

Advanced Cosmological Concepts

Cosmology · Practice Test · 12 Questions

1. Which specific spectroscopic phenomenon occurs when light from distant galaxies is shifted toward the red end of the spectrum due to the expansion of the universe?

- A) Doppler Effect
- B) Cosmological Redshift
- C) Gravitational Lensing
- D) Synchrotron Radiation

2. What is the current estimated age of the universe according to data from the Planck satellite mission?

- A) 11.8 billion years
- B) 13.8 billion years
- C) 15.2 billion years
- D) 17.4 billion years

3. Which fundamental force is responsible for the large-scale structure formation of the universe by pulling matter into filaments and voids?

- A) Strong Nuclear Force
- B) Electromagnetic Force
- C) Gravity
- D) Weak Nuclear Force

4. What is the primary constituent of the universe by mass-energy density, according to the Lambda-CDM model?

- A) Baryonic matter
- B) Dark energy
- C) Dark matter
- D) Neutrinos

5. In the context of stellar evolution, what is the 'Chandrasekhar limit' approximately equal to in terms of solar masses?

- A) 1.44
- B) 2.25
- C) 3.00
- D) 0.75

6. The cosmic microwave background radiation (CMB) corresponds to a blackbody temperature of approximately how many Kelvin?

- A) 0.5 K
- B) 2.7 K
- C) 5.2 K
- D) 10.0 K

7. Which planetary body in our solar system has the highest density, exceeding 5.4 g/cm³?

- A) Earth
- B) Mercury
- C) Venus
- D) Mars

8. What describes the 'Big Freeze' or 'Heat Death' scenario of the universe's ultimate fate?

- A) Rapid collapse into a singularity
- B) Expansion resulting in a cold, featureless void
- C) Conversion of all matter into black holes
- D) Thermal equilibrium via proton decay

9. What is the name of the region surrounding a black hole beyond which nothing, not even light, can escape?

- A) Accretion disk
- B) Event horizon
- C) Ergosphere
- D) Singularity

10. Which galaxy cluster is the closest major neighbor to the Local Group, located approximately 50 million light-years away?

- A) Coma Cluster
- B) Virgo Cluster
- C) Perseus Cluster
- D) Hercules Cluster

11. What is the term for the hypothetical particles that are believed to make up the majority of non-baryonic dark matter?

- A) WIMPs
- B) Quarks
- C) Leptons
- D) Tachyons

12. Which element is most abundant in the universe by mass, excluding the products of stellar nucleosynthesis?

- A) Helium
- B) Hydrogen
- C) Oxygen
- D) Carbon