Oh-Boy! It's the solutions!!

① $W_{nc} = W_f = \Delta E_k + \Delta E_p$

$W_f = E_{kf} - \cancel{E_{ki}}^{\,0} + \cancel{E_{pf}}^{\,0} - E_{pi}$

$W_f = \frac{1}{2}(10\,kg)(8.7\,m/s)^2 - 10\,kg(9.8\,N/kg)(6.0\,m)$

$\boxed{W_f = -2.10\times10^2\ J}$

② $W_{nc} = W_a = \Delta E_k + \Delta E_p$

$W_a = \cancel{E_{kf}}^{\,0} - E_{ki} + E_{pf} - \cancel{E_{pi}}^{\,0}$

$W_a = -\frac{1}{2}(0.25)(20)^2 + 0.25(9.8)(17)$

$\boxed{W_a = -8.4\ J}$

③ $W_{nc} = \Delta E_k + \Delta E_p^{*}$ * Here we have BOTH gravitational potential energy AND spring potential energy

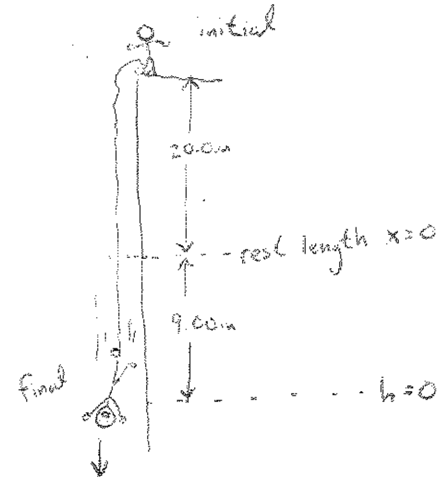
$0 = E_{kf} - \cancel{E_{ki}}^{\,0} + E_{pf} - E_{pi}$

$0 = \frac{1}{2}mv_f^2 + \frac{1}{2}kx^2 - mgh_i$

$0 = \frac{1}{2}67(4.5)^2 + \frac{1}{2}k(9.0)^2 - 67(9.8)(29)$

$k = \frac{2}{9.0^2}\left[67(9.8)(29) - \frac{1}{2}67(4.5)^2\right]$

$\boxed{k = 450\ N/m}$



④ $W_{nc} = \Delta E_k + \Delta E_p$

$-55 = \frac{1}{2}mv_B^2 - \frac{1}{2}mv_A^2 + \cancel{mgh_B}^{\,0} - mgh_A$

$-55 = \frac{1}{2}(2.2)(6.8)^2 - \frac{1}{2}(2.2)v_A^2 - 2.2(9.8)(4.0)$

$\frac{1}{2}(2.2)v_A^2 = \frac{1}{2}(2.2)(6.8)^2 - 2.2(9.8)(4.0) + 55$

$\boxed{v_A = 4.2\ m/s}$

⑤ $W_{nc} = \cancel{\Delta E_k}^{\,0} + \Delta E_p$ * don't forget the d!

$\mu F_N \cos 180° d = mgh_f - mgh_i$

$h_f = \frac{-\mu mgd + mgh_i}{mg} = \boxed{3.2\,m}$

⑥ Just for fun I'll solve this 2 ways i) $W_{net} = \Delta E_k$ ii) $W_{nc} = \Delta E_k + \Delta E_p$

$W_{net} = \Delta E_k$

$W_{motor} + W_{friction} + W_{gravity} = E_{kf} - \cancel{E_{ki}}^{\,0}$

$F_{motor}(10) + F_{friction}(10)\cos 180° + F_g(4)\cos 180° = \frac{1}{2}mv_f^2$

$F_{motor} = \frac{\frac{1}{2}5(5)^2 + 28.3(10) + 5(9.8)(4)}{10} = \boxed{54.2\,N}$

ii) $W_{nc} = \Delta E_k + \Delta E_p$

$W_{motor} + W_{friction} = E_{kf} - \cancel{E_{ki}}^{\,0} + E_{pf} - \cancel{E_{pi}}^{\,0}$

$F_{motor}(10) + F_f(10)\cos 180° = \frac{1}{2}mv_f^2 + mgh_f$

$F_{motor} = \frac{\frac{1}{2}(5)(5)^2 + 5(9.8)(4) + 28.3(10)}{10} = \boxed{54.2\,N}$