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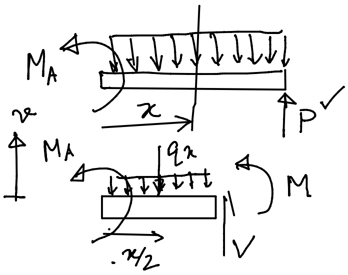
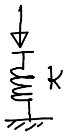


$k = \frac{48EI}{L^3}$

$P = k\Delta$

$\Delta = -v(L)$

$P = qL, \quad M_A + PL = \frac{qL^2}{2}$

$M_A = -\frac{qL^2}{2}$

$v'(0) = 0$

$\cancel{v(0) = 0}$

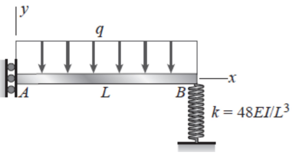
$-\frac{qx^2}{2} + M_A + Vx + M = 0, \quad V = qx.$

$EIv'' = M = \frac{qL^2}{2} + \frac{qx^2}{2} - Vx = \frac{qL^2}{2} - \frac{qx^2}{2}$

$v' = \frac{qL^2}{2}x - \frac{qx^3}{6} + \cancel{C_1} \to 0$

$v = \frac{qL^2x^2}{4} - \frac{qx^4}{24} + \cancel{C_1}x + C_2$ ($C_1 \to 0$)

$-kv(L) = \left(\frac{qL^4}{4} - \frac{qL^4}{24} + C_2\right)k = P$



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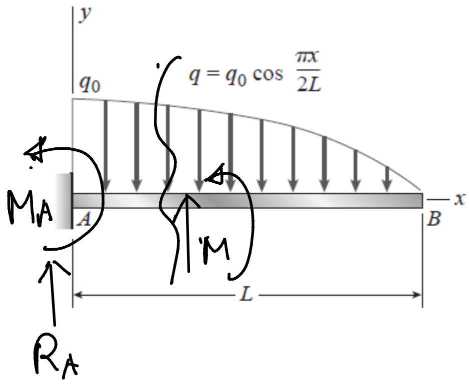


$$V + R_A = \int_0^x q_0 \cos \frac{\pi x}{2L}\, dx = q_0 \sin \frac{\pi x}{2L} \Big|_0^x \Big/ \frac{\pi}{2L}$$

$$M_A + Vx + M = \int_0^x \left(q_0 \cos \frac{\pi \xi}{2L}\right) \xi\, d\xi$$

$$M = -\left(M_A + Vx\right) + \int_0^x q_0 \cos \frac{\pi \xi}{2L}\, d\xi$$

$$= -M_A - Vx$$

$$+ \left[ \xi \int_0^x q_0 \frac{\cos \pi \xi}{2L}\, d\xi - \int q_0 \times \frac{2L}{\pi} \sin \frac{\pi \xi}{2L}\, d\xi \right]_0^x$$

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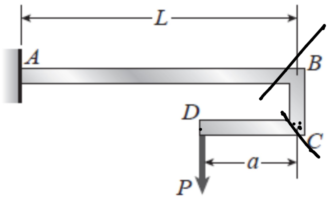
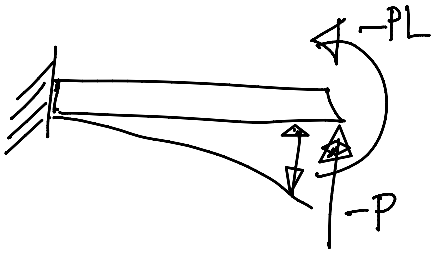
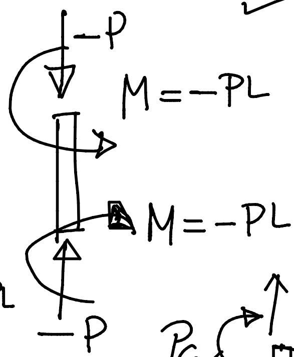
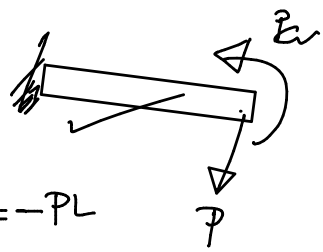


