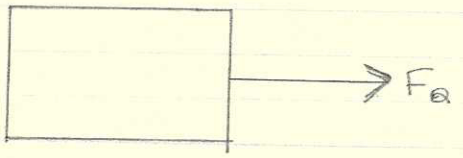
9)

$M = 10\ kg$

$F_a = 50N$

$\Delta d = 7\ m$

$V_A = ?$



$\sum_F = F_{net}$

$\frac{F_a}{m} = \frac{ma}{m}$

$a = \frac{50}{10}$

$a = 5\ m/s^2$

$\sqrt{V_F^2} = \sqrt{V_i^2 + 2ad}$

$V_F = \sqrt{0^2 + 2(5)(7)}$

$V_F = \sqrt{70}$

$V_F = 8.37\ m/s$

$E_{TA} = E_{kA} + E_{gA}$

$E_{TA} = \frac{1}{2}MV_A^2 + mgh_A$

$E_{TA} = \frac{1}{2}(10)(8.37)^2 + (10)(9.8)(15)$

$E_{TA} = 1820.28\ J$

$W = F_{net}\,\Delta d$

$W = (M\cancel{a})\left(\frac{V_2^2 - V_1^2}{2\cancel{a}}\right)$

$W = \frac{mV_2^2}{2} - \frac{mV_1^2}{2}$

$W = E_{k2} - E_{k1}$

$W = \Delta E_k$

Over

b)

$$E_{TA} = E_{TB}$$

$$E_{TA} = E_{TB} + E_{kB}$$

$$E_{TA} = W_F + E_{kB}$$

$$E_{TA} = F_f \Delta d = \frac{1}{2} m v_B^2$$

$$E_{TA} - F_f \Delta d = \frac{1}{2} m v_B^2$$

$$\left(\frac{2}{m}\right)\left(E_{TA} - F_f \Delta d\right) = \left(\frac{1}{2} m v_B^2\right)\left(\frac{2}{m}\right)$$

$$\sqrt{v_B^2} = \sqrt{\left(\frac{2}{m}\right)\left(E_{TA} - F_f \Delta d\right)}$$

$$v_B = \sqrt{\left(\frac{2}{10}\right)\left(1820.28 - (15)(25)\right)}$$

$$v_B = \sqrt{289.06}$$

$$v_B = 17.00 \text{ m/s}$$

c) $E_{TA} = E_{Kc} + E_{ga} + E_{Th}$

$$\left(\frac{2}{M}\right)\left[E_{TA} - mghc - F_F \Delta d\right] = V_c^2$$

$$\sqrt{V_c^2} = \sqrt{\left(\frac{2}{M}\right)\left[E_{TA} - mghc - F_F \Delta d\right]}$$

$$V_c = \sqrt{\left(\frac{2}{10}\right)\left[1820.28 - (10)(9.8)(4) - 15(3\right.}$$

$$V_c = \sqrt{195.656}$$

$$V_c = 13.99 \text{ m/s}$$

d) if there is a negative in the $\sqrt{\ }$ then it cannot.

$$E_{TA} = E_{KD} + E_{ga} + E_{Th}$$

$$\left(\frac{2}{M}\right)\left[E_{TA} - mgh_D - F_F \Delta d\right] = V_D^2$$

$$V_D = \sqrt{\left(\frac{2}{10}\right)\left[1820.28 - (10)(9.8)(12) - (15)(50)\right.}$$

$$V_D = \sqrt{-21.144}$$

$$V_D = \text{undefined}$$

∴ the cart cannot make it to point D.

Over