

Name: _____ Date: _____

Answer Key: Cosmic Evolution Ninth Grade Astronomy Quiz

Calculate cosmic redshifts and evaluate galactic morphology to determine how the universe's accelerating expansion challenges our understanding of dark energy.

1. Which observation served as the primary evidence for the discovery of the accelerating expansion of the universe in the late 1990s?

Answer: B) The light curves of distant Type Ia supernovae

Type Ia supernovae act as 'standard candles.' Observations showed they were fainter than expected for their redshift, indicating the expansion of the universe is accelerating under the influence of dark energy.

2. The Cosmological Principle assumes that on a sufficiently large scale, the universe is both isotropic and homogeneous.

Answer: A) True

This principle is a foundational pillar of modern cosmology, suggesting that the universe looks the same in every direction and from every location when viewed at the largest scales.

3. The _____ describes the relationship where the recessional velocity of a galaxy is directly proportional to its distance from an observer.

Answer: B) Hubble-Lemaître Law

The Hubble-Lemaître Law quantifies the expansion of the universe, using the Hubble constant to link distance with the speed at which galaxies move away.

4. According to the hierarchical model of galaxy formation, how did massive elliptical galaxies most likely originate?

Answer: C) The merger of multiple smaller spiral galaxies

The hierarchical model suggests galaxies 'build up' over time; elliptical galaxies are often the result of galactic 'cannibalism' or mergers that disrupt neat spiral disks.

5. Baryonic matter (atoms) makes up approximately 85% of the total matter content in the universe.

Answer: B) False

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Baryonic matter accounts for only about 5% of the universe's total energy density; dark matter (approx. 27%) and dark energy (approx. 68%) dominate the cosmic composition.

6. Which of the following describes the 'Recombination' epoch, which occurred roughly 380,000 years after the Big Bang?

Answer: C) The stage when electrons and protons formed neutral hydrogen

During Recombination, the universe cooled enough for electrons to be captured by protons, allowing photons to travel freely and creating the Cosmic Microwave Background.

7. A galaxy showing a high rate of star formation, often triggered by gravitational interactions, is known as a ____ galaxy.

Answer: B) Starburst

Starburst galaxies consume their gas reservoirs at an exceptional rate to create new stars, often due to tidal forces during a close encounter with another galaxy.

8. What is the primary role of Dark Matter in the formation of the Cosmic Web?

Answer: A) It provides the gravitational scaffolding for gas to settle into

Dark matter halos formed first in the early universe, creating gravitational wells that attracted baryonic gas to form the galaxies we see today along its filaments.

9. The 'Great Wall' and the 'Sloan Great Wall' are examples of filaments within the large-scale structure of the universe.

Answer: A) True

These are massive galaxy filaments that represent some of the largest known structures in the observable universe, separated by enormous cosmic voids.

10. Extremely luminous active galactic nuclei powered by gas spiraling into supermassive black holes in the distant universe are called ____.

Answer: B) Quasars

Quasars (quasi-stellar radio sources) are found at great distances, meaning we see them as they existed when the universe was young and galaxies were more active.