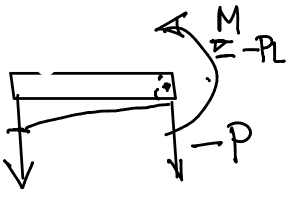



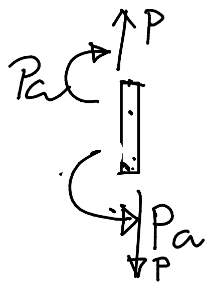

$M+PL=0$

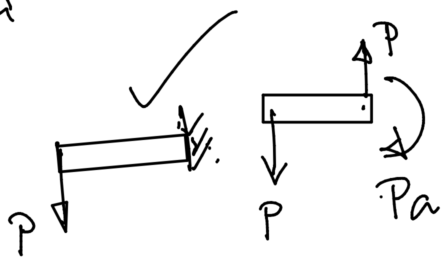
$$\Delta_{axial} = \frac{PL}{EA} = a^2$$

$$\Delta_{bend} = \frac{PL^3}{EI} \sim a^4$$

P



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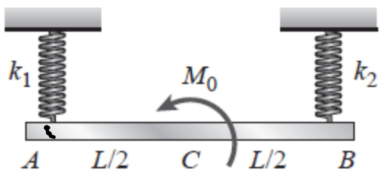


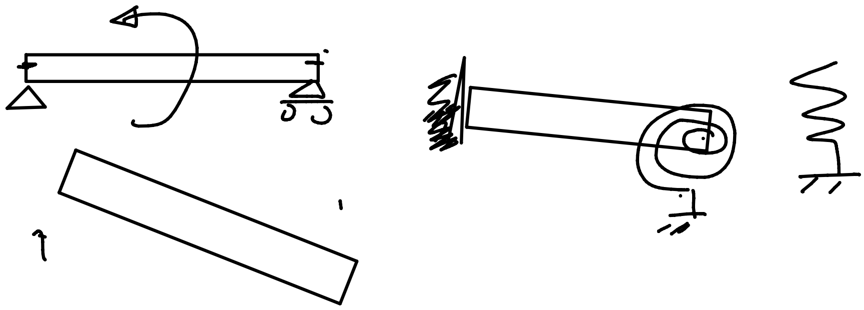

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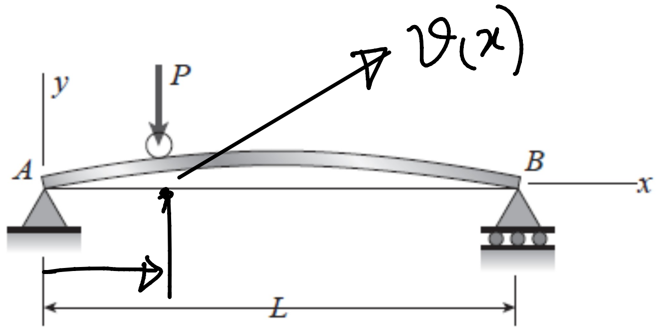


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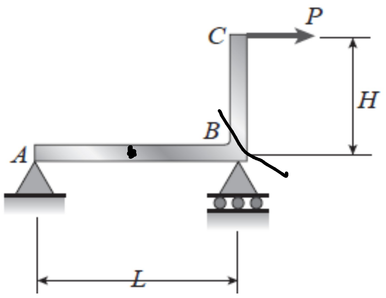


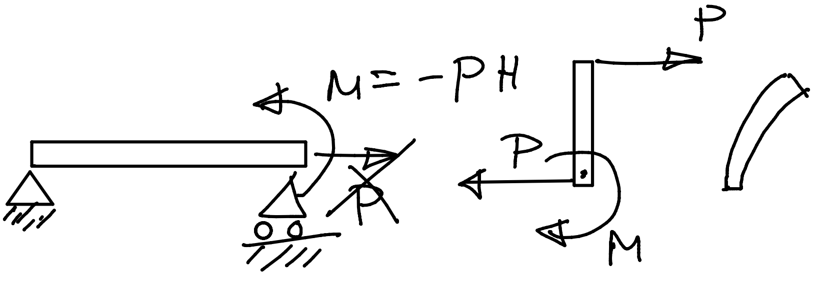


$$-(M+PH)=0$$

$$M=-PH$$

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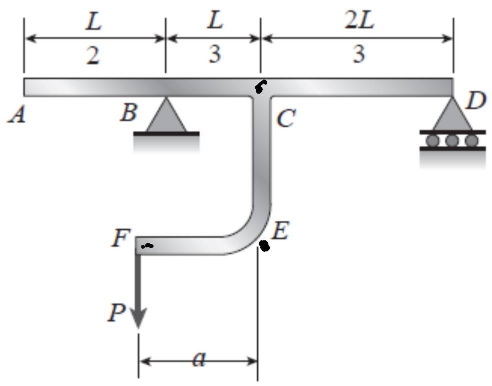


