Inclined Planes

Inclined Planes

- **What forces are present on the box?**

When will it slide?

$F_N = F_N$

F_f

$Mg\cos\theta = F_\perp$

$W = mg$

θ

$F_\parallel = mg\sin\theta$

$F_\parallel > F_f$

$mg\sin\theta > \mathcal{y} F_N$

$mg\sin\theta > \mathcal{y}\, mg\cos\theta$

$$\frac{mg\sin\theta}{mg\cos\theta} = \mathcal{y}$$

$$\boxed{\mathcal{y} = \tan\theta}$$
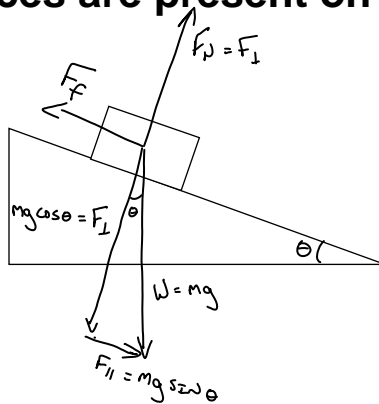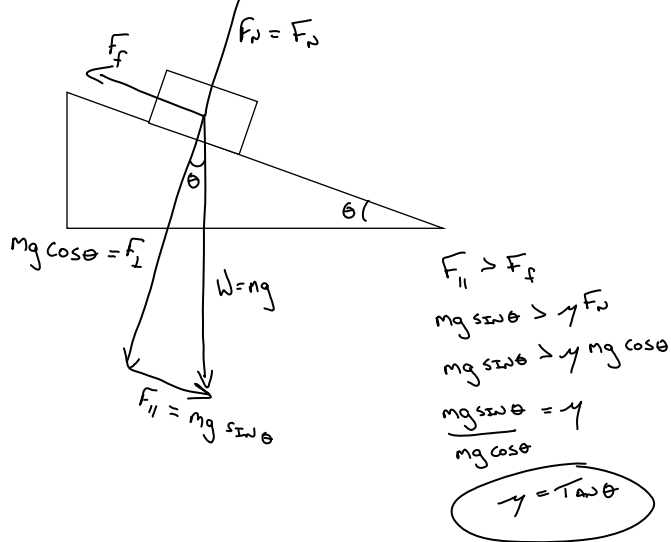
When will it slide?

- **A packing crate is placed on a 20^0 inclined plane. If the coefficient of friction between the crate and the plane is 0.65, will the crate slide down the plane?**
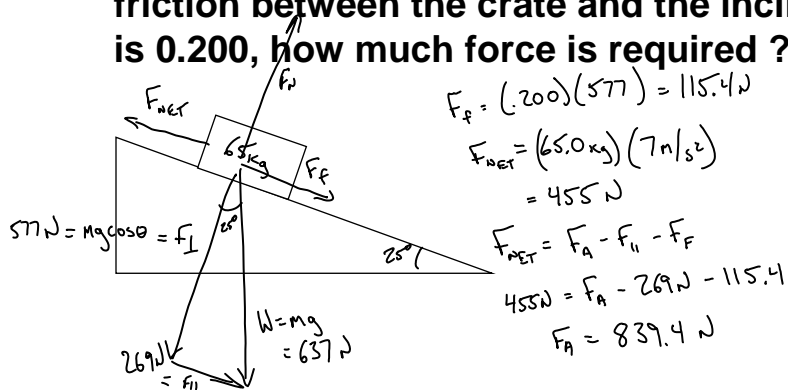
$\mathcal{y} = \tan\theta_{min}$

$.65 = \tan\theta_{min}$

$\theta_{min} = \tan^{-1}(.65)$

$\theta_{min} = 33^0 \Rightarrow No$

Inclined Plane Example

- **A 65.0 kg crate is accelerated at 7 m/s² up an incline making a 25.0⁰ angle with the horizontal. If the coefficient of sliding friction between the crate and the incline is 0.200, how much force is required ?**

$$F_f = (.200)(577) = 115.4 N$$

$$F_{NET} = (65.0 kg)(7 m/s^2)$$

$$= 455 N$$

$$F_{NET} = F_A - F_{\parallel} - F_F$$

$$455 N = F_A - 269 N - 115.4$$

$$F_A = 839.4 N$$

F_{NET}

F_N

$65 kg$

F_f

$577 N = Mg\cos\theta = F_\perp$

$25°$

$269 N = F_{\parallel}$

$W = mg = 637 N$

<u>Return to Honors Physics Notes</u>