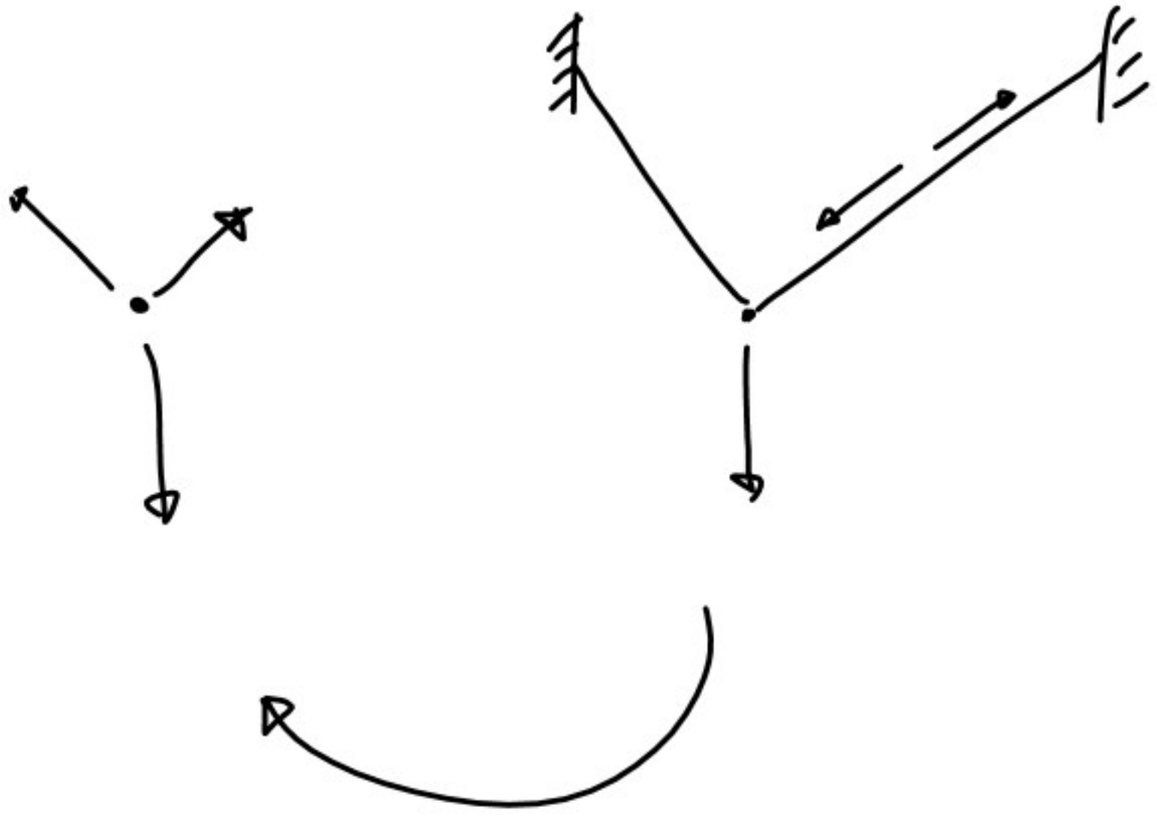
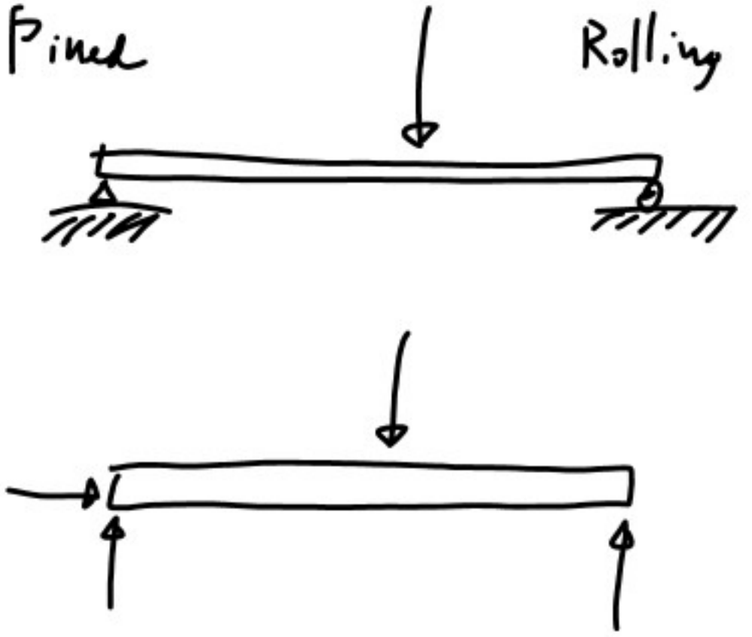
Assignment 1

