Dynamics Worksheet #1 – Newton's Law of Universal Gravitation

1. Find the force of gravity between two 74.0kg physics students that are sitting 85.0cm apart.

2. Find the force of gravity between a cubic meter of water (1000kg) and the Sun. The Sun's mass is 1.99 x 10^{30}kg and is 1.50 x 10^{11}m away.

3. Find the force of gravity between the same cubic meter of water and the Moon. The Moon's mass is 7.36 x 10^{22} and is 3.84 x 10^8m away

4. What is the force of gravity on a 24.0kg table.

5. What would happen to the force of gravity in question #4 if the distance between the table and the center of the Earth was:

   a) tripled?   b) halved?

6. The Sun's mass is 1.99 x 10^{30}kg and it has a radius of 6.96 x 10^8m. What is the Sun's gravitational field strength at its surface?

7.

Object	Mass (kg)	Radius (m)	Dist. To Sun (m)	Force of Gravity between the Sun and the Object (N)	Gravitational Field Strength at the surface of the object (N/kg)	Weight of an 80.0kg student on this object (N)
Moon	7.36 x 10^{22}	1.74 x 10^6	1.50 x 10^{11}			
Venus	4.87 x 10^{24}	6.05 x 10^6	1.08 x 10^{11}			
Earth	5.98 x 10^{24}	6.37 x 10^6	1.50 x 10^{11}			
Mars	6.40 x 10^{23}	3.40 x 10^6	2.28 x 10^{11}			
Jupiter	1.90 x 10^{27}	7.15 x 10^7	7.78 x 10^{11}			

8. What is the gravitational field strength at the top of Mt. Everest which is 8400m above sea level?