1. $W = Fd = 240N(5m) = 1200J$

2. $1kwh = 1000W(1hour)$

$1kwh = 1000\frac{J}{s}(3600s)$

$1kwh = 3.6\times10^{6}J$

$3000J\left(\frac{1kwh}{3.6\times10^{6}J}\right) = 8.3\times10^{-4}kwh$

$(8.3\times10^{-4}kwh)\left(\$0.17/_{kwh}\right) = \$1.41\times10^{-4}$

3. a) $KE_F = \frac{1}{2}mv^2 = \frac{1}{2}(2{,}000kg)(25m/s)^2 = 625{,}000J$

b) $W = \Delta KE = KE_F - KE_i = 625{,}000J - 500{,}000J$

$W = 125{,}000J$

c) $P = \frac{W}{t} = \frac{125{,}500J}{5s} = 25{,}000W$

c) $25{,}000W\left(\frac{1hp}{746W}\right) = 33.5hp$

4. a) $PE = mgh = 0.3kg(9.8m/s^2)(1m)$

$PE_{1m} = 2.94J$

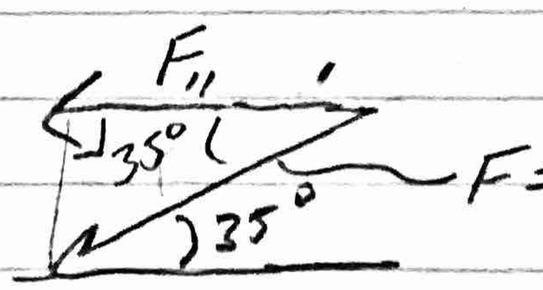
b) $PE_{Bench} + KE_{Bench} = PE_{1m} + KE_{1m}$

$(0.3kg)(9.8m/s^2)(4m) + 0 = 2.94J + KE_{1m}$

$8.82J = KE_{1m}$

5. $W_{Net} = F_{\parallel} d$

In direction of movement



$\frac{F_{\parallel}}{F} = \cos 35^\circ \Rightarrow F_{\parallel} = F\cos 35$

$F_{\parallel} = 0.5N(0.819)$

$F_{\parallel} = 0.410N$

$W = F_{\parallel} d$

$W = 0.41N(4m)$

$W = 1.64J$

6. No friction

$PE_{start} + KE_{start} = PE_A + KE_A$

$mgh + \frac{1}{2}kx^2 + 0 = mgh + KE_A$

$\frac{1}{2}kx^2 = KE_A$

A) $\frac{1}{2}(2000 N/m)(4m)^2 = 16{,}000J = KE_A$

$PE_A = mgh = 400kg(9.8 m/s^2)(50m) = 196{,}000J$

$E_{Total} = 16{,}000J + 196{,}000J = 212{,}000J$

B) $KE_B = \frac{1}{2}mv^2 = \frac{1}{2}(400kg)(3m/s^2) = 1{,}800J$

$PE_B = E_{Total} - KE_B = 212{,}000J - 1{,}800 = 210{,}200J$

No friction; total E constant

$PE_B = mgh$

$210{,}200J = 400kg(9.8 m/s^2)h$

$h_B = 53.6m$

Skip to letter D)

$KE_D = KE_B = 1800J$ Brakes (friction)

$PE_A + KE_A + W_{NC} = PE_D + KE_D$

$196{,}000J + 16{,}000J + (-500N)(60m) = PE_D + 1800J$

$PE_D = 180{,}200J = mgh$

$180{,}200J = (400kg)(9.8 m/s^2)(h) \Rightarrow h = 46.0m$

$E_{total} = 1{,}800J + 180{,}200J = 182{,}000J$

$v_A = 8.94 m/s$

$16{,}000 = \frac{1}{2}(400kg)v^2$

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

#6, continued

c) $h_c = h_d = 46.0\,m$

$PE_c = PE_d = 180,200\,J$

$E_{Total@C} = E_{Total@A} = 212,000\,J$

$KE_c = E_{Total\,c} - PE_c = 212,000\,J - 180,200\,J$

$KE_c = 31,800\,J$

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

$31,800\,J = \frac{1}{2}(400\,kg)v^2$

$v = 12.6\,m/s$