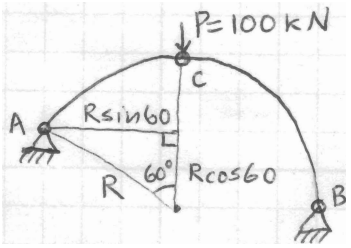
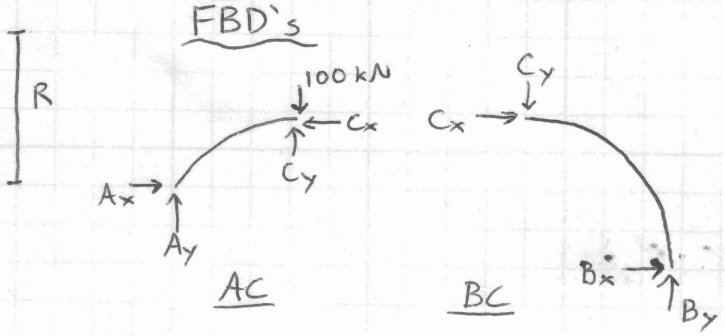
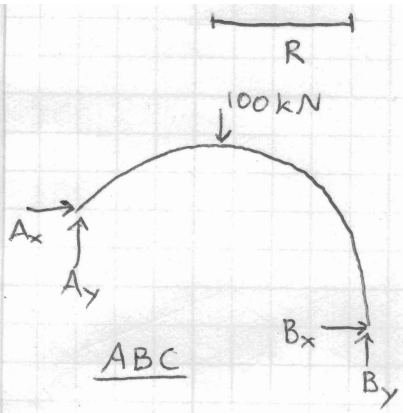
MIDTERM 2 REVIEW



FBD's





Find Support Rxns

On ABC → $\Sigma M_{B\nearrow +} = 0 = 100(R) - A_x\left(\tfrac{1}{2}R\right) - A_y\left(R + \tfrac{\sqrt{3}}{2}R\right)$ (cos60 = ½, sin60 = √3/2)

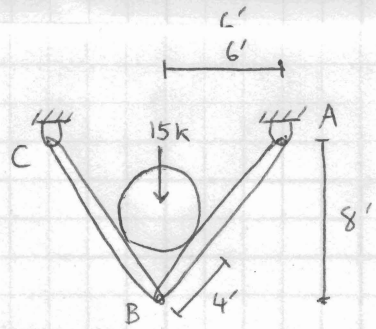
On AC → $\Sigma M_{C\nearrow +} = 0 = -A_y\left(\tfrac{\sqrt{3}}{2}R\right) + A_x\left(R - \tfrac{1}{2}R\right)$

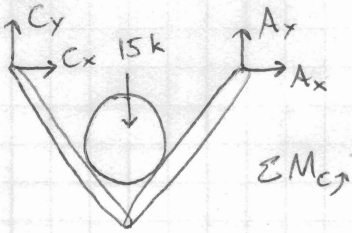
→ $\boxed{A_x = 63.4\,kN \rightarrow}$
$\boxed{A_y = 36.6\,kN \uparrow}$

On ABC → $\Sigma F_x = 0 = A_x + B_x$ → $\boxed{B_x = 63.4\,kN \leftarrow}$

$\Sigma F_y = 0 = A_y + B_y - 100$ → $\boxed{B_y = 63.4\,kN \uparrow}$

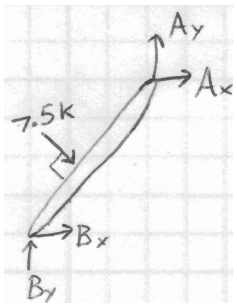
2)





