C) Cosmic microwave background radiation
D) Neutrino oscillations

5. Which theoretical framework, published by Albert Einstein in 1915, revolutionized our understanding of gravity and spacetime, forming the basis for modern cosmology?

A) Special Relativity
B) Quantum Mechanics
C) General Relativity
D) Thermodynamics

6. What significant contribution did Georges Lemaître make to cosmology in 1927?

A) He proposed the Steady State model of the universe.
B) He formulated the theory of inflation.
C) He first proposed the 'primeval atom' hypothesis, a precursor to the Big Bang theory.
D) He discovered dark matter.

7. The COBE (Cosmic Background Explorer) satellite, launched in 1989, provided crucial data confirming what aspect of the early universe?

A) The existence of black holes.
B) The precise abundance of dark energy.
C) Tiny temperature fluctuations in the cosmic microwave background.
D) The composition of interstellar dust.

8. Which cosmological model, proposed in the mid-20th century, suggested that the universe has always existed and maintained a constant average density?

A) The Big Bang Model
B) The Oscillating Universe Model
C) The Steady State Model
D) The Inflationary Model

9. The precise measurement of the Hubble constant, which defines the expansion rate of the universe, has been significantly advanced by observations of which type of astronomical object?

A) Nebulae
B) Cepheid variable stars
C) Comets
D) Asteroids

10. The concept of 'dark matter' was first indirectly suggested by the observations of which astronomer in the 1930s?

A) Vera Rubin
B) Fritz Zwicky
C) Carl Sagan
D) Stephen Hawking

11. What was the primary objective of the Planck spacecraft, launched in 2009?

A) To detect gravitational waves.
B) To map the cosmic microwave background radiation with unprecedented precision.
C) To observe the formation of the first stars.
D) To measure the distance to nearby galaxies.

12. Which of these observational tools, pioneered by Karl Jansky in the 1930s, opened a new window into studying celestial objects and the large-scale structure of the universe?

A) Optical telescopes
B) Radio telescopes
C) X-ray telescopes
D) Infrared telescopes

13. The inflationary epoch, a period of rapid expansion in the very early universe, was proposed by Alan Guth in 1980 primarily to address issues with which cosmological model?

A) Steady State Model
B) Big Bang Model
C) Oscillating Universe Model
D) Hierarchical Model

14. The first direct detection of gravitational waves, predicted by Einstein and observed in 2015, was achieved by which scientific collaboration?

A) Hubble Space Telescope
B) Large Hadron Collider
C) LIGO (Laser Interferometer Gravitational-Wave Observatory)
D) James Webb Space Telescope

15. What significant discovery did Galileo Galilei make with his telescope in the early 17th century that challenged the prevailing geocentric view?

A) The existence of black holes
B) The rings of Saturn
C) The phases of Venus
D) The Andromeda Galaxy

16. The 'Cosmic Distance Ladder' is a series of techniques used by astronomers to measure the distances to celestial objects. Which is generally considered the 'bottom rung' of this ladder?

A) Type Ia supernovae
B) Parallax measurements
C) Cepheid variables
D) Redshift

17. The Big Bang nucleosynthesis, the formation of light atomic nuclei in the early universe, is a key prediction supported by the observed abundances of which elements?

A) Iron and Nickel
B) Oxygen and Carbon
C) Hydrogen and Helium
D) Gold and Platinum

18. Which cosmological parameter, discovered to be non-zero in the late 1990s, is thought to be driving the accelerated expansion of the universe?

A) Baryon density
B) Dark matter density
C) Dark energy density
D) Neutrino mass

19. The concept of the 'observable universe' is defined by the distance light has been able to travel to us since which event?

A) The formation of the first stars
B) The Big Bang
C) The formation of the Milky Way galaxy
D) The discovery of the cosmic microwave background