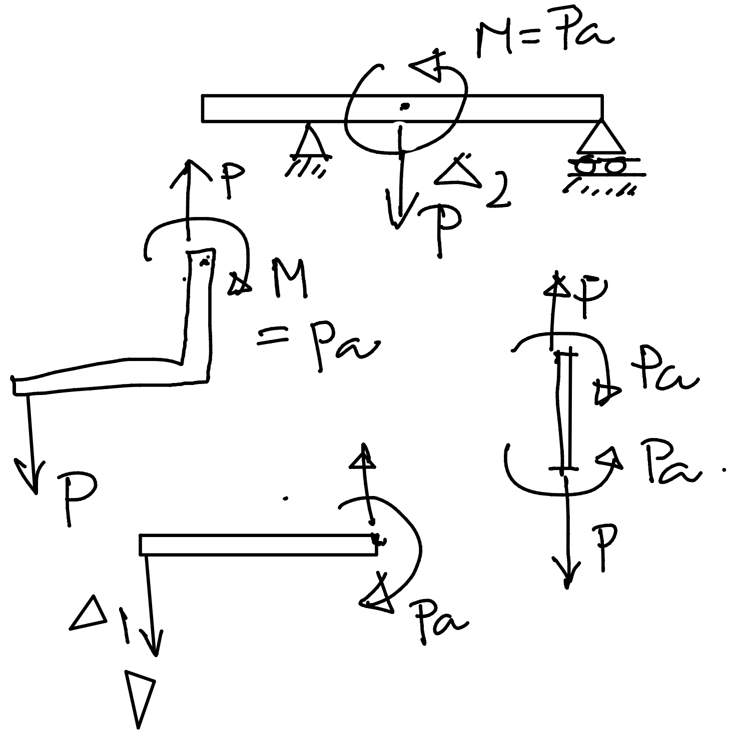


$\Delta_1 + \Delta_2$

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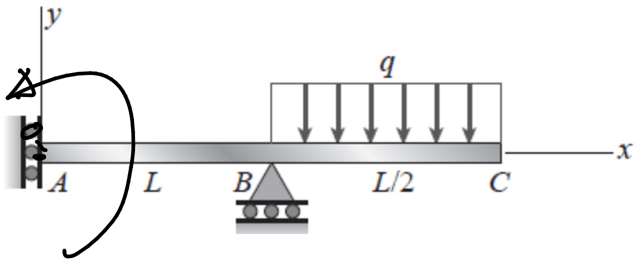
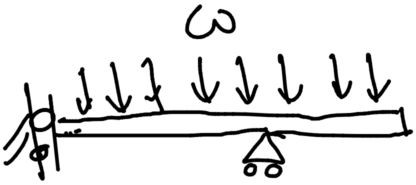
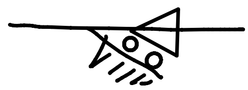



$v'(0) = 0$

$v(L) = 0$



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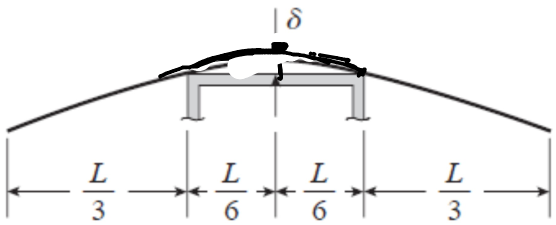
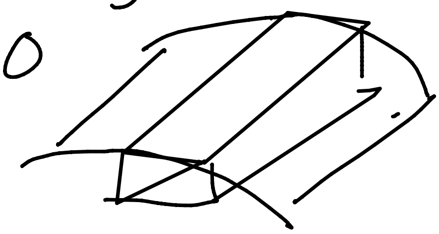



horizontal

$v'(0) = 0$



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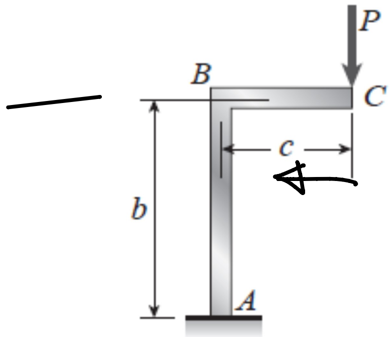


