

Advanced Celestial Mechanics and Planetary Science

Earth Science · Answer Key · 15 Questions

1. Which specific atmospheric phenomenon is primarily responsible for the 'blue' color of Neptune's atmosphere as observed by telescopes?

- A) High concentration of neon
- B) Methane absorption of red light**
- C) Refraction of light by ice crystals
- D) Scattering of light by nitrogen aerosols

2. What is the precise term for the point in an elliptical orbit where a satellite is at its maximum distance from the body it is orbiting?

- A) Periapsis
- B) Zenith
- C) Apoapsis**
- D) Nadir

3. The 'Great Red Spot' on Jupiter is a persistent high-pressure region known as what type of meteorological feature?

- A) Anticyclonic storm**
- B) Cyclonic depression
- C) Supercell thunderstorm
- D) Planetary-scale gravity wave

4. Which moon in the solar system possesses a dense atmosphere composed primarily of nitrogen and methane, with surface liquid hydrocarbon lakes?

- A) Europa
- B) Ganymede
- C) Titan**
- D) Enceladus

5. What is the primary constituent of the 'crust' of the dwarf planet Ceres located in the asteroid belt?

- A) Silicate rock and water ice**
- B) Solid metallic iron
- C) Compressed hydrogen
- D) Frozen carbon dioxide

6. Which celestial body has a rotational axis tilt of approximately 98 degrees, causing its poles to experience 21 years of continuous darkness?

- A) Venus
- B) Neptune
- C) Uranus**
- D) Saturn

7. The Hertzsprung-Russell diagram plots stars based on which two primary physical characteristics?

- A) Mass and velocity
- B) Luminosity and surface temperature**
- C) Distance and absolute magnitude
- D) Age and chemical composition

8. What is the approximate age of the universe as determined by the Planck mission's analysis of the Cosmic Microwave Background?

- A) 10.2 billion years
- B) 13.8 billion years**
- C) 15.6 billion years
- D) 18.1 billion years

9. Which layer of the Sun is responsible for the emission of the majority of visible light and is effectively the 'surface' we observe?

- A) Corona
- B) Chromosphere
- C) Photosphere**
- D) Convective zone

10. What is the Roche limit in the context of planetary science?

- A) The distance within which a celestial body will disintegrate due to tidal forces**
- B) The boundary of a black hole's event horizon
- C) The maximum speed at which a star can rotate before breaking apart
- D) The minimum temperature required for nuclear fusion in a protostar

11. Which chemical element was first discovered in the solar spectrum before it was ever isolated on Earth?

- A) Neon
- B) Helium**
- C) Argon
- D) Xenon

12. What type of galaxy is characterized by a central bar-shaped structure composed of stars?

- A) Elliptical
- B) Irregular
- C) Lenticular
- D) Barred spiral**

13. The Van Allen radiation belts are held in place by which feature of the Earth?

- A) Atmospheric pressure
- B) Gravitational gradient
- C) Magnetic field**
- D) Solar wind pressure

14. What is the primary mechanism that generates the heat observed in the interior of Jupiter and Saturn?

- A) Radioactive decay
- B) Kelvin-Helmholtz contraction**
- C) Nuclear fission
- D) Internal friction from tectonic movement

15. Which astronomical object is the most massive known type of star cluster, often containing millions of stars held together by gravity?

- A) Open cluster
- B) Globular cluster**
- C) Stellar association
- D) OB association