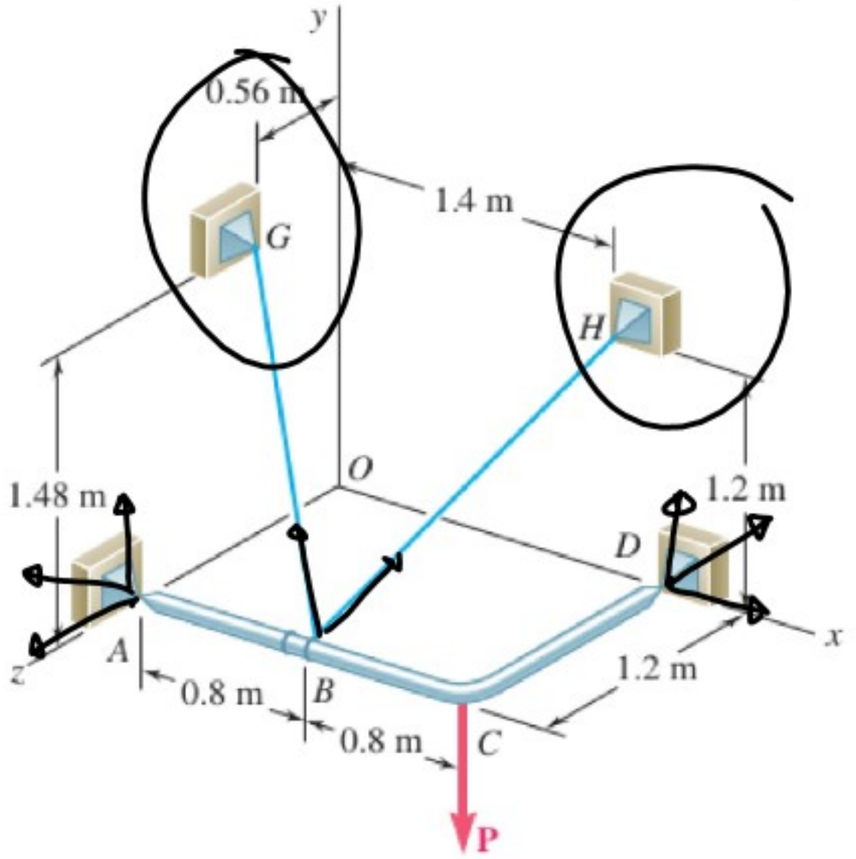
Quiz 1 due Sunday Midnight

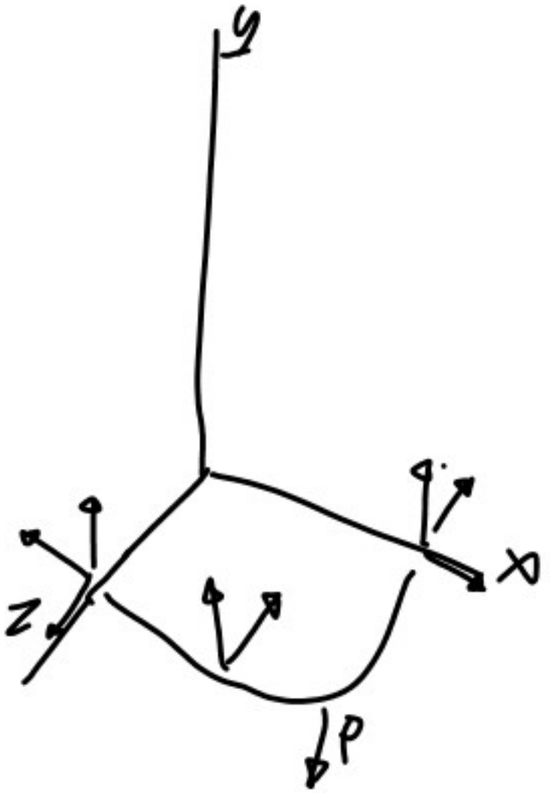
Free Body Digrams



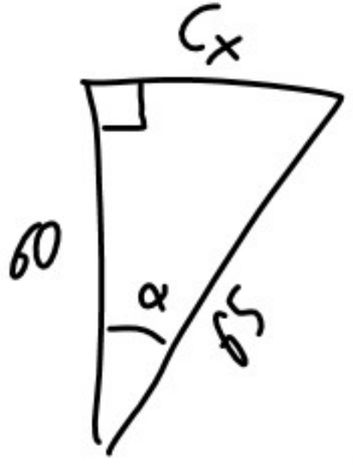


2.84 A force acts at the origin of a coordinate system in a direction defined by the angles $\theta_y = 120°$ and $\theta_z = 75°$. Knowing that the x component of the force is +40 N, determine (*a*) the angle θ_x, (*b*) the magnitude of the force.