$\Sigma M_{C\nearrow} = 0 = -15k(6') + A_y(12')$

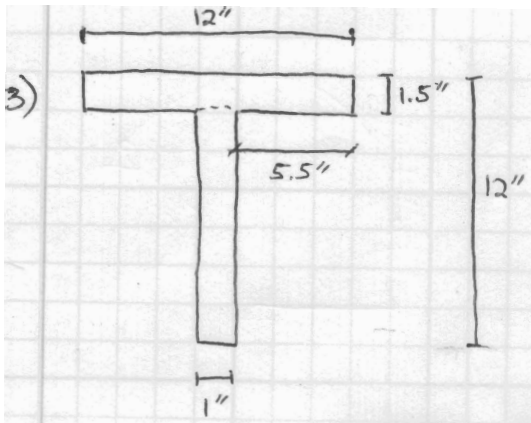
→ $\boxed{A_y = 7.5\,k \uparrow}$



$\Sigma M_{B\nearrow} = 0 = -A_x(8') + A_y(6') - 7.5k(4')$

→ $\boxed{A_x = 1.88\,k \rightarrow}$

3)



→ $\bar{X}$ in middle of section b/c symmetric

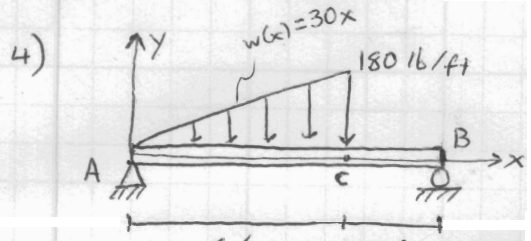
$$\bar{Y} = \frac{\Sigma \bar{y} A}{\Sigma A}$$

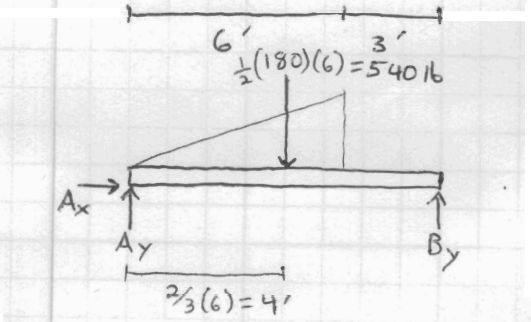
~ split into two rectangles

$$\bar{Y} = \frac{5.25(10.5\times1) + 11.25(12\times1.5)}{(10.5\times1) + (12\times1.5)}$$

→ $\boxed{\bar{Y} = 9.04''}$ from bottom

4)





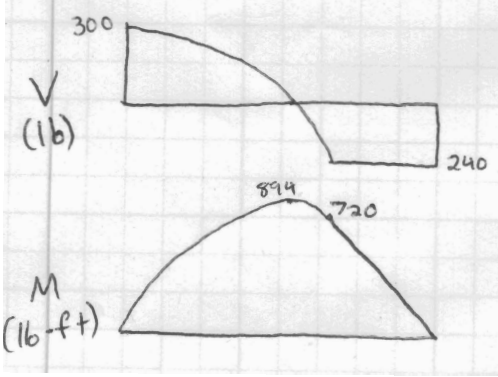
$$\Sigma M_{A\circlearrowleft} = 0 = B_y(9') - 540\,lb(4')$$

→ $B_y = 240\,lb\uparrow$

$$\Sigma F_y = 0 = A_y + B_y - 540\,lb$$

→ $A_y = 300\,lb\uparrow$

$$\Sigma F_x = 0 = A_x$$



A → C

$$V(x) = 300 - \int_0^x 30x\,dx$$

→ $V(x) = 300 - 15x^2$

$$M(x) = \int_0^x 300 - 15x^2\,dx$$

→ $M(x) = 300x - 5x^3$

C → B

→ $V(x) = -240\,lb$

→ $M(x) = 720 - 240x$

$M(c)$

checks

~ V-diagram

$\frac{dV}{dx} = -w(x)$ (A→C) neg. slope

$\frac{d^2V}{dx^2} = \frac{-dw}{dx}$ (A→C) concave down

~ M-diagram

$\frac{dM}{dx} = V(x)$ (A→C) pos., then neg. slope (C→B) neg. slope

$\frac{d^2M}{dx^2} = \frac{dV}{dx}$ (A→C) concave down