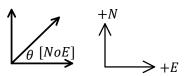


 $\mathsf{OR}$  [E $\theta N$ ] From East towards North



Kinematics Need: Constant Acceleration and Motion in one direction.

$$\vec{v} = \frac{d}{t}$$

Time is the Link Between x and y, Galileo

$$\vec{v} = \frac{\vec{u}}{t}$$
$$\vec{d} = \vec{v}t$$

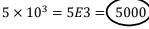
$$=\frac{\vec{v}_f - \vec{v}_i}{t}$$

$$Dron: h = 4.9t^2$$

 $a=rac{ec{v}_f-ec{v}_i}{t}$   $Up, Down \; ; \; t imes 2^*$  @ max height ;  $ec{v}_y=0$   $Drop \; ; \; h=4.9t^2$   $Max \; Height^* \; ; \; h=rac{ec{v}_y^2}{2ec{d}}$ 

$$\vec{a}^*$$
 is Constant  
Slows  $\vec{a} = -ve$   
 $\neq \Delta \vec{v} \rightarrow \vec{a} = 0$   
Rest;  $\vec{v} = 0$ 

2nd



$$\frac{m}{s} \xrightarrow{\times 3.6} \frac{km}{h} \quad 90 \frac{km}{hr} = 25 \frac{m}{s}$$

*speed* : *distance* velocity: displacement

Vectors @/Scalars @\* Tip to Tail  $Graph, Table\ W, S \rightarrow -ve!$ 

$$a = hcos\theta$$
 $o = hsin\theta$ 
 $o = atan\theta$ 

$$\theta = \tan^{-1}\left(+\frac{o}{a}\right)$$
$$Sin/Cos\ Law$$

Sig Figs 123 3 Sig Figs 0.4 1 *Sig Fig* 505 3 *Sig Figs* 0.40 2 Sig Figs 10 1 Sig Fig 10. 2 *Sig Figs*  $a = hcos\theta$   $\theta = tan^{-1} \left( + \frac{\theta}{a} \right) 1.0E2 \ 2 \ SigFigs$ Add: Round to least # of decimal places. Multiply: Round to least # of sig figs.

Attach Prefix **Exponent** to the **Base Unit!** 

Giga =  $10^9$  = 1000000000

 $Mega = 10^6 = 1000000$ Kilo =  $10^3$  = 10001kgBase =  $10^0$  = 1 Centi =  $10^{-2} = \frac{1}{100} = 0.01$ Milli =  $10^{-3} = \frac{1}{1000} = 0.001$ Micro =  $10^{-6} = \frac{1}{1,000,000} = 0.000001$ 

Nano =  $10^{-9} = \frac{1}{1,000,000,000}$ 

*Dynamics* 

" $\vec{a}$ " is the Kinematics – Dynamics Link

 $Pico = 10^{-12} = \frac{1}{1,000,000,000,000}$ 

Winners – Losers (Direction) Newton's 3 Laws:  $\vec{F} = m\vec{a}$ , Inertia (constant velocity\*), = & opposite

Gravitation

$$ec{F}_g = m ec{g}$$
  $< 10000m$   $g = \frac{Gm^*}{r^2}$   $E_p = m ec{g} h$  : Planet Surface

; Planet Surface

Total Distance D = d + d $r = r^* + R$ 

 $\vec{F}_c = Net Force$ Center Minus

Momentum

 $p = m\vec{a}t$ 

$$\vec{F} = \frac{m\vec{v}}{t}$$

 $Momentum\ Before = Momentum\ After$ 

Work, Energy and Power

Conservation of Momentum/Energy

Elastic - Kinetic Energy is conserved, Momentum is conserved; Nothing to do with sticking.

 $W = m\vec{a}\vec{d} \qquad P = \frac{E}{t}$ 

$$P = \frac{E}{t}$$

Energy Before = Energy After

*Equilibrium* 

Rotational Equilibrium

Static Equilibrium

Choose a Pivot!

τ needs a beam

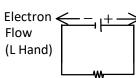
 $\Sigma \vec{F}_y = 0$   $F_{perpendicular}$ 

 $\Sigma \tau = 0$ ; at a point/pivot

 $R_T$  1st

 $\Sigma \vec{F}_{x} = 0$   $F_{beam \ centre}$ 

Circuits



Conventional Current (R Hand)

river flow\*

Current is like

Parallel 2nd Series 1st

Series 2nd Parallel 1st

 $R_1 = R_2^*$ 

Waves and Optics

$$\vec{v} = \kappa f$$

 $f = \frac{1}{T}$ 

Light Bends Towards Normal in a Higher Medium