Name: _____ **Date:** _____

Answer Key: Rocket Through the Cosmos: College Galaxy & Universe Quiz

Undergraduates identify galactic morphologies, explain expansion evidence, and classify cosmic structures during this high-energy introductory astronomy formative assessment.

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1. Which specific light-year distance best approximates the diameter of the Andromeda Galaxy (M31), a neighbor often compared to our own?

Answer: B) 220,000 light-years

While Andromeda is 2.5 million light-years away, its physical diameter is approximately 220,000 light-years, making it larger than the Milky Way.

2. Edwin Hubble’s observations of Cepheid variables in the 'Andromeda Nebula' proved that such objects were distinct galaxies outside our own.

Answer: A) True

By measuring the distance to Cepheid variables, Hubble confirmed these 'nebulae' were far beyond the Milky Way, expanding our understanding of the universe.

3. The Sombrero Galaxy (M104) is famous for its massive central bulge and prominent dust lane, categorizing it primarily as a _____ galaxy.

Answer: C) Spiral

The Sombrero Galaxy is classified as a spiral galaxy (Sa or Sb) due to its distinct disk and spiral structure, even though it has an unusually large bulge.

4. What is the primary characteristic of 'S0' galaxies on the Hubble Tuning Fork diagram?

Answer: C) They possess a disk but lack visible spiral arm structures.

S0 or lenticular galaxies are an intermediate type containing a disk and a bulge but no significant spiral arms or recent star formation.

5. The 'Great Attractor' is a massive gravitational anomaly in intergalactic space that is pulling the Milky Way and other clusters toward it.

Answer: A) True

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The Great Attractor is a regional concentration of mass that influences the peculiar motion of galaxies across hundreds of millions of light-years.

6. Arp 220 is a well-known example of an Ultra-Luminous Infrared Galaxy (ULIRG), which is typically caused by _____.

Answer: B) A galactic merger triggering starbursts

Galactic mergers compress gas clouds, leading to intense periods of star formation (starbursts) that emit strongly in the infrared.

7. Which discovery by Vera Rubin provided strong evidence for the existence of dark matter within galaxies?

Answer: C) Flat galaxy rotation curves

Rubin found that stars at the edges of galaxies rotate as fast as those near the center, implying hidden mass (dark matter) is providing extra gravity.

8. Most of the galaxies we observe in the local universe are moving toward the Milky Way due to gravity.

Answer: B) False

Due to the expansion of the universe (Hubble's Law), most galaxies are moving away from us; only a few nearby galaxies in our Local Group are moving toward us.

9. The Laniakea Supercluster is the specific cosmic structure that contains which of the following?

Answer: A) The Milky Way and the Virgo Cluster

Laniakea is a massive supercluster encompassing the Milky Way and roughly 100,000 other nearby galaxies, including the Virgo Cluster.

10. The 'Cosmic Dawn' refers to the era in the universe's history when _____ first began to shine.

Answer: C) The first stars (Population III)

Cosmic Dawn marks the end of the 'Dark Ages' when the first stars formed and reionized the surrounding hydrogen gas.