Universal Law of Gravitation Problem Set

1. Compute the force of gravity between two .3 kg masses whose centers are 1.5 meters apart.

2. Compute your mass (in kilograms) by dividing your weight (in pounds) by 2.2.

b. The mass of the earth is 5.98×10^{24} kg and the radius of the earth is 6.38×10^{6} m. Use the Law of Universal Gravitation to calculate the gravitational force of attraction between you and the earth.

c. Convert your answer in (b) to pounds by multiplying by .2245. How does this answer compare to your weight?

3. Two masses m_1 and m_2, are separated by a distance r. The force of attraction between the two masses is F

    a. If m1 is doubled, how does F change? _____

    b. If neither of the masses were changed, but r was doubled, how would F change?

    _____

    c. If r was not changed but both masses were doubled, how would F change?

    _____

    d. If r was halved and both masses were doubled, how would F change?

    _____

4. The mass of the moon is 7.35×10^{22}kg and the radius of the moon is 1.74×10^{6}m. Compute the acceleration due to gravity of an object of mass, m, on the moon.

5. Calculate the distance between two 75 kg masses that have a gravitational attraction of 8.34×10^{-7} N.

6. What is the acceleration of gravity 2250 km above the Earth's surface?

7. What is the period for a satellite orbiting the Earth 1.55×10^{7} m from the Earth's center?

8. How far above the Earth's surface would you have to go for your weight to be reduced to one-sixth of what it is on the Earth's surface?

9. How fast would an object be going if it were at the distance described in problem number 4?

10. Determine the acceleration due to gravity, the period, and the centripetal velocity, of an object orbiting the Earth 3,3885,000 m above the Earth's surface.