

## ME 2120 Recitation 1

Useful Equations

$$\sin\theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos\theta = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan\theta = \frac{\textit{opposite}}{\textit{adjacent}}$$

$$\Delta x = x_f - x_0$$

$$\Delta y = y_f - y_0$$

$$\Delta z = z_f - z_0$$

$$\sum F = 0$$

$$\sum F_x = 0$$

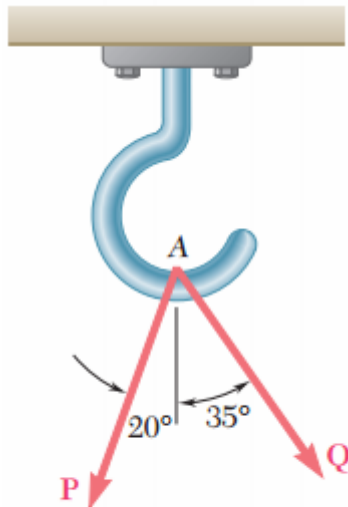
$$\sum F_y = 0$$

$$\sum F_z = 0$$

$$\sum M = 0$$

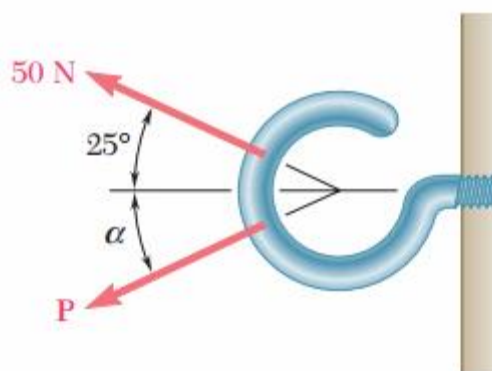
**2.2** Two forces **P** and **Q** are applied as shown at point **A** of a hook support. Knowing that  $P = 60$  lb and  $Q = 25$  lb, determine graphically the magnitude and direction of their resultant  $\mathbf{R}$ .

**2.15** Solve Prob. 2.2 by trigonometry.



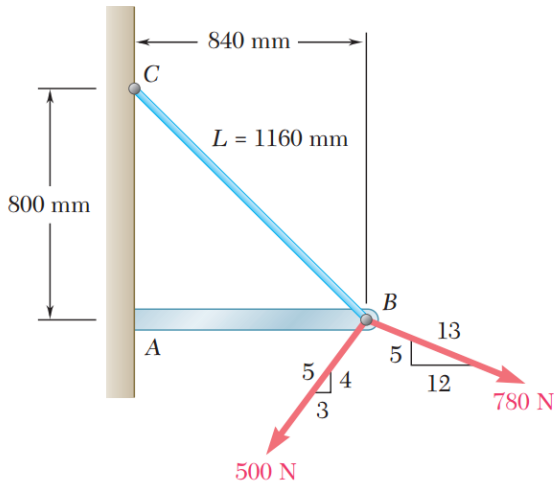
**Fig. P2.1 and P2.2**

- 2.7** Two forces are applied as shown to a hook support. Knowing that the magnitude of  $\mathbf{P}$  is 35 N, determine by trigonometry (a) the required angle  $\alpha$  if the resultant  $\mathbf{R}$  of the two forces applied to the support is to be horizontal, (b) the corresponding magnitude of  $\mathbf{R}$ .



**Fig. P2.7**

**2.36** Knowing that the tension in cable  $BC$  is  $725\text{ N}$ , determine the resultant of the three forces exerted at point  $B$  of beam  $AB$ .



**Fig. P2.36**

**2.36**

**GIVEN:**  
 $T_{BC} = 725\text{ N}$

**FIND:**  
 RESULTANT OF THE THREE FORCES EXERTED AT POINT B OF BEAM AB.

**FORCES EXERTED BY CABLE BC:**  
 $F_x = -(725\text{ N}) \frac{840\text{ mm}}{1160\text{ mm}} = -525\text{ N}$ ,  $F_y = +(725\text{ N}) \frac{800\text{ mm}}{1160\text{ mm}} + 500\text{ N}$

**500-N FORCE:**  
 $F_x = -(500\text{ N}) \frac{3}{5} = -300\text{ N}$ ,  $F_y = -(500\text{ N}) \frac{4}{5} = -400\text{ N}$

**780-N FORCE:**  
 $F_x = +(780\text{ N}) \frac{12}{13} = +720\text{ N}$ ,  $F_y = -(780\text{ N}) \frac{5}{13} = -300\text{ N}$

FORCE	X Comp (N)	Y Comp (N)
$T_{BC} = 725\text{ N}$	-525	+500
500 N	-300	-400
780 N	+720	-300
$R_x = -105$	$R_y = -200$	

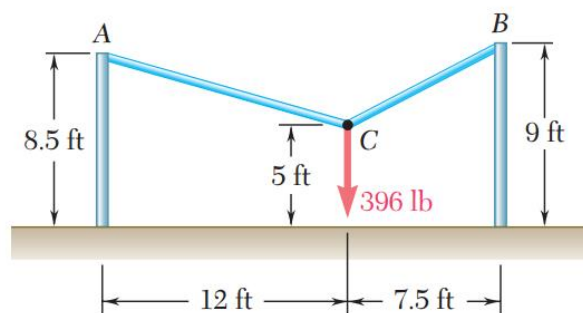
$R_x = -(105)\text{ N}$ ,  $R_y = -(200)\text{ N}$

$\tan \alpha = \frac{200\text{ N}}{105\text{ N}}$ ,  $\alpha = 62.3^\circ$

$R = \frac{200\text{ N}}{\sin 62.3^\circ} = 225.9\text{ N}$

$R = 226\text{ N} \angle 62.3^\circ$

- 2.130** Two cables are tied together at  $C$  and loaded as shown. Determine the tension ( $a$ ) in cable  $AC$ , ( $b$ ) in cable  $BC$ .



**Fig. P2.130**