Friday, September 07, 2018 10:33 AM

9) Solve for *r*:

$a = \frac{Gm_2}{r^2}$

$r = \sqrt{\frac{Gm_2}{a}}$

10) Solve for *d*:

$v_f^{\,2} = v_i^{\,2} + 2ad$

$d = \frac{v_f^{\,2} - v_i^{\,2}}{2a}$

IV. Dimensional Analysis

Based on given units for the variables on the right, determine what would be the unit(s) for the variable left of the equal sign. Reduce the units to find the final simplest unit for the variable.

1. $a = \frac{F}{m}$, if F units are kg * m/s^2 and m units are kg

$a = \frac{F}{m} \rightarrow \frac{kg \cdot \frac{m}{s^2}}{kg} = m/s^2$

2. $a_c = \frac{v^2}{r}$, if v units are m/s and r units are m

$a_c = \frac{v^2}{r} \rightarrow \frac{\left(\frac{m}{s}\right)^2}{m} = \frac{\frac{m^2}{s^2}}{\left(\frac{m}{1}\right)} = \frac{m^2}{s^2}\left(\frac{1}{m}\right) \Rightarrow m/s^2$

3. $P = \frac{Fd}{t}$, if F units are kg*m/s^2, d units are m, and t units are s

$P = \frac{Fd}{t} = \frac{kg\frac{m}{s^2}(m)}{\left(\frac{s}{1}\right)} = \left(kg \cdot \frac{m}{s^2}\right)(m)\left(\frac{1}{s}\right) = kg\frac{m^2}{s^3}$

4. $R = \frac{\rho L}{A}$, if ρ units are Ω*m, L units are m, and A units are m^2

$R = \frac{\rho L}{A} = \frac{(\Omega \cdot m)(m)}{(m^2)} = \Omega$

5. $PE_s = \frac{1}{2}kx^2$, if k units are N/m and x units are ~~m~~

(1/2 COULD DOESN'T CHANGE UNITS)

$PE = \frac{1}{2}kx^2 = \left(\frac{N}{m}\right)m^2 = N \cdot m$

6. $F_g = \frac{Gm_1m_2}{r^2}$, if G units are N*m^2/kg^2, m_1 and m_2 are kg, and r units are m.

$F_g = \frac{Gm_1m_2}{r^2} \rightarrow \frac{(N \cdot m^2/kg^2)(kg)(kg)}{(m)^2} = N$