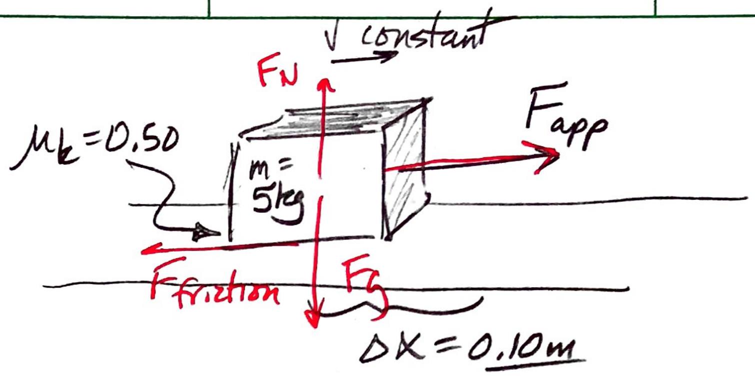
7.33



a) $W = F_{app} x = (F_{app})(0.10m)$

How can I find this?

$\Sigma F_x = ma = 0$ (Box at constant velocity), so

$F_{app} - F_F = 0$

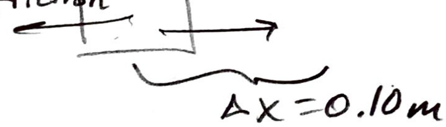
$F_{app} = F_F = \mu F_N = \mu m g = (0.5)(5)(9.8) = 24.5N$

$W = (24.5N)(0.10m) = \boxed{2.45 J}$ Work done by applied force

b) Work done by friction force?

Same, but negative.

$F_{friction} = 24.5N$



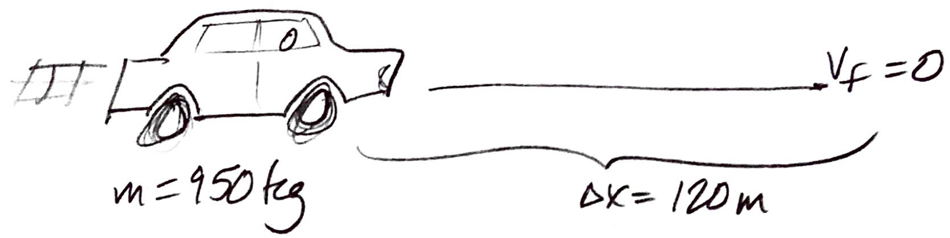
$W = -Fx \; (= Fx \cos 180)$

$= \boxed{-2.45 J}$

c) Net work = overall work done by net force

$W = (F_{net})(x) = (0)(0.10m) = \boxed{0 J}$

7.50 $\vec{v_i} = 90 \frac{km}{hr} \times \frac{1000m}{3600s} = 25.0 \, m/s$



a) From an energy perspective:

$$W = K_f - K_i$$

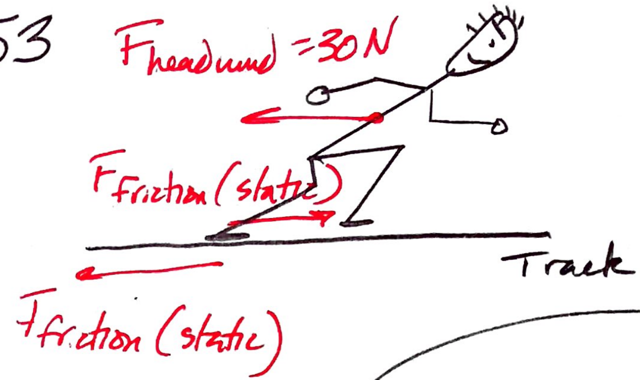
$$F \cdot x = 0 - \frac{1}{2} m v_i^2$$

$$F = \frac{\frac{1}{2} m v_i^2}{x} = \frac{\frac{1}{2}(950 kg)(25 m/s)^2}{120 m} = \boxed{2.47e3 \, N}$$

b) $x = 2m$ instead of 120, so 60 x shorter distance, so 60x the force.

$$F = \frac{\frac{1}{2} m v_i^2}{2m} = \boxed{1.48e5 N}$$

7.53



Using Energy analysis (as requested in problem)

$$W = F_{net} \cdot x = \Delta K$$

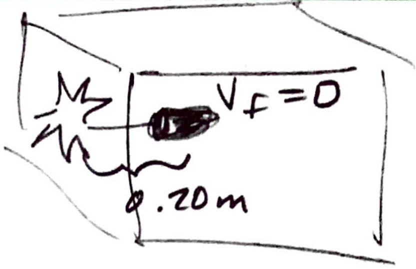
$$(F_{Friction} - F_{wind})(x) = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$$

$$(F_{Friction} - 30)(25\,m) = \frac{1}{2}(60)\left((8)^2 - (2)^2\right)$$

$$F_{friction} = \frac{30(64-4)}{25} + 30 = \boxed{102\,N}$$

7.59 bullet, $m = 8g$

$V_i = 800\,m/s$



Using an energy analysis

$$W = \Delta K$$

$$Fx = \frac{1}{2} m V_f^2 - \frac{1}{2} m V_i^2$$

$$F(0.20m) = 0 - \frac{1}{2}(0.008)(800)^2$$

$$F_{avg} = \boxed{1.28e4\,N}$$