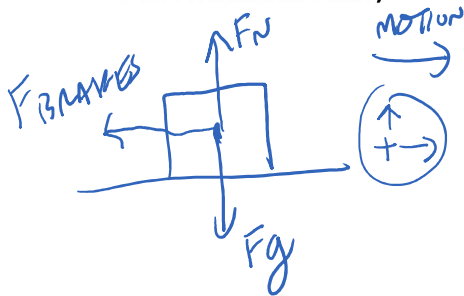4. A 1,500 kg car slams on its brakes and comes to a rest in 4.50 s. If 10,000 N of force is applied to the car for it to stop, calculate the initial speed of the car. **(DRAW A FREE-BODY DIAGRAM FIRST)**

$M = 1500 kg$
$t = 4.50 S$
$V_f = 0$
$F = 10,000 N$
$V_i = $

$V_f = V_i + at$
$V_i = V_f - at$
$= -(6.67 \frac{m}{s})(4.50S)$
$= 30 m/s$

$a = \frac{F}{M} = \frac{-10,000 N}{1500 kg} = -6.67 m/s^2$

5. A 100. kg car starts from rest and reaches a speed of 20.0 m/s over a distance of 15.0 m. Calculate the net force acting on the car.

$M = 100 kg$
$V_i = 0 m/s$
$V_f = 20 m/s$
$d = 20 m$
$F = ?$

$F = ma = (100 kg)(13.3 \frac{m}{s^2}) = 1330 N$

$V_f^2 = V_i^2 + 2ad$
$a = \frac{V_f^2 - V_i^2}{2d} = \frac{(20 m/s)^2}{2(15 m)} = 13.3 m/s^2$

For the following problems remember F$_{net}$ also equals the sum of the forces acting on the object (F$_{net}$ = F1 + F2 + F3...= ma)

6. A person sits on a sled which has a combined mass of 90.0 kg. If the sled is being pulled to the right with a force of 50.0 N and friction applies 50.0 N of resistance, is the sled accelerating? Explain. **(DRAW A FREE-BODY DIAGRAM FIRST)**
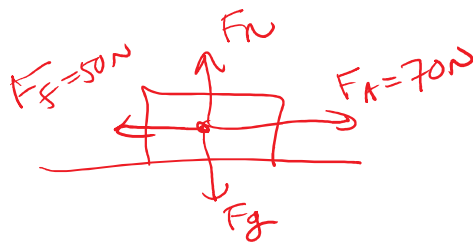
$F_f = 50N$ F_N $F_a = 50N$ Fg
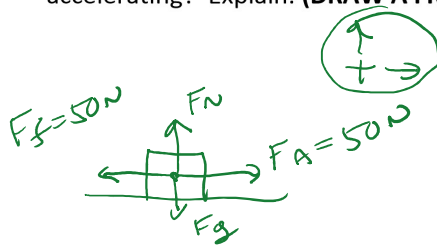
$F_{NET} = F_A + (-F_f)$
$= 50N - 50N = 0 N$

SINCE NO FNET, NO ACCELERATION

7. Based on the previous question, if the sled is now pulled with a force of 70.0 N instead, is the sled accelerating? If so, calculate the acceleration. **(DRAW A FREE-BODY DIAGRAM FIRST)**

$F_f = 50N$ F_N $F_A = 70N$ Fg

$F_{NET} = 70N + (-50N)$
$F_{NET} = 20N$ ← YES accel. RIGHT

$a = \frac{F_{NET}}{M} = \frac{20 N}{90 kg} = 0.222 M/s^2$ RIGHT