Review

$V_1 = ?$

$V_2 = 0$

$a = -9.81 m/s^2$

$\Delta d = 5.85 m$

$$V_2^2 = V_1^2 + 2a\Delta d$$

$$V_1^2 = V_2^2 - 2a\Delta d$$

$$V_1^2 = 0 - 2(-9.81 m/s^2)(5.85 m)$$

$$V_1 = 10.7 m/s$$

$$10.7 \frac{m}{s}\left(\frac{1 km}{1000 m}\right)\left(\frac{3600 s}{1 h}\right) = 38.6 km/h$$

13. $m = 8.0 g$

$V_1 = 400 m/s$

$V_2 = 100 m/s$

$\Delta t = 4.0 \times 10^{-4} s$

$$a = \frac{\Delta V}{\Delta t}$$

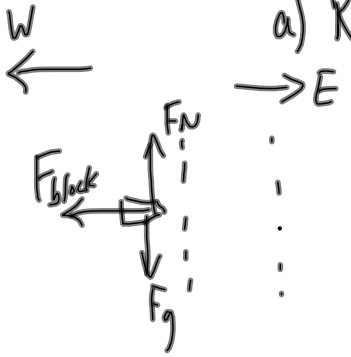
$$a = \frac{V_2 - V_1}{\Delta t}$$

$$a = \frac{100 \frac{m}{s} - 400 \frac{m}{s}}{4.0 \times 10^{-4} s}$$

$$a = -7.5 \times 10^5 \frac{m}{s^2}$$

a) $F = ?$

b) $\Delta d = ?$



a) Recall Newton's Second Law:

$$\vec{F}_{net} = m\vec{a}$$

$$F_{block} = (0.0080 kg)\left(-7.5 \times 10^5 \frac{m}{s^2}\right)$$

$$F_{block} = -6000 N$$

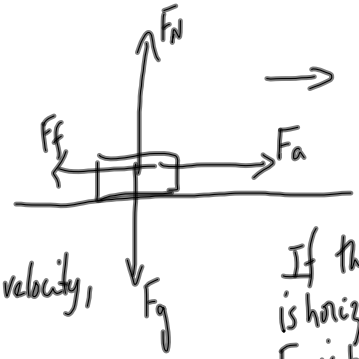
$$\vec{F}_{block} = 6000 N [W]$$

Dynamics Review

Weight: $F_g = mg$ (where $g = 9.81 \frac{m}{s^2}$ near Earth's surface)

Friction: $F_f = \mu F_N$

Draw FBDs!



If going at constant velocity, $F_a = F_f$

If there is + acceleration, $F_a > F_f$

If there is - acceleration, $F_a < F_f$

If the surface is horizontal and F_a is horizontal then $F_N = F_g$

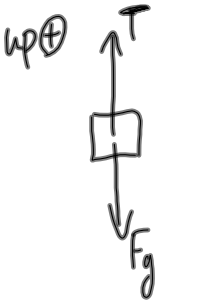
Newton's Laws

① Law of Inertia

② $a \propto F$, $a \propto \frac{1}{m}$ } combine: $a \propto \frac{F}{m}$

$F \propto ma$

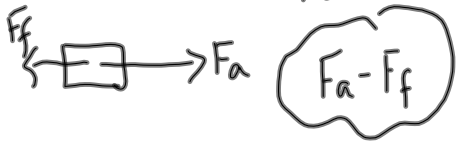
$F = kma$



k is special $\Rightarrow$ $k = \frac{1\,N}{1\,kg \cdot m/s^2}$

$\vec{F}_{net} = m\vec{a}$

$\rightarrow \oplus$



③ Action/Reaction