

Advanced Astrophysics and Planetary Science Quiz

Physical Science · Practice Test · 15 Questions

1. Which specific spectroscopic signature indicates the presence of an M-dwarf star's atmospheric composition through the detection of titanium oxide?

- A) TiO bands
- B) He-II lines
- C) Balmer series
- D) Paschen alpha

2. What is the precise value of the Chandrasekhar limit, the maximum mass a stable white dwarf star can attain?

- A) 1.2 solar masses
- B) 1.44 solar masses
- C) 2.1 solar masses
- D) 3.0 solar masses

3. In orbital mechanics, what is the name of the point where a small body's orbit is at its greatest distance from the barycenter of the system?

- A) Periapsis
- B) Apocenter
- C) Nodes
- D) Inclination

4. Which moon of Jupiter is geologically active and displays the most intense volcanic activity in the solar system due to tidal heating?

- A) Europa
- B) Ganymede
- C) Callisto
- D) Io

5. What is the physical process responsible for the high-energy gamma-ray bursts observed from distant galaxies?

- A) Stellar collapse to a black hole
- B) Supernova type Ia
- C) Thermal emission
- D) Bremsstrahlung

6. The cosmic microwave background radiation corresponds to a blackbody spectrum with a temperature of approximately how many Kelvin?

- A) 1.2 K
- B) 2.7 K
- C) 5.5 K
- D) 10.3 K

7. Which chemical element is primarily produced in the core of a star through the triple-alpha process?

- A) Carbon
- B) Neon
- C) Magnesium
- D) Silicon

8. What is the Roche limit defined as in the context of celestial mechanics?

- A) Distance where a moon breaks up
- B) Orbital resonance threshold
- C) Light speed limit for gravity
- D) Maximum size of an asteroid

9. Which astronomical object is the primary source of the 'Great Attractor' gravitational anomaly?

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

10. What is the approximate age of the universe according to the standard Lambda-CDM cosmological model?

- A) 12.4 billion years
- B) 13.8 billion years
- C) 15.2 billion years
- D) 16.7 billion years

11. Which gas giant planet in our solar system has an axial tilt of approximately 98 degrees?

- A) Saturn
- B) Jupiter
- C) Neptune
- D) Uranus

12. What defines the 'Goldilocks zone' (circumstellar habitable zone) around a star?

- A) Presence of magnetic shielding
- B) Liquid water stability
- C) Atmospheric pressure
- D) Escape velocity

13. Which subatomic particle is emitted in vast quantities during a core-collapse supernova, carrying away most of the released energy?

- A) Neutrino
- B) Muon
- C) Gluon
- D) Positron

14. What is the primary constituent of the atmosphere of Titan, the largest moon of Saturn?

- A) Oxygen
- B) Nitrogen
- C) Methane
- D) Carbon Dioxide

15. What term describes the apparent change in frequency of light from a galaxy moving away from an observer at a significant fraction of the speed of light?

- A) Gravitational lensing
- B) Cosmological redshift
- C) Proper motion
- D) Stellar parallax