Multiply 2 vectors

$$\vec{u} = u_x \vec{i} + u_y \vec{j}$$

$$\vec{v} = v_x \vec{i} + v_y \vec{j}$$

dot product

$$\vec{u} \cdot \vec{v} = u_x v_x + u_y v_y$$

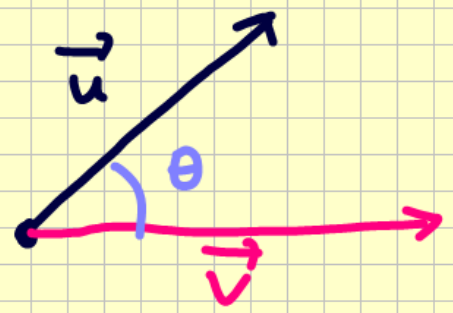
$\vec{a} = 1\vec{i} + 3\vec{j}$ $\qquad$ $\vec{b} = -1\vec{i} + 3\vec{j}$

$$\vec{a} \cdot \vec{b} = (1)(-1) + (3)(3)$$

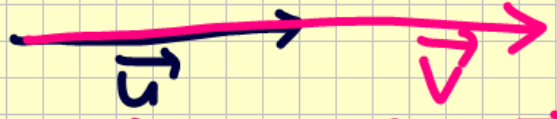
$$= -1 + 9$$

$$\vec{a} \cdot \vec{b} = 8$$

Scalar product



$$\vec{u} \cdot \vec{v} = |\vec{u}||\vec{v}| \cos\theta$$



$\theta = 0^\circ$

