Name: _____

Date: _____

Physics 1

Universal Law of Gravitation Problem Set

1. What is gravity? According to Newton? According to Einstein?

2. Calculate the gravitational pull between a 120 kg object and an 85 kg object if the distance between them is 2 m? Calculate for the same object if they are 0.001 m (1 mm) apart?

3. Electrons are tiny and nearly massless. However, they do have a measurable mass of $9.11\ x\ 10^{-31}\ kg$. Likewise, protons have a mass of $1.67\ x\ 10^{-27}\ kg$. In a hydrogen atom, the distance between them is $5.3\ x\ 10^{-11}\ m$. Calculate the gravitational pull between the proton and the electron?

4. The mass of the earth is $5.98\ x\ 10^{24}\ kg$. The radius of the earth from its center to the surface is 6371 km.
    a. Using an average person's mass (like your own), calculate the gravitational force pull on the surface of the earth between a person and the earth.
    b. Calculate the same pull as you stand on top of Mt. Everest (29,029 feet above sea level).
    c. Calculate the gravitational force you'd experience standing on the Stratos Red Bull Balloon where Felix Baumgartner skydived from 21.7 km above the surface of the earth.
    d. What do these calculations tell you about the force of gravity near the earth?

5. Using the mass of the earth above, the mass of the sun which is 1.99 EE 30 kg and the distance between them, 149,600,000 km, calculate the gravitational force between the earth and the sun.

6. Calculate your weight on Jupiter if the mass of Jupiter is 1.89 EE 27 kg and its radius is 71,800 km.

7. Calculate the weight of a 5 kg object near the surface of the earth.