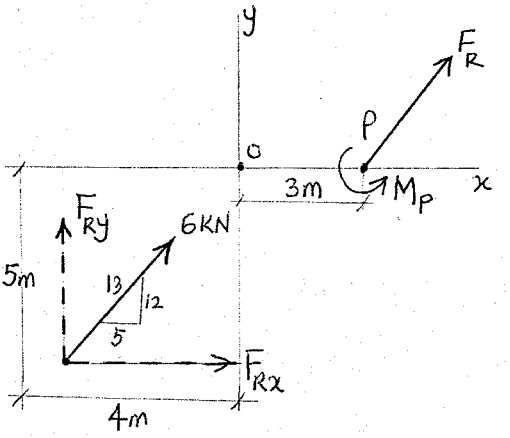
PROBLEM-4-99 HW#6.0



$F_{Rx} = 6\left(\frac{5}{13}\right) = 2.31\,KN \uparrow$

$F_{Ry} = 6\left(\frac{12}{13}\right) = 5.54\,KN \rightarrow$

$\therefore F_R = \sqrt{2.31^2 + 5.54^2}$

$= 6KN$

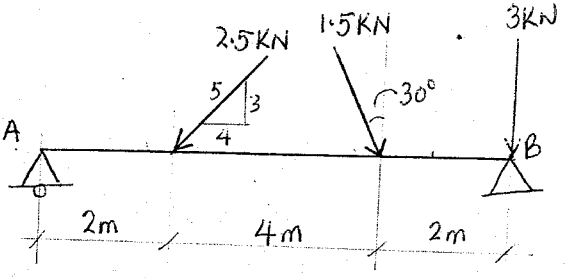
$\theta = \tan^{-1}\left(\frac{F_{Ry}}{F_{Rx}}\right)$

$= \tan^{-1}\left(\frac{5.54}{2.31}\right) = 67.4^\circ$

$\circlearrowright M_P = 2.31(5) - 5.54(7) = -27.23$

$= 27.23\,KNm \circlearrowright$

PROBLEM 4-111



$\stackrel{+}{\rightarrow} F_{Rx} = -2.5\left(\frac{4}{5}\right) + 1.5\sin 30^\circ$

$= -1.25\,KN$

$+\uparrow F_{Ry} = -2.5\left(\frac{3}{5}\right) - 1.5\cos 30^\circ - 3$

$= -5.8\,KN$

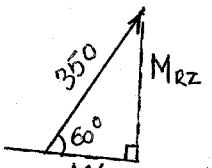
$F_R = \sqrt{(-1.25)^2 + (-5.8)^2} = 5.93KN$

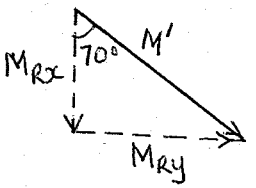
$\theta = \tan^{-1}\left(\frac{-5.8}{-1.25}\right) = 77.8^\circ$

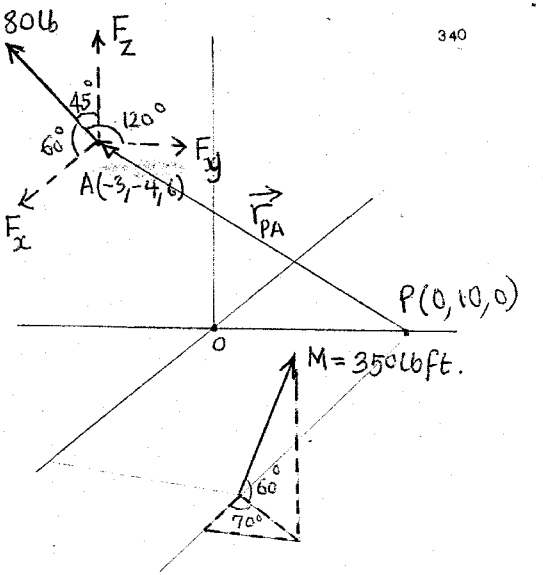
$\circlearrowright M_B = +2.5\left(\frac{4}{5}\right)\times 0 + 2.5\left(\frac{3}{5}\right)\times 6 - 1.5\sin 30\,(0) + 1.5\cos 30\,(2) + 300\times 0$

$= 11.6\,KNm.$

PROBLEM 4-129 HW#6.0







$F_{Rx} = 80\cos 60^\circ = 40\text{lb}$

$F_{RZ} = 80\cos 45^\circ = 56.6\text{lb}$

$F_{Ry} = 80\cos 120^\circ = -40\text{lb}$

$\therefore F_R = \{40i - 40j + 56.6k\}\text{lb}$

$\vec{r}_{PA} = (-3-0)i + (-4-10)j + (6-0)$

$= \{-3i - 14j + 6k\}\text{ft.}$

$M_{RZ} = 350\sin 60^\circ = 303.1\text{ lbft}$

$M' = 350\cos 60^\circ = 175\text{ lbft}$

$M_{RY} = 175\sin 70^\circ = 164.45\text{ lbft}$

$M_{RX} = 175\cos 70^\circ = 59.85\text{ lbft}$

$\therefore M_R = M_{Rx} + M_{Ry} + M_{RZ} = \{59.85i + 164.45j + 303.11k\}\text{lbft.}$

$$M_C = \vec{r}_{PA} \times F_R = \begin{vmatrix} i & j & k \\ -3 & -14 & 6 \\ 40 & -40 & 56.6 \end{vmatrix}$$