2.F3 The 60-lb collar A can slide on a frictionless vertical rod and is connected as shown to a 65-lb counterweight C. Draw the free-body diagram needed to determine the value of h for which the system is in equilibrium.



$$\tan\alpha = \frac{15}{h}$$

$$h = \frac{15}{\tan\alpha}$$

$$= 36 \text{ in}$$

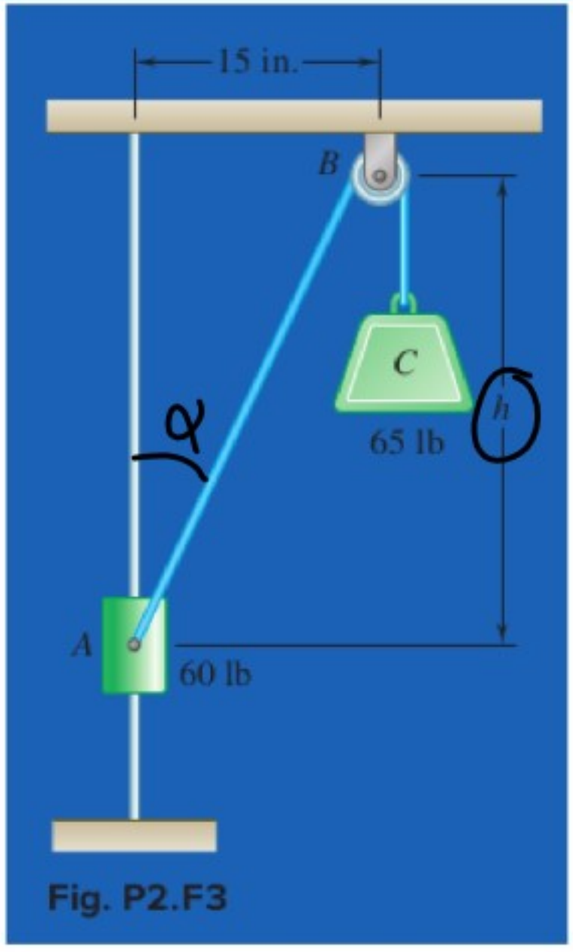
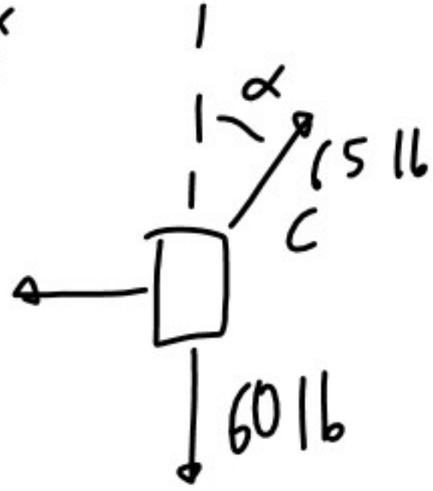


