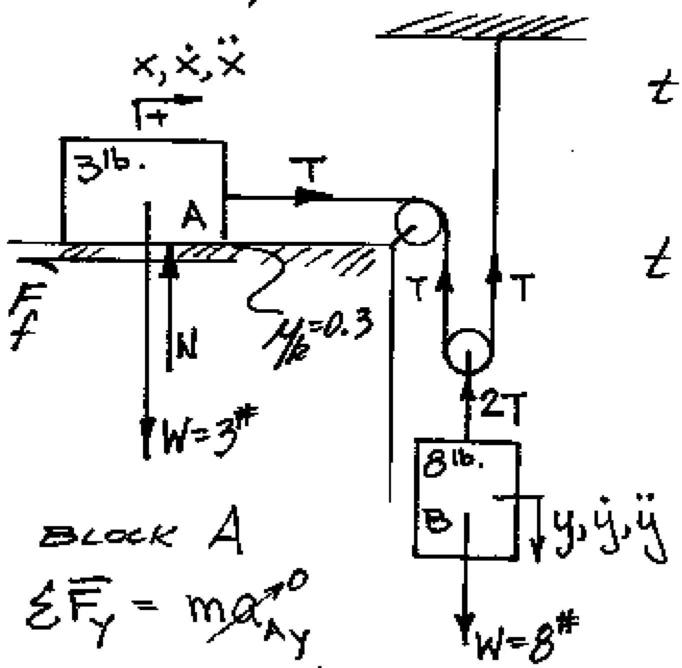
SIMILAR PULLEY PROBLEM DONE BY ENERGY METHOD.



INITIALLY AT REST

$t=0, \quad x_0 = \dot{x}_0 = \ddot{x}_0 = 0$

$y_0 = \dot{y}_0 = \ddot{y}_0 = 0$

$t>0$ when $\dot{x} = v_A = 5'/s$

find y_B = distance for B when A reaches 5'/s.

BLOCK A

$\Sigma F_y = m a_{Ay} \overset{0}{}$

$\therefore N = W = 3^{\#}$

$\therefore F_f = \mu N = (0.3)(3^{\#})$

$F_f = 0.9^{\#}$

APPLY CONSERVATION of ENERGY

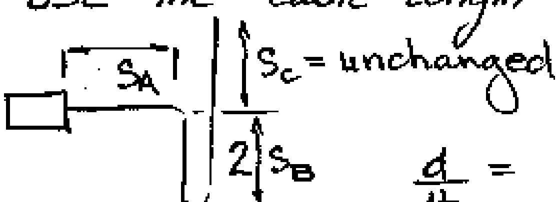
$\Delta PE + \Delta KE = 0$

$(PE_f - PE_i) + (KE_f - KE_i) = 0$

PE = function of displacement = WORK ENERGY = Fd

NEED displacements, or ΔS

Use the cable length and its changing lengths.



$L = S_A + 2S_B + S_C$

$\frac{d}{dt} = \quad 0 = \dot{S}_A + 2\dot{S}_B = \Delta S_A + 2\Delta S_B$

$\therefore v_A = -2v_B, \quad \Delta S_A = -2\Delta S_B$

$\Delta PE_A = T_A \Delta S_A$ where $T = F_f = 0.9^{\#}$

$\Delta PE_B = W \Delta S_B$

$\Delta KE = \frac{1}{2} m V^2 = \frac{1}{2} \frac{W}{g} V^2$ where $V_B = \frac{V_A}{2} = \frac{5}{2} = 2.5'/s$

$\Delta PE = \Delta KE$

$0.9^{\#}(-2\Delta S_B) + 8^{\#}(\Delta S_B) = \frac{1}{2}\frac{3^{\#}}{32.2}(5)^2 + \frac{1}{2}\frac{8^{\#}}{32.2}(2.5)^2$

$6.2\Delta S_B = 1.94$

$\therefore \boxed{\Delta S_B = 0.313 ft.}$

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