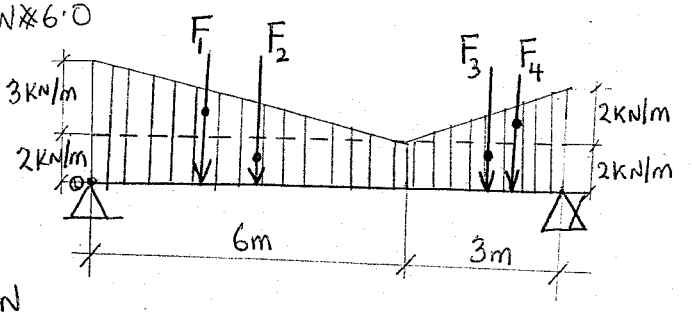
$= [56.6(-14) + 40(6)]i - [56.6(-3) - 40(6)]j + [-40(-3) - 40(-14)]k$

$= \{-552.4i + 409.8j + 680k\}\text{lbft.}$

$\therefore M_{RP} = M_R + M_C$

$= \{-492.6i + 574.3j + 983.1k\}\text{lbft.}$

PROBLEM 143 HW#6.0



$F_1 = 2 \times 6 = 12\text{kN}$

$F_2 = \frac{1}{2} \times 6 \times 3 = 9\text{kN}$

$F_3 = 2 \times 3 = 6\text{kN}$

$F_4 = \frac{1}{2} \times 3 \times 2 = 3\text{kN}$

$\bar{x}_1 = \frac{1}{2}(6) = 3\text{m}$

$\bar{x}_2 = \frac{1}{3}(6) = 2\text{m}$

$\bar{x}_3 = \frac{1}{2}(3) + 6 = 7.5\text{m}$

$\bar{x}_4 = \frac{2}{3}(3) + 6 = 8\text{m}$

$\downarrow F_R = \Sigma F = 12 + 9 + 6 + 3 = 30\text{kN}$

$\therefore \bar{x}(30) = 12(3) + 9(2) + 6(7.5) + 3 \times (8) = 123$

$\therefore \bar{x} = 123/30 = 4.10\text{m}.$

PROBLEM 4-149

$\uparrow F_{Ry} = -\frac{1}{2} \times 3 \times 200 = -300\text{N}$

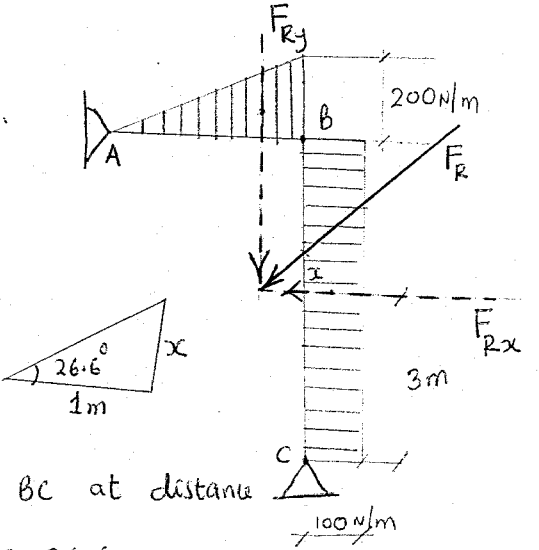
$\rightarrow F_{Rx} = -6 \times 100 = -600\text{N}$

$F_R = \sqrt{(-300)^2 + (-600)^2} = 671\text{kN}$

$\theta = \tan^{-1}\left(\frac{-300}{-600}\right) = 26.6°$

$\bar{x}_1 = \frac{1}{3}(3) = 1\text{m}$

$\bar{x}_2 = \frac{1}{2}(6) = 3\text{m}$



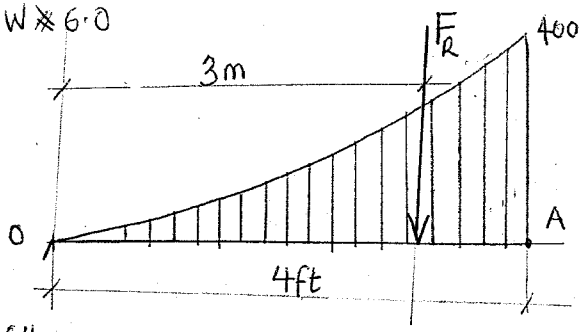
Resultant's line of action intersect BC at distance

$3 + x = 3 + 1 \times \tan 26.6$

$= 3 + 0.5$

$= 3.5\text{m}.$

ROBLEM 4-163 HW*6.0



$$F_R = \int_A dA = \int_0^4 25x^2\,dx$$

$$= 25\left[\frac{x^3}{3}\right]_0^4$$

$$= 25\left[\frac{4^3}{3} - \frac{0^3}{3}\right]$$

$$= 533.3\,lb$$

$$= \frac{\int_A x\,dA}{\int_A dA} = \frac{\int_0^4 x(25x^2)\,dx}{533.3}$$

$$= \frac{\int_0^4 25x\,dx}{533.3}$$

$$= \frac{25\left[\frac{x^4}{4}\right]_0^4}{533.3}$$

$$= \frac{25\left[\frac{4^4}{4} - \frac{0^4}{4}\right]}{533.3} = \frac{1600}{533.3} = 3.0\,m$$

$$M_{CA} = F_R \times (4 - \bar{x})$$

$$= 533.3 \times 1$$

$$= 533.3\,lb\,ft.$$