Name _____    **Practice Test 2**    Astronomy

(Last, First)

# Useful Formulas and Values

$M_{sun}$ = 1.99 x $10^{30}$ kg

$M_{earth}$ = 5.97 x $10^{24}$ kg

$M_{moon}$ = 7.35 x $10^{22}$ kg

$R_{sun}$ = 6.96 x $10^8$ m

$R_{earth}$ = 6.38 x $10^6$ m

$R_{moon}$ = 1.74 x $10^6$ m

$d_{earth \rightarrow moon}$ = 3.84 x $10^5$ km

G = 6.67 x $10^{-11}$ $\frac{m^3}{s^2 kg}$

g = 9.80 m/$s^2$

c = 3.00 x $10^8$ m/s

$10^9$ nm = $10^6$ $\mu$m = 1 m

1 AU = 1.5 x $10^{11}$ m

1 ly = 9.46 x $10^{15}$ m


1 y = 3.16 x $10^7$ s

1000 m = 1 km

1 m = 100 cm

3600 arcsec = 1 degree


1 pc = 3.26 ly

1 pc = 3.09 x $10^{16}$ m

d = vt

$F = \frac{GMm}{d^2}$

$V = \sqrt{\frac{GM}{d}}$

$V = \sqrt{\frac{2GM}{R}}$

$g = \frac{GM}{R^2}$

$p^2 = a^3$

$M = \frac{4\pi^2 a^3}{Gp^2}$

$\frac{L}{2\pi d} = \frac{\alpha}{360^o}$

$V_{sphere} = \frac{4}{3}\pi r^3$

$A = \pi r^2 = \pi D^2/4$

$C = 2\pi r$


$\sigma$ = 5.671 x $10^{-8}$

h = 6.62 x $10^{-34}$ J s

$L = \sigma T^4$

L = Power/Area


$E = \frac{hc}{\lambda}$

$T = \frac{2.9 \, x \, 10^6 nm \cdot K}{\lambda_{max}}$

$v = c \cdot \frac{\Delta\lambda}{\lambda_o}$

R = 1.097 x $10^7$ $m^{-1}$

$\frac{1}{\lambda} = R(\frac{1}{4} - \frac{1}{n^2})$

$Area_{sphere} = 4\pi R^2$

$v = c = \lambda\nu$

$\theta = 2.5 \, x \, 10^5 \frac{\lambda}{D}$

Light gathering power $\propto D^2$

frac left = $2^{-\frac{t}{H}}$

**Multiple Choice Section. Circle the letter of the correct answer**

1. Which planet has a greenhouse effect?
   (A) Mercury
   (B) Venus
   (C) Earth
   **(D) Both B and C**

2. Which is the largest planet?
   (A) Saturn
   **(B) Jupiter**
   (C) Uranus
   (D) Neptune

3. The age of the solar system has been dated rather precisely to 4.56 billion years. What method was used to determine this number?
   (A) Calculating the age of the Sun
   **(B) Determining the age of meteorites by radioactive dating**
   (C) Determining the age of the Moon, which is older than Earth, by measuring the density of craters
   (D) Calculating the age of Earth by counting layers of geologic deposits

4. 'Continental drift' on Earth is now thought to be caused by
   (A) earthquakes.
   (B) precession of Earth's spin axis.
   (C) tidal forces from the Moon and Sun acting on the continental land masses.
   **(D) circulation currents in the deep interior causing slabs of Earth's crust to move slowly.**

5. How many human beings have walked on the Moon?
   (A) 1
   (B) 6
   **(C) 12**
   (D) 18

6. Moon quakes occur most often when the Moon is near perigee. The reason for this is
   **(A) increased tidal distortion of the Moon by Earth.**
   (B) the higher probability of impacts on the Moon of meteoroids that have been accelerated by Earth at these lunar phases.
   (C) increased speed of rotation of the Moon at these times and the consequent reduction of the gravitational force on the surface.
   (D) increased sunlight on the Moon's surface at these times.

7. The surface features and topology of Venus have been determined primarily by
   **(A) radar methods from Earth and from Venus-orbiting spacecraft detecting reflected radio waves from the surface.**
   (B) surface lander vehicles that have explored the surface.
   (C) visible light and UV photography from the Hubble Space Telescope and Earth-bound telescopes.
   (D) balloon-borne spacecraft launched into the Venus atmosphere by spacecraft.

8. One distinctive feature that is visible on the 'surface' of Jupiter through a telescope from Earth is
   (A) the Cassini Division.
   (B) Maxwell Montes.
   (C) Olympus Mons.
   **(D) the Great Red Spot.**

9. What is the Cassini division?
   (A) the layer of relatively clear air separating Saturn's upper cloud deck from the middle cloud deck.
   (B) the boundary between the bright B ring and the faint C ring in Saturn's rings.
   (C) a major gap in the asteroid belt.
   **(D) a wide, dark gap in Saturn's rings.**

10. The three outer Galilean satellites of Jupiter (Europa, Ganymede, and Callisto) all appear to have cores of rock. In addition to rocky material, the major constituent of these satellites seems to be ices of
    **(A) $H_2O$.**
    (B) $CO_2$.
    (C) $NH_3$.
    (D) $CH_4$.

11. Which of Jupiter's satellites is characterized by an exceptionally smooth, icy surface, few craters, and many streaks and cracks?
    (A) Ganymede
    (B) Callisto
    (C) Io
    **(D) Europa**

**Short Answer Section    Your answer must be legible for credit.**

1. Trans-Neptunian objects orbit in a region known as the _____. What is unique about their orbits?

   Kuiper belt. Kuiper belt objects have orbits with large eccentricities and their orbits are often steeply inclined with respect to the ecliptic plane

2. A rock contains a small amount of a radioactive isotope with a half life of 1 billion years. If it contains only $\frac{1}{4}$ of the original amount of the isotope, what is the age of the rock?

   1/4 of the original radioactive isotopes says that two half-lives have past since the original rock formed. Two half-lives is 2 billion years.

3. Describe the main regions of the interior of the Earth.

   The Earth has (moving outward from the center) a solid iron core, a liquid iron cord, a plastic mantel (iron and silicate materials) and a solid crust of solid silicate material. The plastic asthenosphere is the upper part of the mantle below the crust.

4. What are rilles and scarps and when did they form?

   Rilles are ancient lava flows that look like rivers or streams They formed early in the Moon's history.

   Scarps are ridges or cliffs caused by ancient lava flows when the moon formed or crustal cracking of the surface as the Moon cooled. Scarps may still be forming as the moon continues to cool.

5. Titan has a cold but thick atmosphere. What did the Huygens lander discover under the thick clouds of Titan?

   The Huygens lander found lakes and rivers of liquid methane ($CH_4$) or ethane ($C_2H_8$). There is likely methane 'rain'. The solid surface has 'rocks' of water ice. There are cryovolcanoes