CONVERSIONS : 1 km/hr is 5/18 meters per second exactly

1 km is 1000 meters, 1 hr is 3600 seconds

1 meter/second is 2.236936292054402 miles/hour

1 mph = 0.44704 m/s

General Equations of motion (for constant acceleration)

$D=\frac{(V_i+V_f)\,T}{2}$ $\qquad V_f=V_i+A\,T$

$D = V_iT + 1/2\,A\,T^2$

$V_f^2 = V_i^2 + 2\,A\,D$

g=A=9.81 m/s/s

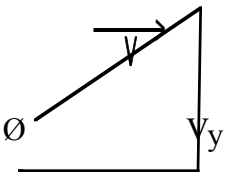
For Projectiles/Vectors: $T_x=T_y$, $A_x = 0$, usually, so

Pythogarean: $(\overrightarrow{V})^2= V_x^2 + V_y^2$

$V_x= \overrightarrow{V} \cos(Ø)$

$V_y= \overrightarrow{V} \sin(Ø)$

$Ø= \tan^{-1}(V_y/V_x)$



X	Y
$D_x = V_{ix}T$	$D_y = V_{iy}T + 1/2\,A_y\,T^2$
$D_x = \overrightarrow{V}\cos(Ø)\,T$	$D_y = \overrightarrow{V}\sin(Ø)T + 1/2\,A_y\,T^2$
	$V_{fy}^2 = V_{iy}^2 + 2\,A_y\,D_y$
	$V_{fy}=V_{iy} + A_y\,T$

V_{fy} at top = zero, $T=1/2T_f$ if Dy=0 (up then down

F(net) =Sum all forces on object F(net) could be

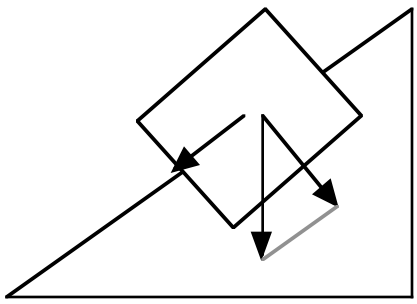
F(net) =Tension-Weight, or F(net) =Pull-Friction, or F(net) =Parallel Force-Pull-friction, etc....

NL I: Inertia

NL II F(net)=mA

W=mg

NL III F1 = F2



Force(Friction)= μF(Normal)

μ = Ff/FN where μ is the coefficient of friction between two surfaces.

ON RAMP:

Perpendicular Force=Wcosø

Sliding Force= Parallel Force=Wsinø