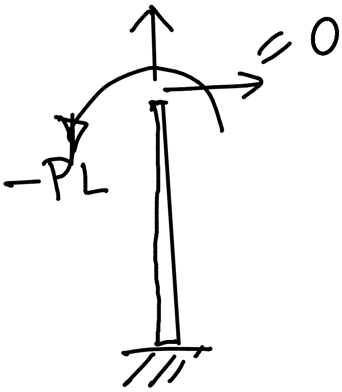


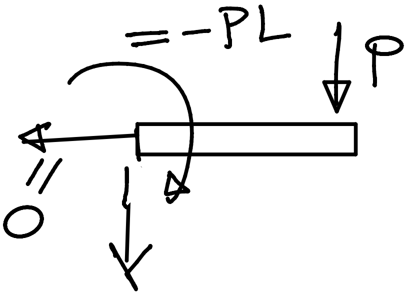


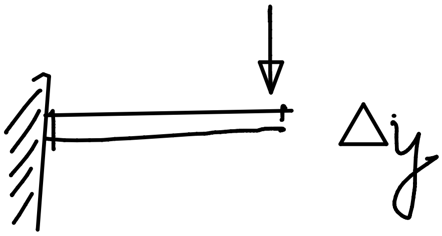


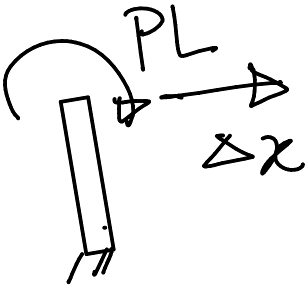

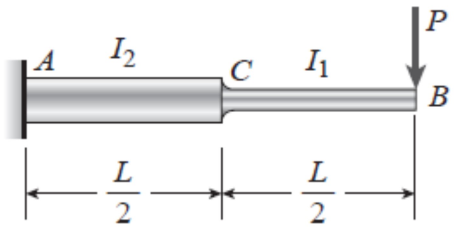


$$v'' = \frac{M(x)}{EI_2} \quad AC$$

$$= \frac{M(x)}{EI_1} \quad CB$$

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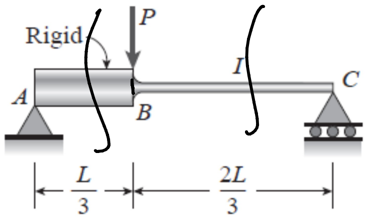
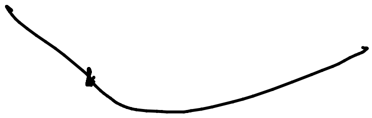



$V(x)$

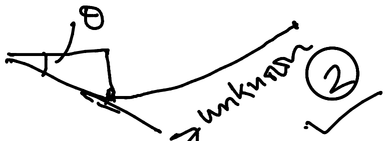
$M(x)$



$EI_1 v'' = M(x)$ AB

$v(L) = 0$ (1)

$v$




$\frac{L}{3} \times \theta = v\left(\frac{L}{3}\right)$

$v'\left(\frac{L}{3}\right) = \theta$

$\frac{\theta L}{3} = f\left(\frac{L}{3}\right) + C_1 \frac{L}{3} + C_2$ (2)

$\theta = g\left(\frac{L}{3}\right) + C_1$ (3)

$EIv'' = M(x)$ BC.

$v' = g(x) + C_1$

$v = f(x) + C_1 x + C_2$

$x = \frac{L}{3}$ $v'\left(\frac{L}{3}\right)$

$v\left(\frac{L}{3}\right)$

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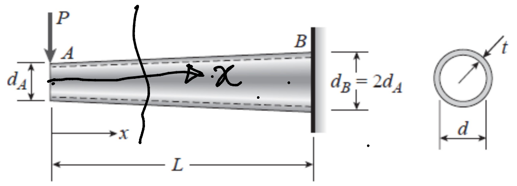



