Universal Gravitation

Chapter Eight

Physics

$m_e = 5.98 \times 10^{24}$ kg
$r_e = 6.38 \times 10^{6}$ m
$r_{oe} = 1.5 \times 10^{11}$ m (orbital)

$m_s = 1.99 \times 10^{30}$ kg
$r_s = 6.96 \times 10^{8}$ m
$m_v = 4.87 \times 10^{24}$ kg
$r_{ov} = 1.08 \times 10^{11}$ m

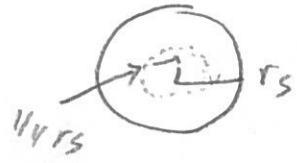
$m_m = 7.22 \times 10^{22}$ kg
$r_m = 1.785 \times 10^{6}$ m
$r_m = 3.9 \times 10^{8}$ m (from earth)
$T_m = 27.3$ days

1. Find the period of a planet that is 1.89×10^{11} m from the sun using Newton's Variation of Kepler's 3rd Law?

$T_p = ?$ (sec)
$r_{op} = 1.89 \times 10^{11}$ m

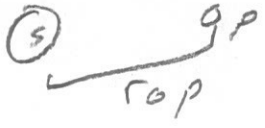
2. What would "g" be on the surface of the sun if it imploded and became ¼ its present size?…still has same mass….

$g_s' = ?$
$r_s' = \frac{1}{4} r_s$
$m_s = 1.99 \times 10^{30}$ kg



3. What is the velocity of the planet in #1 as it circles the sun?

$v = ?$
$r_{op} = 1.89 \times 10^{11}$ m
$m_s = 1.99 \times 10^{30}$ kg



4. State Kepler's Three Laws of Planetary Motion:
   1)
   2)
   3)

5. Mr. G (90.0 kg) stands 25 cm away from his 925 kg Corvette. What gravitational force of attraction is present? (note the distance is in centimeters)

$F = ?$
$m_1 = 90$ kg
$m_2 = 925$ kg
$r = .25$ m

6. Neptune is 30 times further from the sun than the earth is. What is its period?

$r_{ON} = 30 r_{oe}$
$r_{oe} = 1$ AU
$T_N = ?$
$T_e = 1$ yr