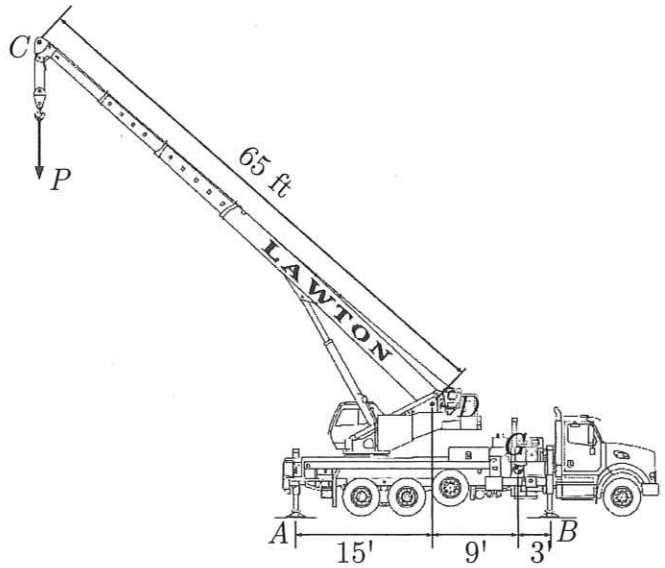
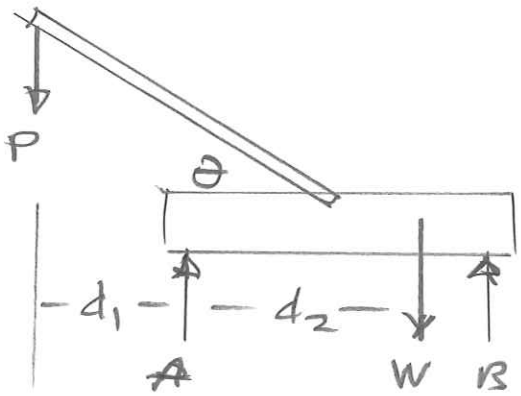
Mechanics
More Equilibrium Problems

Mr. Haynes

The mobile crane shown is supported by outriggers at A and B and weighs 18000 lb, with a center of gravity at G.

What is the smallest angle θ the boom can make with the horizontal without tipping over when lifting a load P = 10000 lb?





$W = 18$ KIP

$P = 10$ KIP

$d_1 = 65\cos\theta - 15$

$d_2 = 15 + 9 = 24'$

AT TIPPING $B = 0$

$\Sigma M_A = 0$

$P d_1 = W d_2$

$65\cos\theta - 15 = \frac{W}{P}(24)$

$\cos\theta = \frac{\frac{W}{P}(24) + 15}{65}$

$\cos\theta = .895$

$\theta = 26.4^\circ$