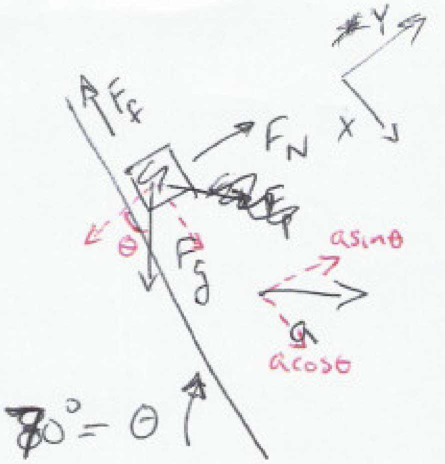


Object sliding down a surface that is pushing it (accelerating the object)

$F_f = \mu_s F_N$

(Y) $\sum F = -F_g\cos\theta + F_N = ma\sin\theta$

(X) $\sum F = F_f - F_g\sin\theta = ma\cos\theta$ FIND $\underline{a}$

$$F_f = \mu_s F_N = (ma\sin\theta + mg\cos\theta)\mu_s$$

$$\mu_s ma\sin\theta + \mu_s mg\cos\theta - mg\sin\theta = ma\cos\theta$$

mass cancels! (solution is independent of the mass of object)

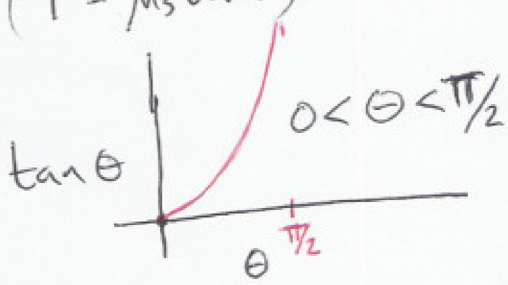
$$\mu_s g\cos\theta - g\sin\theta = a\cos\theta - \mu_s a\sin\theta$$

$$g(\mu_s\cos\theta - \sin\theta) = a(\cos\theta - \mu_s\sin\theta)$$

- blows up when $\cos\theta = \mu_s\sin\theta$
- ∅ when $\mu_s\cos\theta = \sin\theta$

$$a = g\frac{(\mu_s\cos\theta - \sin\theta)}{(\cos\theta - \mu_s\sin\theta)} = g\frac{(\mu_s - \tan\theta)}{(1 - \mu_s\tan\theta)}$$

$$a = g\frac{(\tan\theta - \mu_s)}{(\mu_s\tan\theta - 1)}$$



☑ units

$a = 20.7\ m/s^2$ $\theta = 80^\circ$, $\mu_s = 0.6$

$a = 32.5\ m/s^2$ $\theta = 70^\circ$

REASONABLE $\mu_s \uparrow$ $a \downarrow$ (it is stickier)

$\theta \uparrow$ $a \downarrow$ (more a needed so "F_N" is increased)