

Name: _____ Date: _____

Blast Through the Deep Field: A 9th Grade Galactic Physics Quest

High schoolers calculate cosmic distances using redshift and analyze Hubble's Law to map the accelerating expansion of our universe.

1. When observing the spectra of distant galaxies, Edwin Hubble noted a systematic 'redshift.' What physical phenomenon causes this shift toward longer wavelengths?

- A. The gravitational pull of dark matter within the galaxy
- B. The depletion of hydrogen fuel in older stellar populations
- C. The stretching of spacetime as the universe expands
- D. Interstellar dust clouds absorbing blue light frequencies

2. According to the Big Bang theory, the universe was once an incredibly hot, dense state. The residual heat from this event, cooled to roughly 2.7 Kelvin, is known as the _____.

- A. Cosmic Microwave Background (CMB)
- B. Schwarzschild Radius
- C. Event Horizon Radiation
- D. Great Attractor Signal

3. True or False: Most of the mass in a typical galaxy, such as the Sombrero Galaxy, consists of visible stars and gas clouds.

- A. True
- B. False

4. Which of these galactic structures is characterized by a lack of rotational symmetry and often results from tidal interactions between two passing galaxies?

- A. Lenticular Galaxy
- B. Irregular Galaxy
- C. Grand Design Spiral
- D. Standard Elliptical

5. The Andromeda Galaxy and the Milky Way are currently moving toward each other and are part of a gravitationally bound group of roughly 50 galaxies called the _____.

- A. Boötes Void
- B. Sloan Great Wall
- C. Local Group
- D. Orion Arm

6. True or False: Elliptical galaxies are generally composed of older, redder stars and contain very little of the cool gas needed for new star formation.

- A. True

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B. False

7. In 1998, observations of Type Ia Supernovae led to the discovery that the expansion of the universe is not slowing down, but accelerating. What is the name of the mysterious force driving this?

- A. Centrifugal Force
- B. Dark Energy
- C. Quasar Feedback
- D. Neutrino Pressure

8. The _____ describes the relationship where a galaxy's velocity of recession is directly proportional to its distance from Earth.

- A. Keplerian Orbit
- B. Hubble-Lemaître Law
- C. Chandra Limit
- D. Drake Equation

9. True or False: The 'Observable Universe' includes all galaxies in existence, regardless of whether their light has had time to reach us since the Big Bang.

- A. True
- B. False

10. If you are looking at the 'Whirlpool Galaxy' through a telescope, you are seeing it as it existed millions of years ago. This concept is fundamental to astronomy and is known as:

- A. Parallax
- B. Look-back time
- C. Time dilation
- D. Proper motion