Name_____

Date _____ **Pd**____

Unit III: Worksheet 6

1. The National Academy of Science, in order to gather information on deforestation, wishes to place a 500 kg satellite in a polar orbit around the earth. The radius of the earth is approximately 6.38×10^3 km, and the acceleration of gravity at the orbital altitude of 160 km is very nearly the same as it is at the surface of the earth.

a. Construct a force diagram for the satellite described in the statement above.

b. Explain what is causing the centripetal force for the satellite.

c. Calculate how long it would take for the satellite to make one complete revolution around the earth.

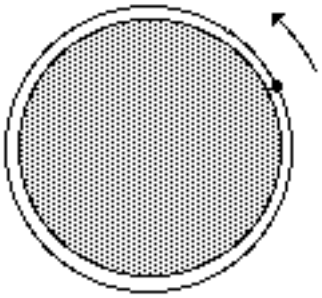
2. The earth's orbit around the sun is very nearly circular, with an average radius of 1.5×10^8 km. Assume the mass of the earth is 6×10^{24} kg.

a. Calculate the average speed of the earth in its orbit around the sun.

b. Calculate the magnitude of the earth's average acceleration in its orbit around the sun.

c. Use your answer in (b) to calculate the force of the Sun on the Earth.

3. The gravitational field strength on the moon, which has a radius of 1.74×10^6 m , is approximately 0.17 as large as the gravitational field strength at the surface of the earth. Calculate how much a 1500 kg satellite would weigh at the surface of the moon.



4. Assume that the diagram represents the orbit of the satellite around the moon at an altitude of 100 km.

a. Construct a force diagram of the satellite in orbit.

b. Show the direction of the acceleration, if any.

c. Calculate the orbital speed of the satellite.

d. Calculate the orbital period of the satellite (in hours).

e. If the satellite were to change its orbit so that it was now at an altitude of 50 km, would it have to speed up or slow down? Explain. Determine the factor of change for the velocity.