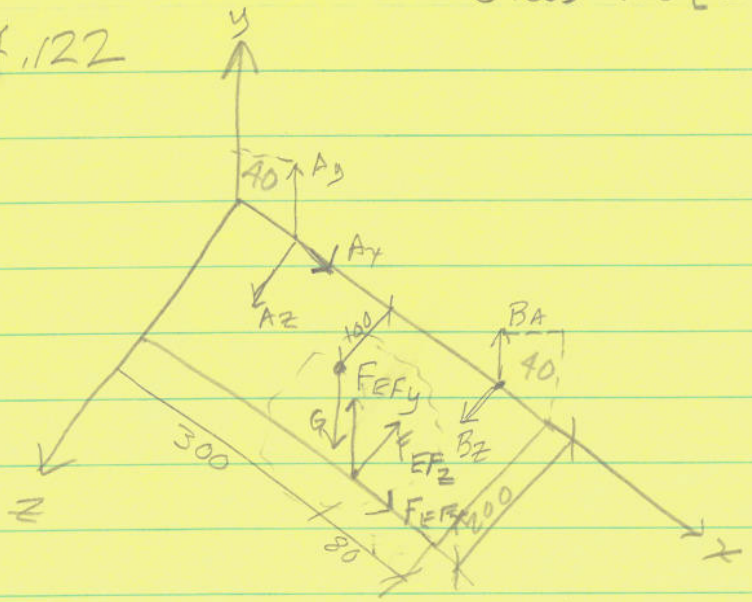
Class Notes 9/22/08

4.122



$G = 15\,kg \cdot 9.81\,m/s^2 = 147.2\,N$

$Line_{EF} = \sqrt{(80mm)^2 + (250mm)^2 + (-200)^2} = 330$

$+\circlearrowleft \sum M_{A_{x\,Axis}} = G(100mm) - F_{EF_y}(200mm) = 0$

$$F_{EF_y} = \frac{147.2N\,(100\,mm)}{200\,mm}$$

$F_{EF_y} = 73.6N$

$$\Rightarrow F_{EF} = F_{EF_y}\left(\frac{L_{EF}}{L_{EF_y}}\right)$$

$$= 73.6N\left(\frac{330\,mm}{250\,mm}\right) = 97.1N$$

$$F_{EF_x} = F_{EF}\left(\frac{80}{330}\right) = 97.1N\left(\frac{80}{330}\right) = 23.5N$$

$$F_{EF_z} = F_{EF}\left(\frac{-200}{330}\right) =$$

$$+\circlearrowleft \sum M_{A_{Z\,AXIS}} = -147.2N(150mm) + F_{EF_y}(260\,mm) + B_y(300mm) = 0$$

$$= \frac{-147.2N(150mm) + 73.6N(260mm)}{300mm} = -B_y$$

$$\sum F_y = 0 \Rightarrow A_y + (B_y = 9.81) + (F_{EF_y} = 73.6) - 147.2 = 0$$

$$A_y + 9.81 + 73.6 - 147.2 = 0$$

$$A_y = 63.8N$$

$$+\circlearrowleft \sum M_{A_{y\,AXIS}} = 0 \Rightarrow -B_z(300mm) + F_{EF_z}(260mm) + F_{EF_x}(200mm) = 0$$

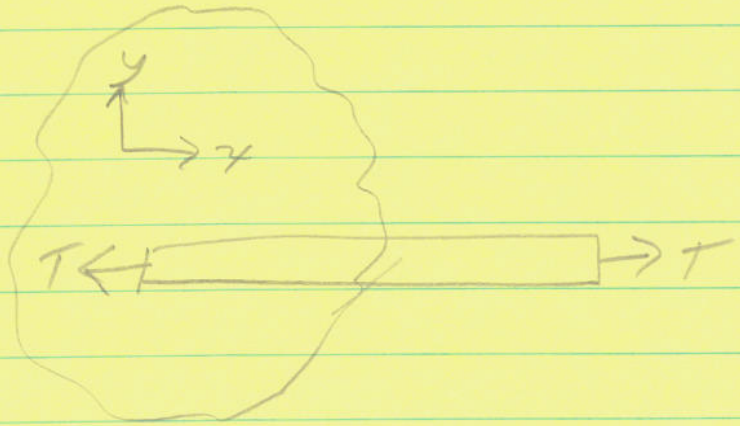
$$B_z = \frac{58.8(260) + 23.5(200)}{300} = 66.6\,N$$

