Orbital Mechanics MASTERY Assignment

G = 6.673 x 10^{-11}(N•m^2)/kg^2 (All orbital distances are measured from center to center.)   v = (2πR)/T

Earth's Radius: 6.37 x 10^6 m   Mass: 5.98 x 10^{24} kg   Orbit radius: 1.50 x 10^{11} m   a = (4π^{2}R)/T^2

Moon's Radius: 1.74 x 10^6 m   Mass: 7.35 x 10^{22} kg   Orbit radius: 3.85 x 10^8 m   a = v^2/R

Sun's Radius: 6.96 x 10^8 m   Mass: 1.99 x 10^{30} kg   a = (2πv)/T

You are to complete this assignment –getting help as needed. Show the completed assignment to the teacher by the due date. Then check your answers with the answer book in the classroom and ask any further questions you may have.

Do your work on a separate sheet of paper.

1. Use pictures, and as few words as possible words, to describe each of Kepler's 3 laws. Correctly number each law in your pictures.
2. A space ship is moved 4 times as far away from the Earth, how will its new force of attraction compare to its old force of attraction?
3. A Martian's spaceship move 3 times closer to the planet Mars. How will his new force of attraction compare to his old?
4. An asteroid moves to a position where the pull of gravity is 16 times greater. How does the new distance compare to the old?
5. A Venusian moves to a position from the Sun where the force of gravity is 1/625 times the old force. How does this new position compare to the Sun compare to the old position?
6. Use the data below to show Kepler's thirds law works add what you know about the Earth.

	Venus	Mars	Earth
Orbital radius	0.723 AU's	1.52 AU's	
Orbit's period	0.665 yrs	1.88 yrs	

7. Mars has two moons that orbit it. Deimos and Phobos. Deimos takes 1.26244 days to go around Mars once. Deimos is 23,459 km from Mars. Phobos takes 0.31891 days (7.65 hours) to go around Mars. Phobos' mass is 1.08 x 10^{16} kg. If the force of attraction between Mars and Phoebos is 5.26 x 10^{15} N, then what is the mass of Mars?