Chapter 13 Gravitation

Example 1:
Calculate the gravitational force between two 30 kg spheres whose centers are separated by 0.5 m.

Example 2:
Two stars (one of mass m and one of mass 4 m) are separated by a distance D. Determine where a third mass could be placed and the net gravitational force acting on it would be zero.

Example 3:
The gravitational force between two bodies is 1×10^{-8} N when they are separated by 20 cm. If their combined mass is 5 kg, determine their individual masses.

Example 4:
Determine the mass of the Earth.

Example 5:
Calculate the gravitational potential energy of a system consisting of a 1 kg, a 2 kg and a 3 kg mass that are located at the corners of a right triangle that has sides that are 3 m, 4 m and 5 m long. The small mass is located at the smallest angle while large mass is located at the largest angle.

Example 6:
What speed must an object have if it is to escape from the surface of the Earth? (Assume the Earth is not rotating.)

Example 7:
If two equal masses start from rest an infinite distance apart, what is their speed at the instant before they collide? (mass = 10 kg and radius = 2 cm)

Example 8:
How much energy is required to put a 1000 kg satellite in orbit 500 km above the Earth's surface if it starts from the surface of a non-rotating Earth?

Example 9:
A 1000 kg satellite is in orbit 500 km above the surface of the Earth. How much energy must be added to the satellite if it is to escape from the Earth?

Example 10:
A spacecraft orbits about a planet. The period of its orbit is 1.77 days and the radius is 4.22×10^{8} m. What is the mass of the planet?

Example 11:
What is the period and speed of a satellite whose orbit is 200 km above the surface of the Earth?

Example 12:
What is the orbit radius of a geosynchronous satellite?

Example 13:
Calculate earth's gravitational field strength at 0 m and 200 km above the surface.