

Extra Practice Problems for Chapter 7

$$(G = 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2)$$

1. An object travels in a circle with a constant speed of 4.51 m/s and a frequency of 1.09 Hz. What is the radius of the circle?
2. A 734-g object experiences a centripetal force of 14.2 N while traveling in a circle of radius 62 cm. What is its speed?
3. The centripetal force of an object in uniform circular motion is measured. What happens to the force if the speed is cut in half? What happens to the force if the radius is cut in half?
4. A toy is attached to a string that can withstand a tension of 59.5 N. If the toy is to be twirled at a speed of 12.1 m/s in a circle of radius 72 cm, what is the maximum mass it can have?
5. A car takes a curve at a speed of 52 m/s. If the coefficients of friction between the tires and the road are 0.41 and 0.22, what is the minimum radius of curvature that allows the car to stay on the curve without sliding?
6. The gravitational attraction between two balls, each with a mass of 2.85 kg, is 6.92×10^{-10} N. What is the distance between their centers?
7. The gravitational force between two objects is measured. What happens to the force if the mass of one of the objects is divided by 4? What happens if the distance between their centers is divided by 4?
8. The gravitational force between the earth and an object 125 m above its surface is 150 N. What is the force when the object is 34 m above the earth's surface?
9. An artificial satellite orbits the earth at a radius of 22,000 km. What is its speed? (The mass of the earth is 5.97×10^{24} kg.)
10. A distant planet orbits its star with a period of 67 days. If its orbital radius is 2.2×10^8 km, what is the mass of the star?