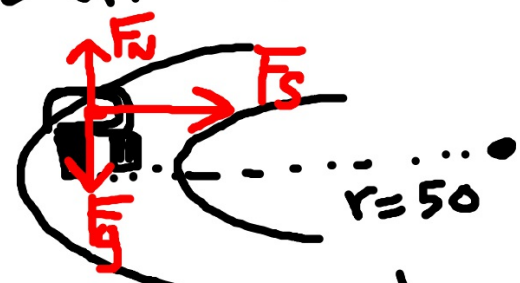
Bellwork 4/27

For a circular road of radius 50 m and $\mu_s = 0.63$, will a car moving 30 M/s skid off the road?



Formulas

$\Sigma F = ma$

$a_c = \frac{v^2}{r}$

$F_g = mg$

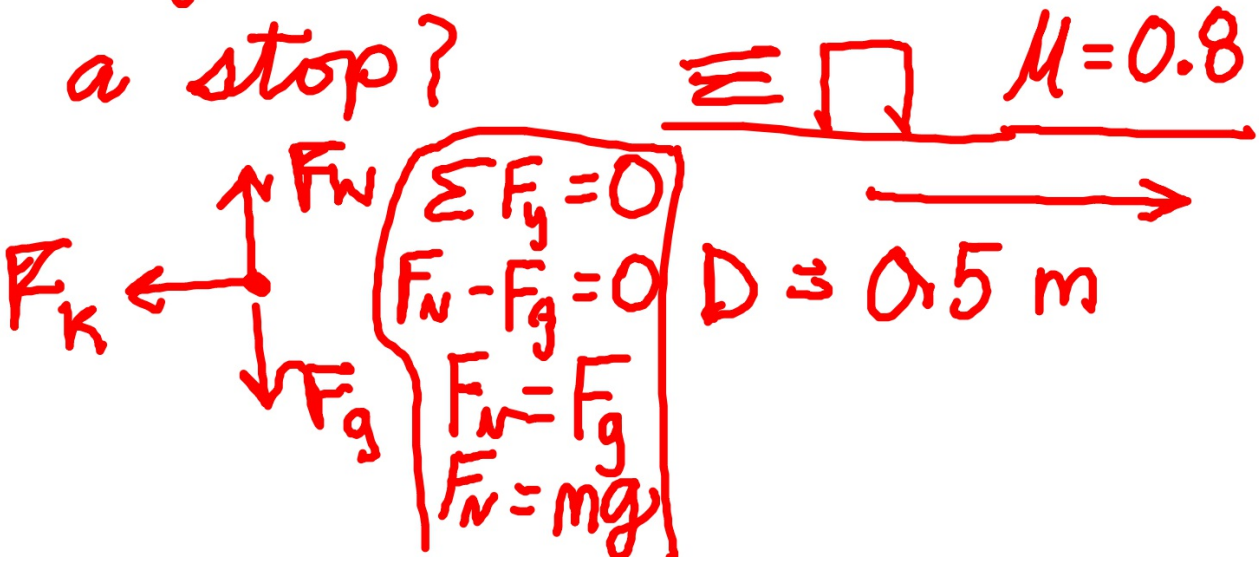
$F_s = \mu_s F_N$

Hint: v=? solve & compare

$17.6 \frac{m}{s} < 30 \frac{m}{s}$

*car will slide

Example 2 Work done by friction on a 2 kg object as it slides to a stop?



$$W_{(\text{by friction})} = -F_K D$$

$$W = -\mu_K F_N D$$

$$W = -\mu_K mgD$$

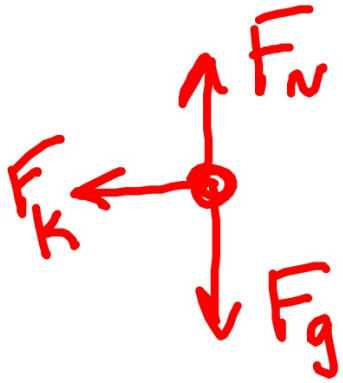
$$W = -0.8\,(2\,kg)\left(9.8\,\tfrac{m}{s^2}\right)(0.5m)$$

