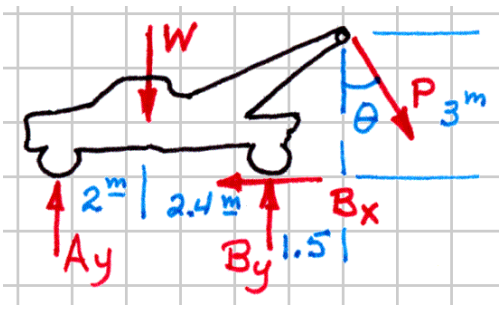
1-48

$$W = 6800(9.81) = 66,708 \text{ N}$$



From a free-body diagram of the truck, the equilibrium equations are

$$\rightarrow \Sigma F_x = 0: \qquad P\sin\theta - B_x = 0$$

$$\uparrow \Sigma F_y = 0: \qquad A_y + B_y - 66,708 - P\cos\theta = 0$$

$$\circlearrowleft \Sigma M_B = 0: \qquad (66,708)(2.4) - 4.4A_y - (P\cos\theta)(1.5) - (P\sin\theta)(3) = 0$$

The fourth equation needed to solve for the four unknowns is either $A_y = 0$ (the front wheels are on the verge of lifting off the ground) or $B_x = 0.8B_y$ (the rear wheels are on the verge of slipping). Guessing that the front wheels are on the verge of lifting off the ground gives the solution

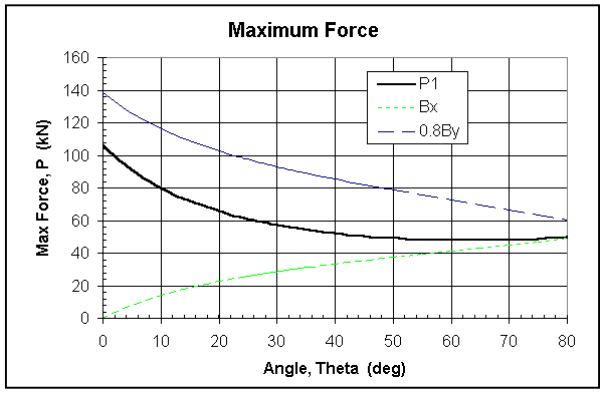
$$A_y = 0 \text{ N}$$

$$P = \frac{66,708(2.4)}{1.5\cos\theta + 3\sin\theta} \text{ N}$$

$$B_x = P\sin\theta \text{ N}$$

$$B_y = 66,708 + P\cos\theta \text{ N}$$

The forces B_x and $0.8B_y$ are plotted on the same graph as the force P. Since B_x is always less than $0.8B_y$, the guess that the front wheels are on the verge of lifting off the ground was the correct guess, and the solution is valid for all values of θ.



$E = 1500$ lb ..... **Ans.**

$\mathbf{T}_{BD} = 10.85$ lb ⮟ 39.81° ..... **Ans.**

$\mathbf{C} = 18.67$ lb ⮜ 75.23° ..... **Ans.**