

Name: _____ Date: _____

Answer Key: Cosmic Clues: Deciphering the Vast Universe for Seniors

Examine the mechanics of Hubble's Law and galactic structures to understand how astrophysicists map the history of our solar neighborhood and beyond.

1. Which specific phenomenon provides evidence that the universe is expanding, as observed by Edwin Hubble in the 1920s?

Answer: B) Redshift of distant galaxies

Redshift occurs when light waves from a receding object are stretched, indicating that galaxies are moving away from us as space expands.

2. The Sombrero Galaxy (M104) is characterized by a prominent dust lane and a massive central bulge, categorizing it as which type of galaxy?

Answer: C) Spiral

Despite its unique appearance, the Sombrero Galaxy is a spiral galaxy (specifically an unbarred spiral) seen nearly edge-on.

3. True or False: The 'Great Attractor' is a massive gravitational anomaly in intergalactic space that is pulling the Milky Way toward it.

Answer: A) True

The Great Attractor is a gravitational center in the Laniakea Supercluster that influences the motion of local galaxies, including our own.

4. What is the primary difference between a Spiral galaxy and an Elliptical galaxy regarding star formation?

Answer: C) Spirals have abundant gas and dust for new stars.

Spiral galaxies contain cold gas and dust in their discs, which fuels the birth of new stars; elliptical galaxies consist mostly of older stars.

5. The Boötes Void is a massive, nearly empty region of space that contains very few galaxies. What is the technical term for these regions in the cosmic web?

Answer: B) Voids

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In large-scale cosmic structure, 'voids' are the vast spaces between filaments that contain very little matter.

6. True or False: In about 4.5 billion years, the Milky Way is predicted to collide and merge with the Andromeda Galaxy.

Answer: A) True

Andromeda and the Milky Way are currently moving toward each other due to mutual gravitational attraction and will eventually form an elliptical galaxy.

7. Which of the following describes the 'Centaurus A' galaxy, known for its intense radio emissions and central black hole activity?

Answer: B) An active galactic nucleus (AGN)

Centaurus A is a famous example of an active galaxy, energized by a supermassive black hole at its core.

8. What is the name of the 'standard candle' or type of pulsating star used to measure the distance to other galaxies?

Answer: C) Cepheid Variable

Cepheid Variables have a direct relationship between their luminosity and pulsation period, making them vital for calculating cosmic distances.

9. True or False: Dark matter can be seen directly through optical telescopes because it emits high-energy visible light.

Answer: B) False

Dark matter does not emit, absorb, or reflect light; its presence is inferred only through its gravitational effects on visible matter.

10. Which component makes up approximately 68% of the universe and is responsible for its accelerated expansion?

Answer: C) Dark energy

Dark energy is the theoretical force or property of space that drives the accelerated expansion of the universe.