Fig. P2.F3

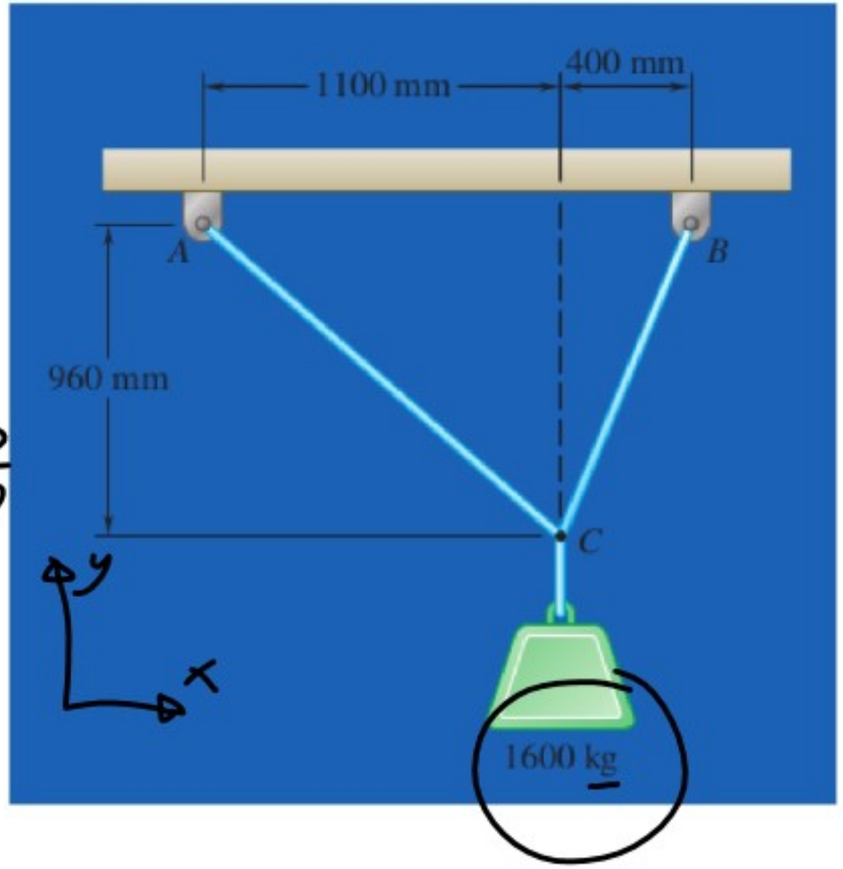


$C_y = 60\text{lb}$

$\cos\alpha = \frac{60}{65}$

$\alpha = 22.6°$

2.F1 Two cables are tied together at C and loaded as shown. Draw the free-body diagram needed to determine the tension in AC and BC.



$$AC_x = BC_x$$

$$AC_y + BC_y = 15680$$

$$\frac{AC_x}{AC_y} = \frac{1100}{960} \qquad \frac{BC_x}{BC_y} = \frac{400}{960}$$

