

Name: _____ Date: _____

Answer Key: Blast Throughout the Deep Field: A 10th Grade Cosmology Quest

Analyze the spectral shifts and galactic signatures used by astronomers to map the vast expansion of our observable universe.

1. Which of the following galaxy types is characterized by a high concentration of old stars and very little active star formation?

Answer: C) Elliptical

Elliptical galaxies are often called 'red and dead' because they contain mostly older stars and lack the cool gas needed to create new ones.

2. Edwin Hubble's observations of the Andromeda Galaxy proved that it was located outside of the Milky Way.

Answer: A) True

By identifying Cepheid variable stars in Andromeda, Hubble calculated its distance, settling the 'Great Debate' by proving galaxies exist beyond our own.

3. What specifically does a 'Redshift' in the light spectrum of a distant galaxy indicate to an astrophysicist?

Answer: B) The galaxy is moving away from the observer

As a galaxy moves away, the light waves are stretched, shifting them toward the longer, redder wavelengths of the electromagnetic spectrum.

4. The Sombrero Galaxy is a famous example of a _____ galaxy viewed nearly edge-on from Earth.

Answer: A) Spiral

Despite its unusual appearance, the Sombrero Galaxy (M104) has a flat disk and spiral arms, classifying it as a spiral galaxy.

5. The Cosmic Microwave Background (CMB) radiation is the oldest light detectable in the universe.

Answer: A) True

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The CMB is considered the 'afterglow' of the Big Bang, dating back to approximately 380,000 years after the universe began.

6. Which force is primarily responsible for the formation of the large-scale 'Cosmic Web' structure?

Answer: C) Gravity

Gravity pulls matter together into filaments and clusters, creating the interconnected web-like structure seen in the distribution of galaxies.

7. Scientists believe that _____ makes up the majority of the mass within a galaxy, even though it cannot be seen.

Answer: B) Dark Matter

While ordinary matter makes up only about 5% of the universe, Dark Matter provides the extra gravity needed to hold galaxies together.

8. The 'Local Group' refers to which specific cosmic structure?

Answer: C) The small cluster of galaxies including the Milky Way

The Local Group consists of more than 50 galaxies, including the Milky Way, Andromeda, and the Triangulum galaxy.

9. Quasars are extremely bright objects found at the centers of distant galaxies, powered by black holes.

Answer: A) True

Quasars (quasi-stellar radio sources) are active galactic nuclei where supermassive black holes consume vast amounts of matter, releasing immense energy.

10. The discovery that the universe's expansion is accelerating led to the theory of _____ energy.

Answer: C) Dark

Dark energy is the name given to the mysterious force that is pushing the universe apart at an increasing rate.