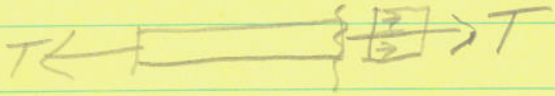
$$\sum F_z = 0 \Rightarrow A_z + (B_z = 66.6N) - (F_{EF_z} = 58.8) = 0$$

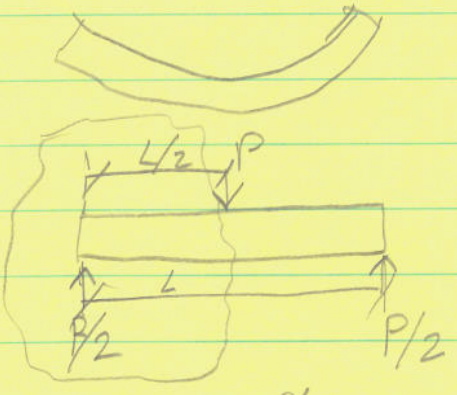
$$A_z = -7.83\,N$$

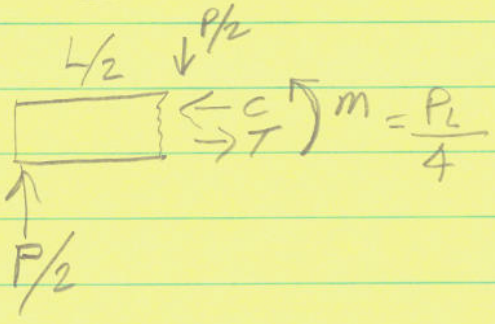
$$\sum F_x = 0 \Rightarrow A_x + F_{EF_x} = 0 \Rightarrow A_x = -23.5N$$

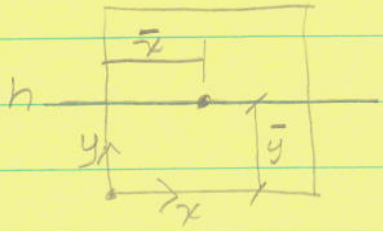
Chap 5 Centroids

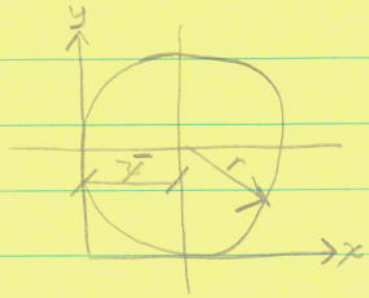








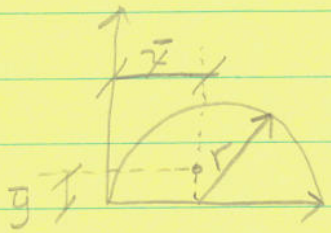




$A = \pi r^2$

$\bar{x} = r$

$\bar{y} = r$

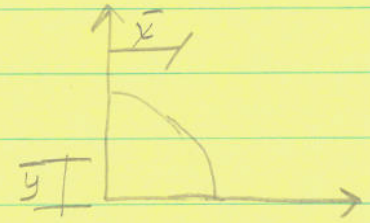


$A = \frac{\pi r^2}{2}$

$\bar{x} = r$

$\bar{y} = \frac{\sum \bar{d}A_i \bar{y}_i}{\sum \bar{d}A_i}$

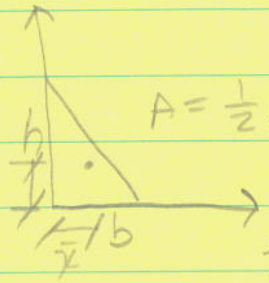
$\bar{y} = \frac{4r}{3\pi}$



$A = \frac{\pi r^2}{4}$

$\bar{x} = \frac{4r}{3\pi}$

$\bar{y} = \frac{4r}{3\pi}$



$A = \frac{1}{2}bh$

$\bar{x} = \frac{b}{3}$

$\bar{y} = \frac{h}{3}$

Study Sample 5.1 & 5.2