2.48 Knowing that $\alpha = 20°$, determine the tension (*a*) in cable *AC*, (*b*) in rope *BC*.

$T_{Ay} \tan 5 = T_{By} / \tan 20$

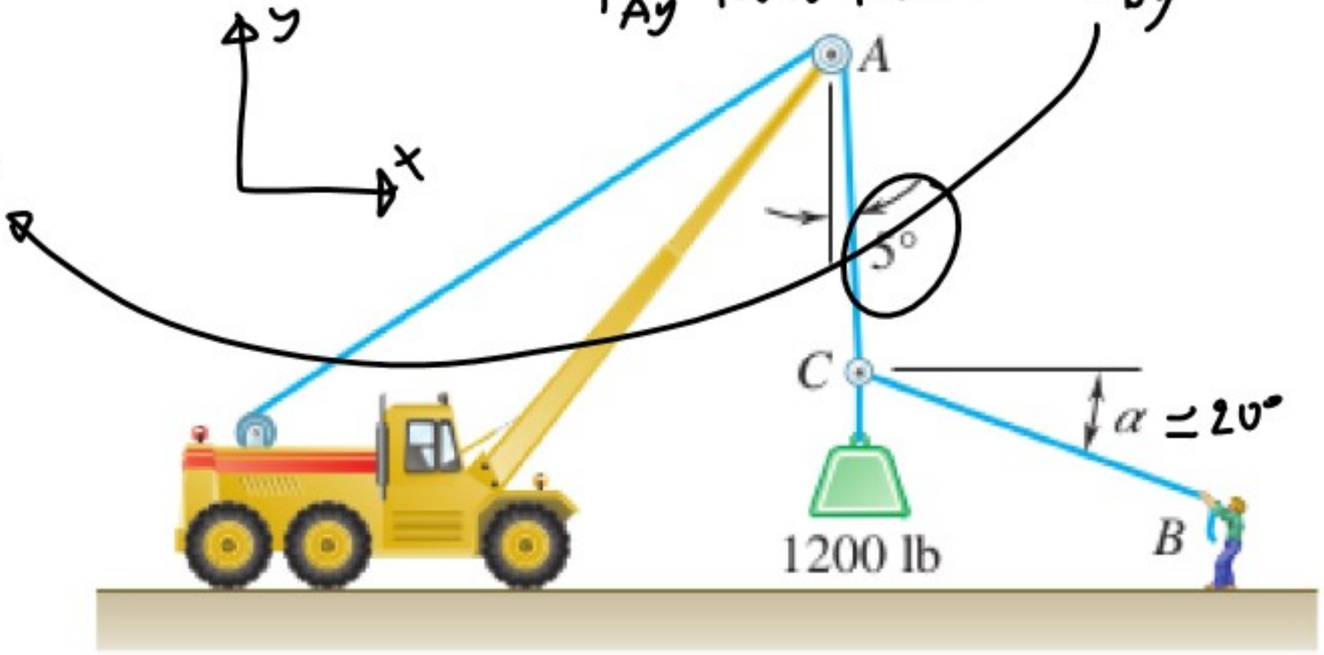
$T_{Ay} \tan 5 \tan 20 = T_{By}$

$T_{Ax} = T_{Bx}$

$T_{Ay} = 1200 + T_{By}$

$\frac{T_{Ax}}{T_{Ay}} = \tan 5$

$\frac{T_{By}}{T_{Bx}} = \tan 20$



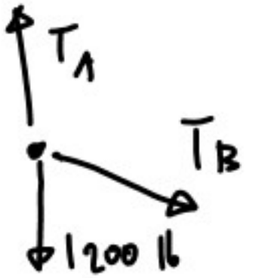


Fig. P2.48

2.48 Knowing that $\alpha = 20°$, determine the tension (*a*) in cable *AC*, (*b*) in rope *BC*.

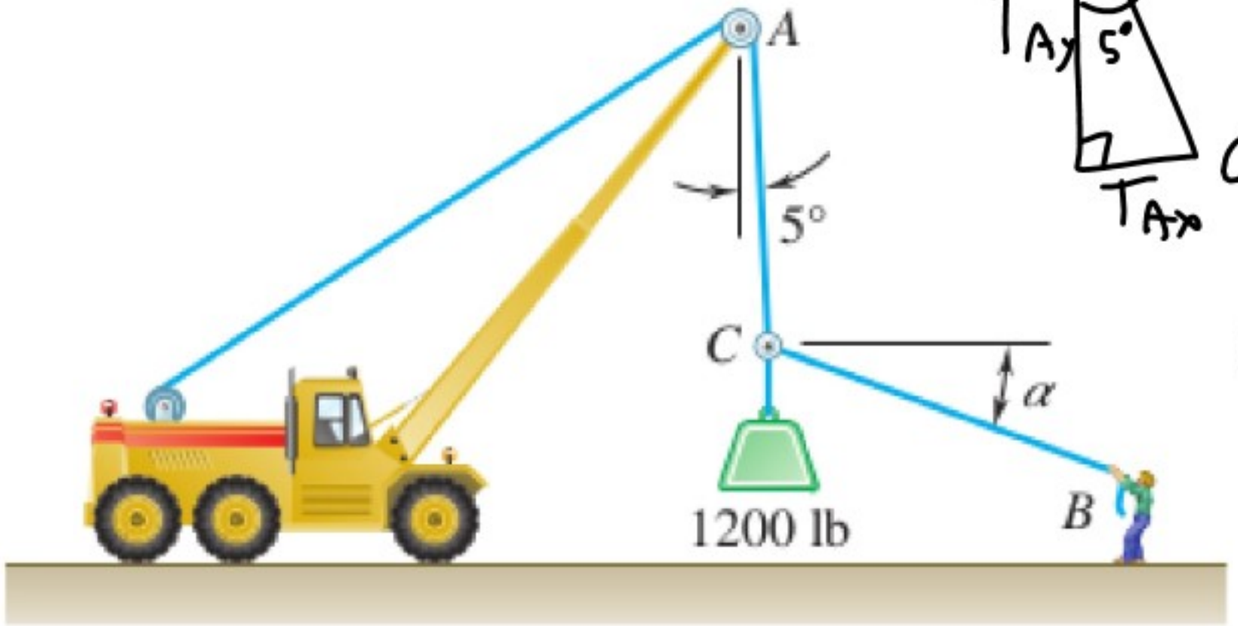


Fig. P2.48

$$\tan 5° = \frac{T_{Ax}}{T_{Ay}}$$

$$\tan 20° = \frac{T_{By}}{T_{Bx}}$$