## Quiz 06:  Chapter 14                           Due:  Friday 10 Feb 23

Examine the solved problem below.  There are <span style="color:red">four errors</span> in the solution below.  Your task is to locate and identify those errors, then correct them and calculate the proper result.  If the same error occurs more than once, only count it as a single error, even if you have to correct it in more than one instance.

Each correctly identified error is worth <span style="color:red">4 points</span>, and the re-calculated result is worth <span style="color:red">4 points</span> as well.  You must save your work in pdf format and submit via the Quiz 06 Assignment in the Chapter 14 folder in the Quizzes folder of the Online Classroom in Blackboard. Please do not use any other file format than pdf.

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The cord is subjected to a constant force of $F = 50$lb and the smooth collar ($W = 15$lb) starts from rest at $A$.  Determine its speed when it passes point $B$.  Neglect the size of pulley $C$.

A)   Apply the work-energy theorem to the collar.

$$T_A + \sum U_{A \to B} = T_B$$

B)   Calculate the initial kinetic energy $T_A$:

$$T_A = 0$$

C)   Calculate the work done by gravity on the collar:

$$U_G = mgh_B - mgh_A = mg(h_B - h_A)$$
$$U_G = mg\left(\tfrac{1}{2}x_B^2 - 0\right) = (15\text{lb})\left(32.2\tfrac{\text{ft}}{\text{s}^2}\right)\left[\tfrac{1}{2}(4\text{ft})^2\right] = 3864\text{N}$$

D)   Calculate the work done by the force $F$ on the collar:

$$U_F = F(l_{AC} - l_{BC}) = F\left(\sqrt{x_{AC}^2 + y_{AC}^2} - \sqrt{x_{BC}^2 + y_{BC}^2}\right)$$
$$U_F = (50\text{lb})\left(\sqrt{(6\text{ft})^2 + (4.5\text{ft})^2} - \sqrt{(2\text{ft})^2 + (0\text{ft})^2}\right) = 275\text{N}$$

E)   Solve for the velocity $v_B$ of the collar at point $B$:

$$T_A + U_G + U_F = \tfrac{1}{2}mv_B^2$$

$$0 + 3864\text{N} + 275\text{N} = \tfrac{1}{2}\left(\frac{15\text{lb}}{32.2\frac{\text{ft}}{\text{s}^2}}\right)v_B^2$$

$$v_B = 133.3\tfrac{\text{ft}}{\text{s}}$$