$$d = \frac{d_A}{L}(L + x)$$

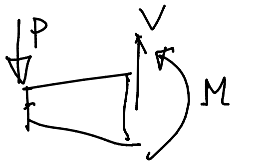
$$I = \frac{\pi t d^3}{8} = \frac{\pi t d_A^3}{8L^3}(L + x)^3 = \frac{I_A}{L^3}(L + x)^3$$

$$v'(L) = 0$$

$$v(L) = 0$$

$$EI v'' = M(x)$$

$$v'' = \frac{M(x)}{EI(x)}$$




$V = P$

$Vx + M = 0$

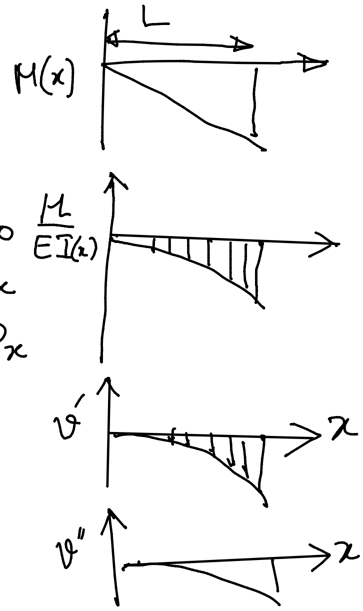
$M = -Vx$

$= -Px$

$$v'' = -\frac{Px}{\frac{EI_A}{L^3}(L+x)^3}$$

$v'$

$v$



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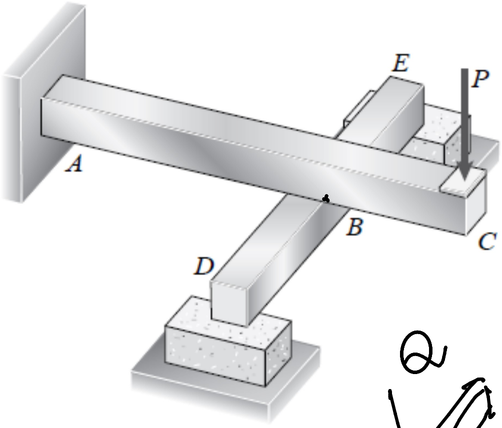


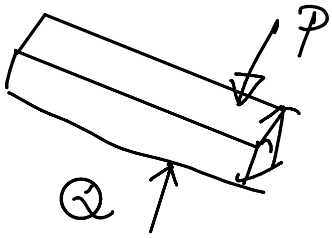


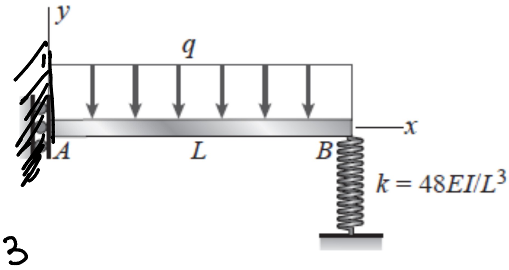


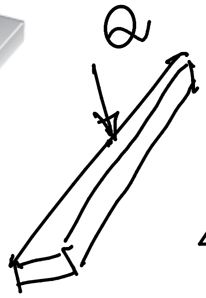


$$\Delta = \frac{QL^3}{\alpha EI} \qquad Q = \frac{\alpha EI}{L^3}\Delta = K\Delta$$

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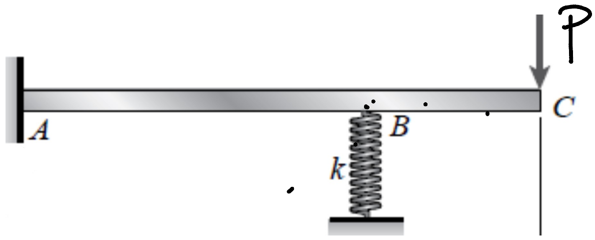
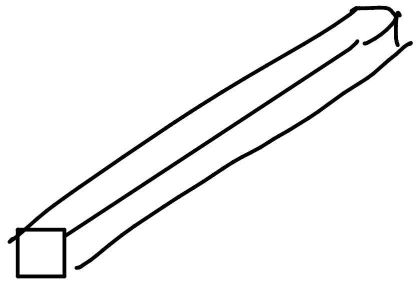



$$\Delta_c = \frac{PL^3}{3EI}$$

$$K = \frac{\alpha EI}{L^3}$$



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