

# Force at Angle Example

- A person is pushing a 15 kg block across a floor with  $\mu_k = 0.4$  at a constant speed. If she is pushing down at an angle of 25 degrees, what is the magnitude of her force on the block?

x- direction:  $\Sigma F_x = ma_x$

$$F_{\text{push}} \cos(\theta) - F_{\text{friction}} = 0$$

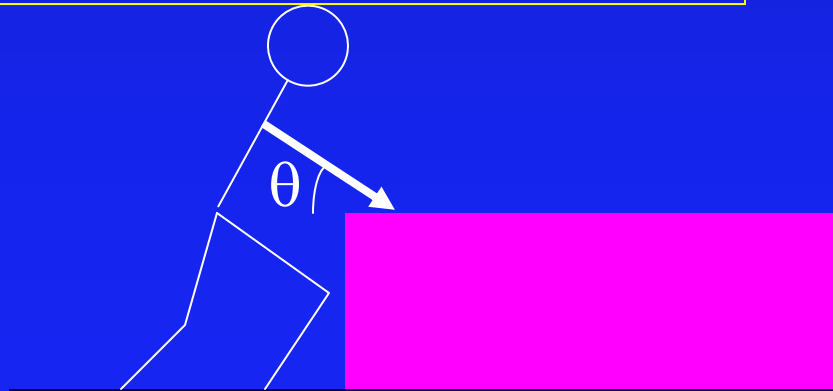
$$F_{\text{push}} \cos(\theta) - \mu F_{\text{Normal}} = 0$$

$$F_{\text{Normal}} = F_{\text{push}} \cos(\theta) / \mu$$

y- direction:  $\Sigma F_y = ma_y$

$$F_{\text{Normal}} - F_{\text{weight}} - F_{\text{Push}} \sin(\theta) = 0$$

$$F_{\text{Normal}} - mg - F_{\text{Push}} \sin(\theta) = 0$$



Combine:

$$F_{\text{push}} \cos(\theta) / \mu - mg - F_{\text{Push}} \sin(\theta) = 0$$

$$F_{\text{push}} (\cos(\theta) / \mu - \sin(\theta)) = mg$$

$$F_{\text{push}} = mg / (\cos(\theta) / \mu - \sin(\theta))$$

$$F_{\text{push}} = 80 \text{ N}$$