$\cos\theta = 1$

$$\vec{u} \cdot \vec{v} = |\vec{u}||\vec{v}|$$

$$\vec{u} \cdot \vec{u} = |\vec{u}|^2$$

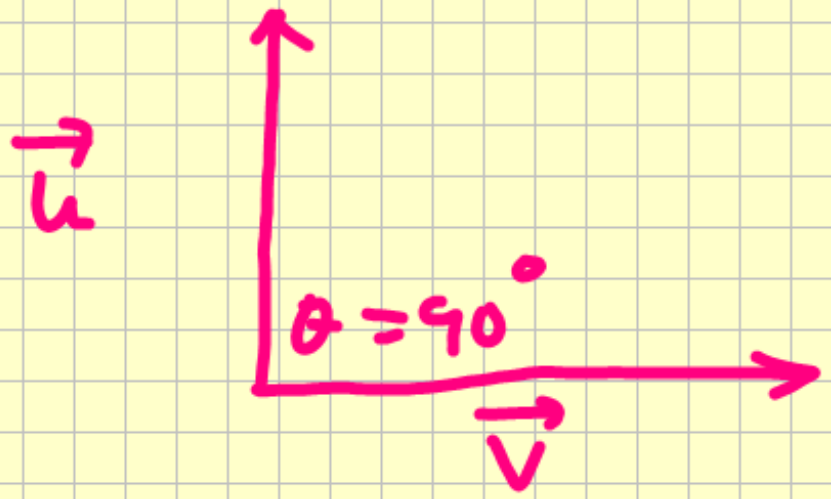
$$= u_x u_x + u_y u_y$$

$$= (u_x)^2 + (u_y)^2$$

$$\vec{u} \cdot \vec{u} = |\vec{u}|^2$$

$$|\vec{u}| = \sqrt{\vec{u} \cdot \vec{u}}$$

$\theta = 90^\circ$



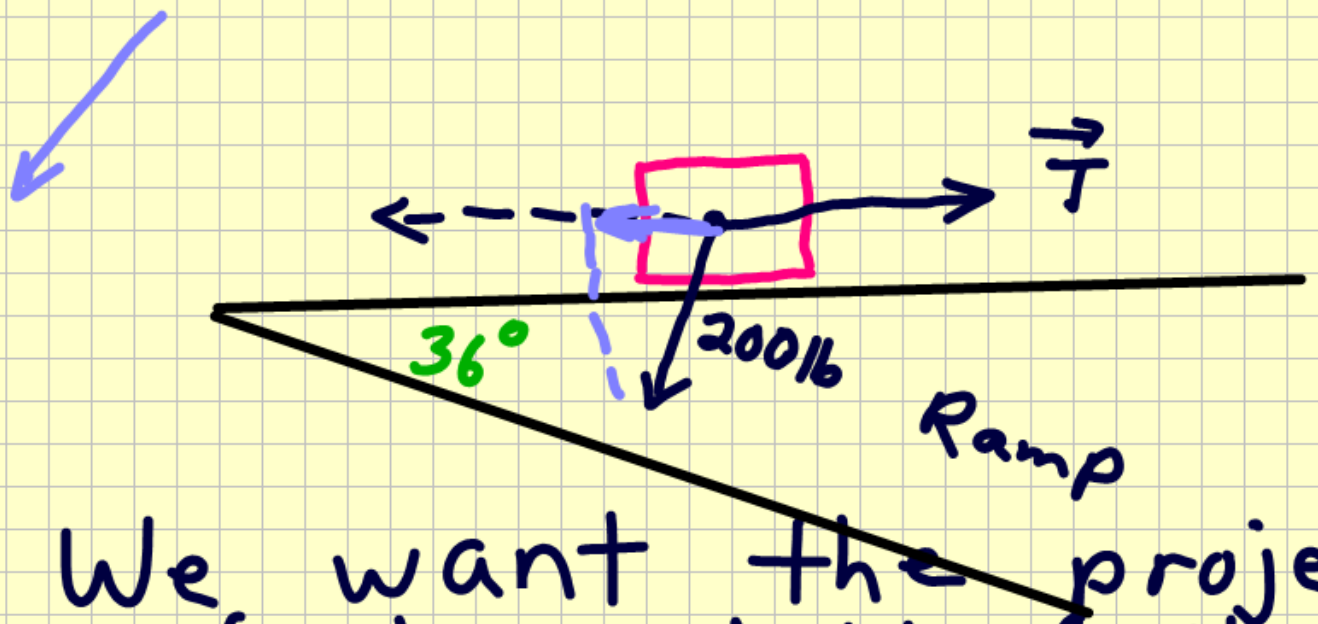
$\vec{u} \cdot \vec{v} = |\vec{u}||\vec{v}| \cos(90^\circ)$

$\vec{u} \cdot \vec{v} = 0$

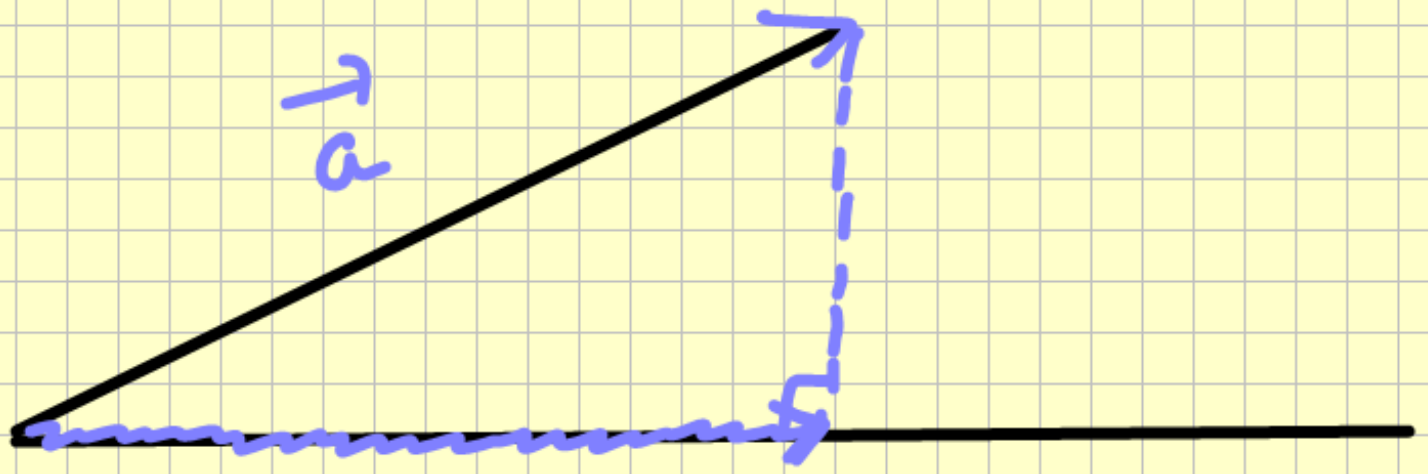
scalar projection of $\vec{w}$ onto $\vec{a}$

