p162 15 - 25 odd

(15) $E_k = \frac{1}{2}mv^2$

$$v = \sqrt{\frac{2E}{m}} = \sqrt{\frac{2(6.21\times10^{-21}\,J)}{5.31\times10^{-26}\,kg}} = \underline{484\ ms^{-1}}$$

(17) $W = \Delta E_k$

$$= \cancel{\frac{1}{2}mv_f^2} - \frac{1}{2}mv_i^2$$

$$= \frac{-1}{2}(9.11\times10^{-31}\,kg)(1.90\times10^{6}\,ms^{-1})^2$$

$$= \underline{-1.6\times10^{-18}\,J}$$

(19) $W = E_k$

$$Fs = \frac{1}{2}mv^2$$

$$v = \sqrt{\frac{2Fs}{m}} = \sqrt{\frac{2(110N)(0.78m)}{(0.088\,kg)}} = \underline{44\ ms^{-1}}$$

(21) $W = E_k$

$$Fs = \frac{1}{2}mv^2$$

so $s \propto v^2$

if $v$ is increased by 50%,

$$s \propto (.5)^2$$

$$s \propto (.25)$$

the stopping distance will increase by a factor of 25%.

(23) $W = \Delta E_K$

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

$v_i = 95\ \text{km h}^{-1} = 26.39\ \text{ms}^{-1}$

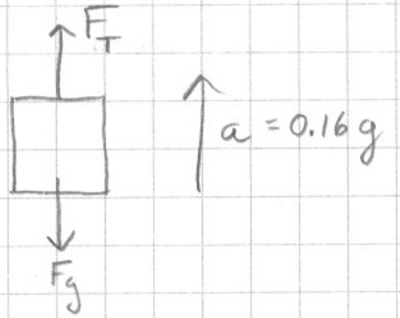
$v_f = (26.39\ \text{ms}^{-1})(.9) = 23.75\ \text{ms}^{-1}$

$$F = \frac{\frac{1}{2} m (v_f^2 - v_i^2)}{s}$$

$$= \frac{\frac{1}{2}(0.25\ \text{kg})(23.75\ \text{ms}^{-1\,2} - 26.39\ \text{ms}^{-1\,2})}{16\text{m}}$$

$F = \underline{-1.1\ N}$

(25)




(a) $\Sigma F = ma$

$F_T - mg = ma$

$F_T = ma + mg$

$= m(a+g)$

$= (285\ \text{kg})(.16(9.81\ \text{ms}^{-2}) + (9.81\ \text{ms}^{-2}))$

$F_T = \underline{3240\ N}$

(b) $W_{net} = F_{net}\, s$

$F_{net} = F_T - mg$

$= (F_T - mg)\, s$

$= (3240N - 285\text{kg}(9.81\text{ms}^{-2}))\, 22\text{m}$

$\underline{W_{net} = 9770\ J}$

25 (c) $W_{cable} = Fs$

$= F_T s = (3240N)(22m)$

$W_{cable} = \underline{71\ 300\ J}$

(d) $W_{gravity} = F_g s$

$= mgs = (285\ kg)(9.81\ ms^{-2})(22m)$

$= \underline{61\ 500\ J}$

(e) $W_{net} = \Delta E_k$

$W_{net} = \frac{1}{2} m v^2$

$v = \sqrt{\frac{2W_{net}}{m}} = \sqrt{\frac{2(9770J)}{285\ kg}}$

$\underline{v = 8.3\ ms^{-1}}$