Manipulate your name onto this paper: Key

1.7

AP Physics 1: Manipulating variables

1. Using the formula for momentum, how would momentum change if you doubled the mass?

$p=mv \Rightarrow p=(2m)v \Rightarrow p=2(mv)$ double the momentum

2. Using the formula for density, how would density change if you tripled volume?

$\rho=\frac{m}{V}$ $\rho=\frac{m}{(3V)} \Rightarrow \rho=\frac{1}{3}\left(\frac{m}{V}\right)$ would divide density by 3

3. Using the formula for force, how would force change if you doubled both m_1 and m_2?

$F_g=G\frac{m_1m_2}{r^2}$ $F_g=G\frac{(2m_1)(2m_2)}{r^2} \Rightarrow F_g=4\left(G\frac{m_1m_2}{r^2}\right)$ Change by a factor 4

4. Using the formula for angular speed, solve for t.

$\omega=\omega_0+\alpha t \Rightarrow \frac{\omega-\omega_0}{\alpha}=\frac{\alpha t}{\alpha} \Rightarrow t=\frac{\omega-\omega_0}{\alpha}$

a. How would time change if you doubled angular acceleration?

$t=\frac{\omega-\omega_0}{(2\alpha)} \Rightarrow t=\frac{1}{2}\left(\frac{\omega-\omega_0}{\alpha}\right)$ divide time by 2

5. Using the formula for force, how would force change if you doubled the radius?

$F_g=G\frac{m_1m_2}{r^2}$ $F_g=G\frac{m_1m_2}{(2r)^2} \Rightarrow F_g=G\frac{m_1m_2}{4r^2} \Rightarrow F_g=\frac{1}{4}(G$

divide Force by 4

6. Using the formula for period, how would the period change if you quadrupled the mass?

$T_s=2\pi\sqrt{\frac{m}{k}}$ $T_s=2\pi\sqrt{\frac{(4m)}{k}} \Rightarrow T_s=2\left(2\pi\sqrt{\frac{m}{k}}\right)$

change period by a factor of 2

7. Using the formula for period, how would the period change if you multiplied the g by 9?

$T_p=2\pi\sqrt{\frac{l}{g}} \Rightarrow T_p=2\pi\sqrt{\frac{l}{(9g)}} \Rightarrow T_p=\frac{1}{3}\left(2\pi\sqrt{\frac{l}{g}}\right)$

divide period by 3

8. Using the formula for acceleration, solve for r.

$a_c=\frac{v^2}{r} \Rightarrow r=\frac{v^2}{a_c}$

a. How would the radius change if you doubled both velocity and acceleration?

$r=\frac{(2v)^2}{(2a_c)} \Rightarrow r=\frac{4v^2}{2a_c} \Rightarrow r=2\left(\frac{v^2}{a_c}\right)$ double the radius