$$p = |\vec{w}| \cos\theta$$

vector proj. of $\vec{w}$ onto $\vec{a}$ $\quad \vec{p} = p\,\vec{a}$



We want the projection of the weight of the box onto force...that we are pulling (parallel to the ramp).

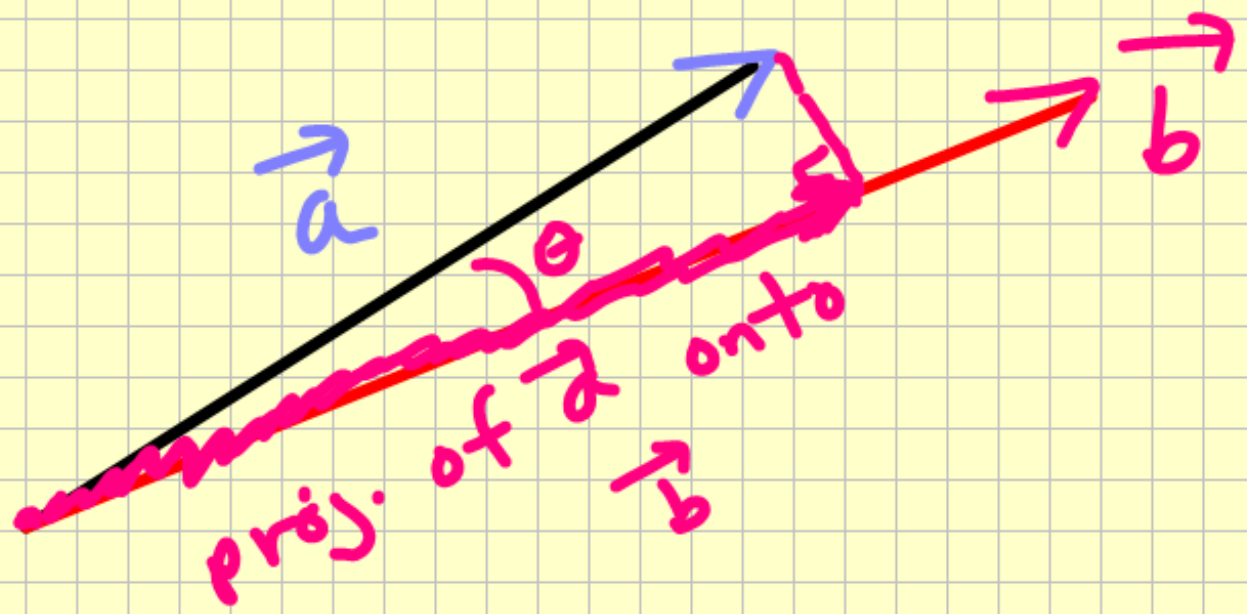


horizontal

projection of $\vec{a}$ onto

the horizontal

axis . . .



p means magnitude of the proj.

$$p = |\vec{a}| \cos\theta$$

$$\vec{p} = p\,\vec{b}$$