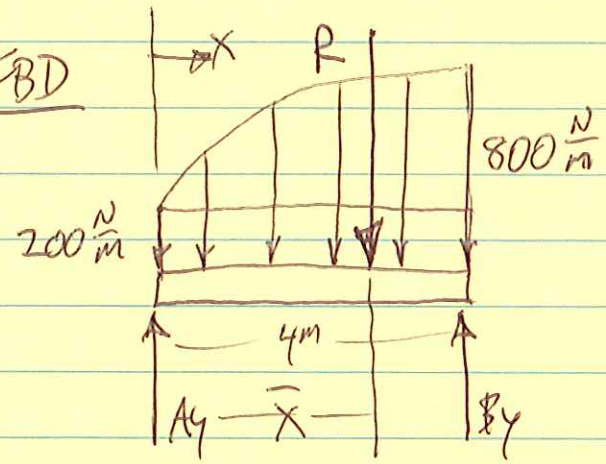
PROB. 5.76

FIND $\vec{R}$, $\bar{X}$, A_y AND B_y

FBD



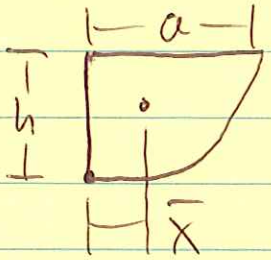
$$\bar{X} = \frac{\Sigma \bar{X}_i A_i}{\Sigma A_i}$$

$$\bar{X} = \frac{\bar{X}_1 A_1 + \bar{X}_2 A_2}{A_1 + A_2}$$

AREA 1: RECTANGLE

$$A_1 = \left(200 \tfrac{N}{m}\right)(4^m) = 800^N, \quad \bar{X}_1 = \tfrac{1}{2}(4^m) = 2^m$$

AREA 2: SEMIPARABOLIC AREA.



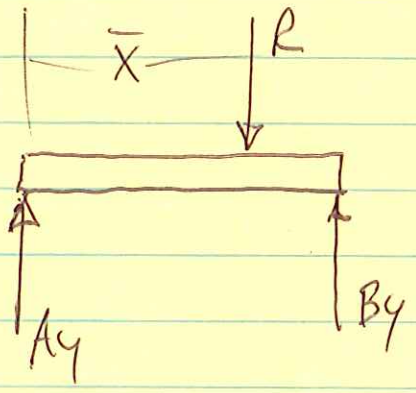
$$A_2 = \tfrac{2}{3}ah = \tfrac{2}{3}(4^m)\left(600 \tfrac{N}{m}\right) = 1600^N$$

$$\bar{X} = \tfrac{3}{8}a = \tfrac{3}{8}(4^m) = 1.5^m$$

$$\bar{X}_2 = 4^m - 1.5^m = 2.5^m$$

$$\bar{X} = \frac{(2^m)(800^N) + (2.5^m)(1600^N)}{(800^N) + (1600^N)} = \underline{2.33^m}$$

$$\vec{R} = A_1 + A_2 = \underline{2400^N} \downarrow$$



$\Sigma F_y = 0: \quad A_y + B_y - 2400 = 0$

$A_y = -B_y + 2400$

$\Sigma M_A = 0 \circlearrowleft: \quad -(2.33^m)(2400^N) + (4^m)B_y = 0$

$\underline{B_y = 1400^N}$

$\underline{A_y = -(1400) + 2400 = 1000^N}$