25. A solid uniform sphere has a mass of 1.0 X 104 kg and a radius of 1.0 m. What is the magnitude of the gravitational force due to the sphere on a particle of mass *m* located at a distance of (a) 1.5 m and (b) 0.50 m from the center of the sphere? (c) Write a general expression for the magnitude of the gravitational force on the particle at a distance *r =* 1.0 m from the center of the sphere.

41. Two neutron stars are separated by a distance of

1.0 x 1010 m. They each have a mass of 1.0 x 1030 kg and a radius of 1.0 x 105 m. They are initially at rest with respect to each other. As measured from that rest frame, how fast are they moving when (a) their separation has decreased to one-half its initial value and (b) they are about to collide?

50. An orbiting satellite stays over a certain spot on the

equator of (rotating) Earth. What is the altitude of the orbit (called a *geosynchronous orbit)?*

51. A satellite, moving in an elliptical orbit, is 360 km

above Earth's surface at its farthest point and 180 km above at its closest point. Calculate (a) the semimajor axis and (b) the eccentricity of the orbit.

64. A satellite orbits a planet of unknown mass in a circle of radius 2.0 x 107 m. The magnitude of the gravitational force on the satellite from the planet is *F* = 80 N.

(a) What is the kinetic energy of the satellite in this orbit? (b) What would *F be* if the orbit radius were increased to 3.0 x 107 m?

82. A satellite is in elliptical orbit with a period of 8.00 x 104 s about a planet of mass 7.00 x 1024 kg. At aphelion, at radius 4.5 X 107 m, the satellite's angular speed is 7.158 x 10-5 rad/s. What is its angular speed at perihelion?

84. A uniform solid sphere of radius *R* produces a gravitational acceleration of *ag* on its surface. At what distance from the sphere's center are there points (a) inside and (b) outside the sphere where the gravitational acceleration is *ag /3?*

85. A projectile is fired vertically from Earth's surface with an initial speed of 10 km/s. Neglecting air drag, how far above the surface of Earth will it go?