Name
Universal Gravitation

Multiple Choice

1. If the distance between two objects were doubled, the force of gravitational attraction between the objects would be:
    a. the same.
    b. double the original force.
    c. one half of the original force.
    d. one quarter of the original force.

2. Newton's law of universal gravitation states that
    a. the orbits of the planets are elliptical.
    b. the speed of a planet's orbit varies depending on which part of the ellipse it is occupying.
    c. the square of the ratio of the periods of any two planets revolving around the Sun is equal to the cube of the ratio of their average distance from the Sun.
    d. objects attract other objects with a force that is directly proportional to the product of their masses, and inversely proportional to the square of the distance between them.

3. Gravity is what type of force?
    a. field force
    b. contact force
    c. normal force
    d. frictional force

4. In this text, which of the following symbols represents the constant of universal gravitation?
    a. F_g
    b. G
    c. g
    d. F_c

5. Which of the following equations expresses Newton's law of universal gravitation?
    a. $F_c = \dfrac{mv_t^2}{r}$
    b. $F_g = \dfrac{m_1 m_2}{r}$
    c. $g = G\dfrac{m_E}{r^2}$
    d. $F_g = G\dfrac{m_1 m_2}{r^2}$

6. When calculating the gravitational force between two extended bodies, you should measure the distance
    a. from the closest points on each body.
    b. from the most distant points on each body.
    c. from the center of each body.
    d. from the center of one body to the closest point on the other body.

7. Newton had the insight to see that the _____.
    a. moon is moving
    b. moon orbits Earth
    c. force on the moon has the same nature as the force on an apple
    d. moon always keeps one side toward Earth
    e. none of the above

8. The gravitational force between two massive spheres
    a. is always an attraction.
    b. depends on how massive they are.
    c. depends inversely on the square of the distances between them.

    d.   all of the above

9. Suppose the gravitational force between two spheres is 70 N. If the distance between the spheres is halved, what is the force between the masses?
    a.   17.5 N   b. 35 N   c. 70 N   d. 140 N   e. 280 N

10. The force of gravity on you while your on the earth is greatest when you are standing _____.
    a.   just below Earth's surface
    b.   on Earth's surface
    c.   just above Earth's surface

11. As a spaceship from Earth goes toward the moon, the force it exerts on the Earth:
    a.   increases.   c.   decreases.
    b.   remains the same.   d.   is zero.

Problem

12. Calculate the force of gravitational attraction between two spheres of mass 10.1 kg and 45.4 kg that are 38.5 m apart.

13. A 61.5 kg student sits at a desk 1.25 m away from a 70.0 kg student. What is the magnitude of the gravitational force between the two students? ($G = 6.673 \times 10^{-11}$ N·m^2/kg^2)

14. Two trucks with equal mass are attracted to each other with a gravitational force of 6.7×10^{-4} N. The trucks are separated by a distance of 3.0 m. What is the mass of one of the trucks? ($G = 6.673 \times 10^{-11}$ N·m^2/kg^2)

15. What is the gravitational force between two 0.300 kg coffee mugs that are 0.75 m apart?