

# Milestones in Cosmological Understanding

Cosmology · Answer Key · 19 Questions

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**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