

Cosmic Geography Challenges

Physical Geography · Answer Key · 24 Questions

1. What is the dominant element in the Sun's atmosphere, by mass?

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

2. Which of the following planets has the most extensive ring system in our solar system, composed primarily of ice particles?

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

3. The Great Red Spot on Jupiter is a persistent anticyclonic storm. Approximately how long has it been observed continuously?

- A) Over 100 years
- B) Over 200 years
- C) Over 300 years**
- D) Over 400 years

4. What is the primary component of the atmospheres of Venus and Mars?

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

5. Which moon in our solar system exhibits cryovolcanism, erupting plumes of water ice and other volatiles?

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

6. The Kuiper Belt, a region beyond Neptune, is home to numerous icy bodies. What is the approximate distance of its inner edge from the Sun?

- A) 20 AU
- B) 30 AU**
- C) 40 AU
- D) 50 AU

7. What is the primary mechanism responsible for the formation of stars within nebulae?

- A) Supernova shockwaves
- B) Gravitational collapse**
- C) Galactic collisions
- D) Stellar winds

8. The Roche limit describes the minimum distance at which a celestial body can approach a larger body without being torn apart by tidal forces. What is the Roche limit proportional to?

- A) The square root of the ratio of their densities**
- B) The cube root of the ratio of their densities
- C) The ratio of their densities
- D) The inverse of the ratio of their densities

9. What is the most abundant element in the universe by mass?

- A) Helium
- B) Oxygen
- C) Iron
- D) Hydrogen**

10. The 'Pioneer anomaly' was a slight, unexplained deceleration observed in the Pioneer 10 and 11 spacecraft as they traveled away from the Sun. What is the current leading explanation for this phenomenon?

- A) Gravitational lensing from an unseen object
- B) A misunderstanding of solar radiation pressure**
- C) An artifact of the spacecraft's propulsion system
- D) An unknown fundamental force

11. Which planet in our solar system has the most eccentric orbit, meaning its distance from the Sun varies the most?

- A) Mercury**
- B) Mars
- C) Pluto (dwarf planet)
- D) Mercury

12. The 'solar wind' is a stream of charged particles released from the upper atmosphere of the Sun. What is its typical speed?

- A) 100 km/s
- B) 300 km/s
- C) 500 km/s**
- D) 700 km/s

13. What phenomenon causes the 'tail' of a comet to always point away from the Sun?

- A) The comet's rotational inertia
- B) Solar wind and solar radiation pressure**
- C) The comet's gravitational pull
- D) The orbital path of the comet

14. Which dwarf planet is located in the asteroid belt between Mars and Jupiter?

- A) Pluto
- B) Eris
- C) Ceres**
- D) Haumea

15. The Andromeda Galaxy, our closest large galactic neighbor, is on a collision course with the Milky Way. Approximately how many years from now is this collision predicted to occur?

- A) 1 billion years
- B) 2 billion years
- C) 4 billion years**
- D) 6 billion years

16. What is the primary reason for the distinct color of Mars, often referred to as the 'Red Planet'?

- A) High concentration of methane gas
- B) Surface covered in iron oxide (rust)**
- C) Abundant red algae on the surface
- D) Reflective properties of its atmosphere

17. Which of the following is NOT a terrestrial planet?

- A) Venus
- B) Earth
- C) Neptune**
- D) Mercury

18. The 'habitable zone' (or Goldilocks zone) around a star is defined as the region where:

- A) Liquid water could exist on a planet's surface**
- B) A planet's atmosphere is thick enough to sustain life
- C) A planet's temperature is consistently above freezing
- D) A planet is within the star's gravitational influence

19. What is the estimated age of the observable universe?

- A) 4.5 billion years
- B) 8.2 billion years
- C) 13.8 billion years**
- D) 20.5 billion years

20. The temperature on the surface of the Moon can fluctuate drastically between day and night. What is the approximate maximum temperature during the lunar day?

- A) 50°C
- B) 100°C
- C) 127°C**
- D) 200°C

21. What is the most common type of star in the Milky Way galaxy?

- A) Red giants
- B) White dwarfs
- C) Red dwarfs**
- D) Blue supergiants

22. Which gas is the primary driver of the runaway greenhouse effect on Venus?

- A) Nitrogen
- B) Oxygen
- C) Sulfur dioxide
- D) Carbon dioxide**

23. The 'Cassini Division' is a prominent gap in Saturn's A ring. What is it primarily caused by?

- A) Impacts from small asteroids
- B) The gravitational influence of Saturn's moon Mimas**
- C) The solar wind eroding the ring particles
- D) The electromagnetic field of Saturn

24. What is the approximate ratio of hydrogen to helium by mass in the Sun's core?

- A) 3:1
- B) 4:1**
- C) 7:1
- D) 10:1