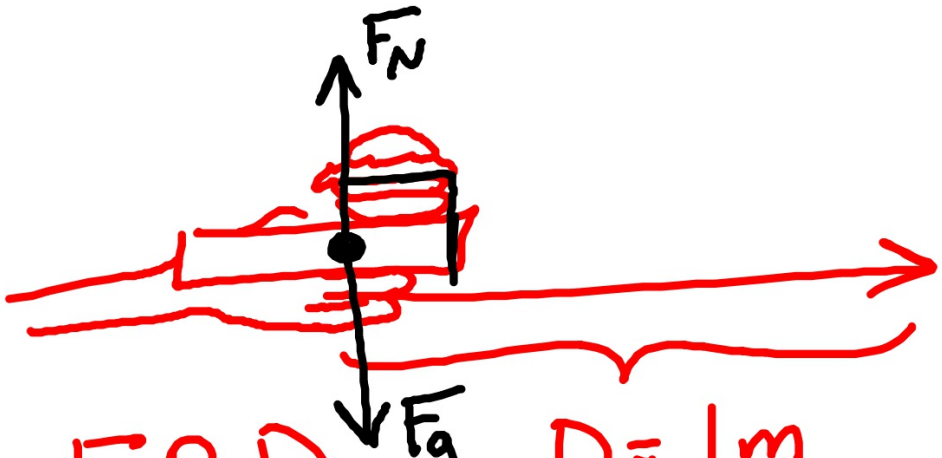
$$W = -7.84\,J$$

Work done by $F_g = 0$

Work done by $F_N = 0$

} Because $\perp$ to D.





FBD

TRAY

Kinetic Energy

Energy of motion

$$\boxed{K = \frac{1}{2} m v^2}$$

Units: $kg \cdot \frac{m^2}{s^2} = \boxed{kg \cdot \frac{m}{s^2}} \cdot m$

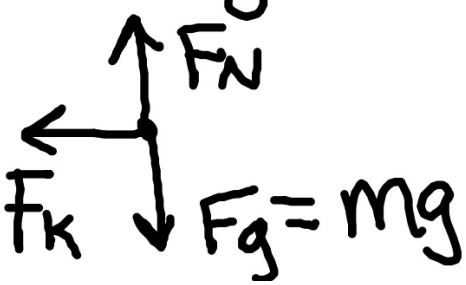
$= N \cdot m$

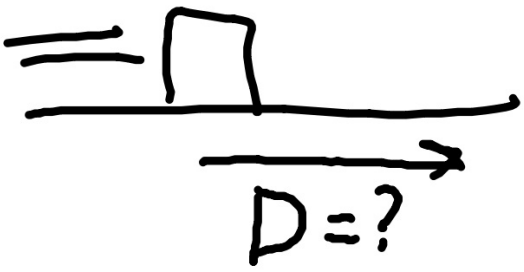
$W = \Delta K$ "Δ" = change

$$\boxed{W = K_f - K_i}$$

$N \cdot m$ = Joule (J)

Example Friction slows a 1kg from 2 m/s to 1 m/s. How much does the K change? If force of friction is is 3N. How far does it go?





$$\Delta K = K_f - K_i$$

$$= \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$$

$$= \frac{1}{2}(1\,kg)\left(1\,\frac{m}{s}\right)^2 - \frac{1}{2}(1\,kg)\left(2\,\frac{m}{s}\right)^2$$

$$= 0.5\,J - 2\,J$$

$$= -1.5\,J$$

$$\Delta K = W$$

$$-1.5\,J = -F_k \cdot D$$

$$-1.5\,J = -3\,N \cdot D$$

$$\boxed{D = 0.5\,m}$$