Universal Gravitation

Name: _____

1) What happens to the gravitational force between two masses when the distance between the masses is doubled?

2) The moon and Earth are attracted to each other by gravitational force. Does the more massive Earth attract the moon with a greater force than the moon attracts the Earth? Explain.

3) If Earth began to shrink, but its mass remained the same, what would happen to the value of g on Earth's surface?

4) If Earth were twice as massive, but remained the same size, what would happen to the value of G?

5) An apparatus like the one Cavendish used to find G has a large lead sphere that is 7.2 kg in mass and a small one that is 0.063 kg. Their centers are 0.045 m apart. Find the force of attraction between them.

6a) What is the gravitational force between two 15 kg packages that are 35 cm apart?

b) What fraction is this of the weight of one package?

7) Using the data in Table 8–1, compute the gravitational force that the Sun exerts on Saturn.

8) Assume that you have a mass of 50.0 kg and Earth has a mass of 5.97×10^{24} kg. The average radius of the Earth is 6.38×10^{6} m.
a) What is the force of gravitational attraction between you and Earth?

b) What is your weight?

9) Mimas, one of the moons of Saturn, has an orbital radius of 1.87×10^{8} m and an orbital period of 23 hours. Use Newton's version of Kepler's Law to find the mass of Saturn.

10) A 1000 kg satellite orbiting the Earth experiences an attractive force of 180 N.
a) At what distance is the satellite orbiting?

b) What is the period of the satellite?

Answers: 5) 1.5×10^{-8} N 6b) 8.3×10^{-10} 8a) 489 N 10b) 28.2 hr