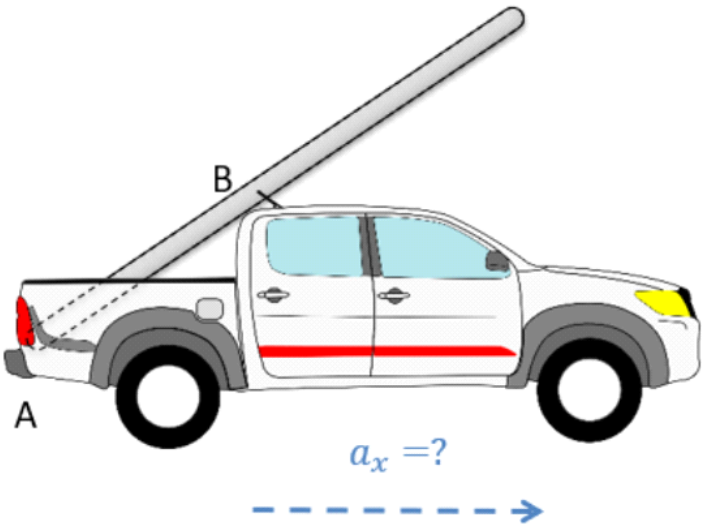
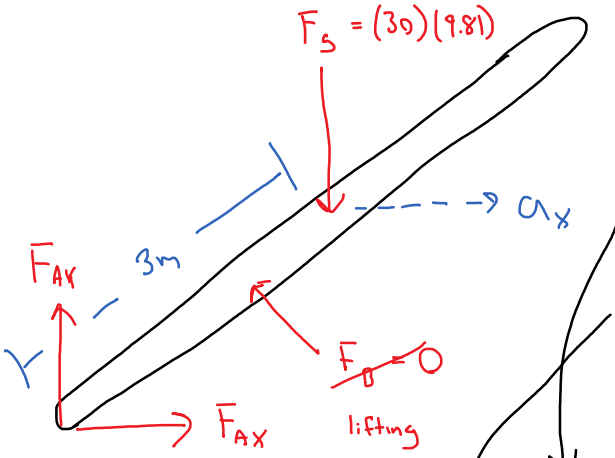
Problem 4

A pickup truck is carrying a 30 kg, 6 meter long ladder at a 35 degree angle as shown to the right. The ladder is wedged against the tailgate at A and makes contact with the roof of the truck at B. The distance from A to B is 2 meters. At what rate of acceleration would we expect the ladder to start to rotate upwards?





$$\Sigma F_x = F_{AX} = (30\,kg)\,a_x$$

$$\Sigma F_y = F_{AY} - (30)(9.81) = 0$$

$$\Sigma M_c = (F_{AX})(3\sin(35)) - (F_{AY})(3\cos(35)) = 0$$

$$F_{AY} = 294.3\,N$$

$$F_{AX}\ \frac{(294.3)(3\cos(35))}{3\sin(35)} = 420.3\,N$$

$$a_x = \frac{F_{AX}}{m} = \boxed{14.0\ m/s^2}$$