

Name: \_\_\_\_\_

**Astr 1010 – Spring 2016**  
**ASSIGNMENT #3 – DUE: MONDAY, MARCH 7, 2016**

1. Your weight on any world is proportional to the acceleration caused by gravity at the surface. We can use Newton's Law of Universal Gravitation and Newton's Second Law of motion to find the ratio of gravitational acceleration  $g$  on another world compared to that on Earth  $g_{\oplus}$  where the symbol  $\oplus$  indicates Earth:

$$\frac{g}{g_{\oplus}} = \frac{(M/M_{\oplus})}{(R/R_{\oplus})^2}$$

Here  $M$  is mass and  $R$  is radius. Use this formula in the table below to find your weight on some of the other worlds in the Solar System.

Object Name	Mass (kg)	$M/M_{\oplus}$ ratio	Radius (km)	$R/R_{\oplus}$ ratio	$g/g_{\oplus}$ ratio	Weight (pounds)
Earth	$5.97 \times 10^{24}$	1	6378	1	1	
Moon						
Mars						
Ceres						

2. Work out the distances from the Sun of the planets according to the Titius-Bode "Law" in the table below. Fill out columns 3, 4, and 5 of the sequence, and compare your result in column 5 with the actual semimajor axes of the planets in the text appendix Table E.2.

Planet	Start	$\times 3$	$+4$	$\div 10$	$a$ (AU)
Mercury	0				
Venus	1				
Earth	2				
Mars	4				
Asteroids	8				
Jupiter	16				
Saturn	32				
Uranus	64				
Neptune	128				
Pluto	256				
Eris	512				

3. The NASA Jet Propulsion Laboratory in California has built many of the spacecraft that explore the Solar System. Visit their web site at:  
<http://www.jpl.nasa.gov/missions/?type=current>

Read the pages for the following eight current missions and fill in the table below.

<b>Mission</b>	<b>Launch Date</b>	<b>Destination</b>	<b>Goals and Current Status</b>
Cassini			
Dawn			
Juno			
MER Opportunity			
Mars Odyssey			
Mars Reconnaissance Orbiter			
MSL Curiosity			
Voyager 1			