

# HOMework #3

NOTES:

You will need a calculator, a pencil, and a standard scantron.

Each question has one correct answer. Choose the best answer for each. Mark your answer on the scantron.

This homework is due at the beginning of class on April 17. Late homeworks will not be accepted.

1. Which world hosts the Great Red Spot?
  - a) Uranus
  - b) Jupiter
  - c) Neptune
  - d) Saturn
  
2. Which world does not show "internal heat"?
  - a) Neptune
  - b) Saturn
  - c) Uranus
  - d) Jupiter
  
3. Which world does not have planetary rings?
  - a) Jupiter
  - b) Neptune
  - c) Saturn
  - d) Uranus
  - e) All of these have rings.
  
4. Why does the helium content of Saturn appear to be smaller than Jupiter?
  - a) Saturn is too cold to keep helium.
  - b) Saturn is too hot to keep helium.
  - c) Much of Saturn's helium has sunk toward its center.
  - d) Jupiter sucked up all of the helium when it formed, leaving little for Saturn.
  - e) Helium combines with oxygen to form heavy water at Saturn.

5. Who discovered Uranus?
- a) Adams
  - b) Lowell
  - c) Leverrier
  - d) Tombaugh
  - e) Herschel
6. Jupiter is about 10 times larger than the Earth. However, it rotates in only 10 hours instead of 24 hours. How much faster is Jupiter rotating at its equator as compared to the Earth? I am asking for a comparison of rotation speeds at the respective equators.
- a) 24 times
  - b) 29 times
  - c) 10 times
  - d) 9 times
  - e) same speeds
7. Which moon shows strong volcanic activity?
- a) Europa
  - b) Io
  - c) Callisto
  - d) Titan
  - e) Ganymede
8. The Roche limit refers to
- a) the distance at which something moves slower than the planetary escape speed.
  - b) how close an object can approach a planet before being crushed by tidal forces.
  - c) how close an object can approach a planet before being ripped apart by tidal forces.
  - d) the maximum allowable mass of a planet.
  - e) the maximum allowable mass of a moon.
9. Triton is a moon in a retrograde orbit. Suppose its orbit degrades at an average rate of 1 km per century, and that its current distance from Neptune's upper atmosphere is about  $1.5 \times 10^9$  meters. Approximately how long before Triton will fall into Neptune?
- a)  $1.5 \times 10^{11}$  years
  - b)  $1.5 \times 10^{10}$  years
  - c)  $1.5 \times 10^8$  years
  - d)  $1.5 \times 10^7$  years
  - e)  $1.5 \times 10^6$  years

10. Which of the following is not a Dwarf Planet?
- a) Pluto
  - b) Ceres
  - c) Charon
  - d) Eris
11. Most rocky asteroids are found between
- a) Earth and Mars.
  - b) Mars and Jupiter.
  - c) Jupiter and Saturn.
  - d) Saturn and Uranus.
  - e) Uranus and Neptune.
12. The nucleus of a comet is about
- a) 1 meter in size.
  - b) 10 kilometers in size.
  - c) 10,000 kilometers in size.
  - d) 10 million kilometers in size.
  - e) 10 AU in size.
13. A meteor streaks across the sky with a speed of 20 km/sec. If the U. S. is about 3000 miles across, and 1 mile equals 1.6 km, how long does it take the meteor to move across the U. S.?
- a) About 4 minutes.
  - b) About 9 seconds.
  - c) About 9 hours.
  - d) About 1.5 seconds.
  - e) About 1.5 minutes.
14. Suppose that you have a 100 kg sample of a substance with a half-life of 6 months. How long must you wait until only 6 kg of the original substance remains?
- a) about 6 years
  - b) about 0.5 years
  - c) about 0.03 years
  - d) about 8 years
  - e) about 2 years
15. Most extra-solar planets have been discovered with the
- a) microlensing method.
  - b) doppler shift method.
  - c) astrometric method.
  - d) transit method.
  - e) photometric method.

16. There are about 100 billion stars in the Milky Way galaxy. Thinking in terms of the Drake equation, suppose that the probability of a star having a planetary system is  $\mathcal{P} = 80\%$ . Suppose that the probability of having a planet in the habitable zone is  $\mathcal{P} = 5\%$ . Suppose the chance of such a planet having life is  $\mathcal{P} = 0.01\%$ , and finally that the life would be technologically advanced is  $\mathcal{P} = 0.001\%$ . How many intelligent civilizations would be predicted for our Galaxy?

- a)  $4 \times 10^8$
- b)  $4 \times 10^6$
- c)  $4 \times 10^3$
- d) 4
- e)  $4 \times 10^{-3}$