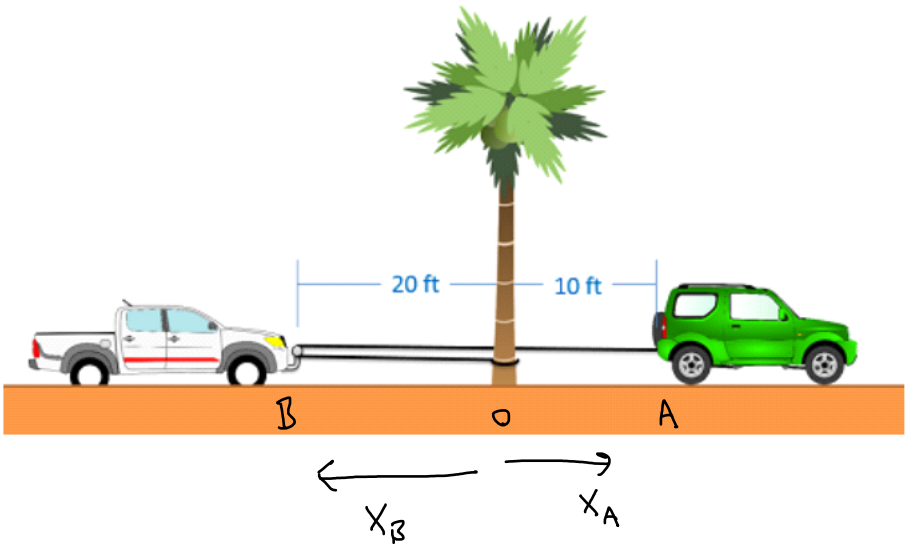
Question 1:

A truck becomes stuck in the sand at a local beach. To help, a friend takes a 50 ft long rope, ties one end to her car, loops the rope around a bar at the front of the truck, and then ties the other end to a stationary tree as shown below. If the car accelerates at a rate of .2 m/s^2, what will the velocity of the truck be by the time it gets to the tree?



$L = S_0 = X_A + 2X_B$ $\qquad \ddot{X}_A = .2\ ft/s^2$

$\dot{L} = 0 = \dot{X}_A + 2\dot{X}_B$ $\qquad \ddot{X}_B = -.1\ ft/s^2$

$\ddot{L} = 0 = \ddot{X}_A + 2\ddot{X}_B$

$$V_f^2 = V_0^2 + 2a(X_f - X_i)$$

$V_0 = 0$ $\quad a = 0$ $\quad X_i = 20$

$$\boxed{V_f = 2\ ft/s}$$