Universal Gravitation

1.A satellite orbits around Earth at a distance of 1.28×10^7 m from the centre of the Earth. The satellite weighs 6000 N on the surface of Earth. For the satellite in orbit calculate it's a) mass, b) weight and c) speed. (612 kg, 1.49×10^3 N, 5.58×10^3 m/s)

2.A satellite which weighs 1.0×10^4 N on the surface of Earth is put into circular orbit 7.05×10^8 m above the Earth's surface. Calculate: a) its mass b) its weight c) its velocity and d) its acceleration towards the Earth. (1.0×10^3 kg, 0.79 N, 7.5×10^2 m/s, 0.000 79)m/s^2

3.A satellite orbits Neptune in 200 minutes. The radius of its orbit is 2.92×10^7 m. Calculate: a) the average speed of the satellite and b) its centripetal acceleration. (1.53×10^4 m/s, 8.01 m/s^2)

4.What orbital speed must a satellite of mass 800 kg have in order to maintain an orbit 2.00×10^7 m above the surface of Jupiter where the gravitational field strength is 15 m/s^2? What would it weigh at this height? 3.7×10^4 m/s, 1.2×10^4 N)

5.Compute the gravitational force between a proton and an electron using the following data:
mass of proton = 1.67×10^{-27} kg (3.63×10^{-47} N)
mass of electron = 9.11×10^{-31} kg
radius of orbit of an electron = 5.29×10^{-9} cm.

6.A space explorer is 1 billion km away from a certain star and she observes that the gravitational force between herself and the star is 1000 N. What will this force be when she is half a billion km from the star? (4000 N)

7.A satellite circles the Earth once every 95 minutes at an average altitude of 500 km. Calculate the mass of the Earth. (5.9×10^{24} kg)

8.A satellite put into circular orbit around Uranus weighs 2.0×10^4 N on Earth. The radius of the satellite's orbit is 4.0×10^7 m. Calculate: a) the period of the satellite, b) its orbital velocity c) the force needed to maintain this orbit, d) the centripetal acceleration and e) the mas of Uranus.
(2.1×10^4 s, 1.2×10^4 m/s, 7.2×10^3 N, 3.6 m/s^2, 8.6×10^{25} kg)

9.A satellite which weighs 7.0×10^3 N on Earth is put into orbit 200 km above the surface of Mars. For the satellite find: a) mass b) weight in orbit c) the gravitational field strength acting on it and d) the centripetal acceleration. (7.1×10^2 kg, 2.3×10^3 N, 3.2 m/s^2, 3.4×10^3 m/s)

10.A satellite with a mass of 640 kg is in orbit above the surface of the Earth where the gravitational field strength is 8.6 m/s^2. What is the gravitational force on the satellite at this height? (5.5×10^3 N)

11.A 1000 kg satellite is put into a circular orbit above Earth so that it always remains over the same place on Earth. (This is called a synchronous orbit.) a) What is the radius of this orbit?
b) What would the satellite weigh in orbit? c) How fast does it go while orbiting?
(4.22×10^7 m, 224 N, 3.07×10^3 m/s)