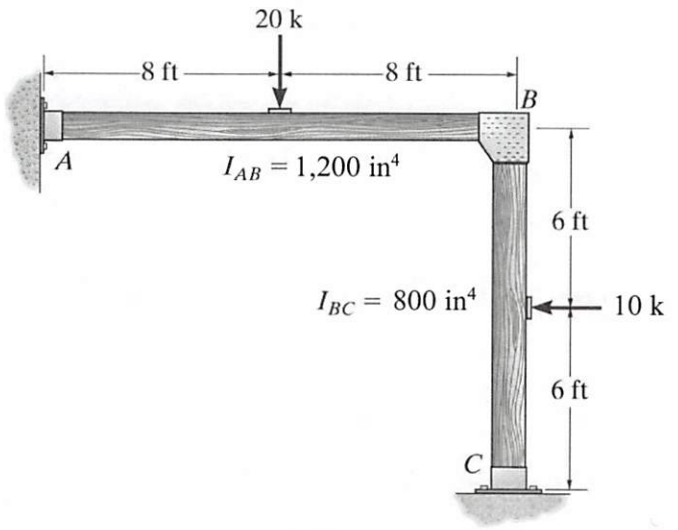
CIVL 4122 Quiz #5 F25 Name: _____ 1/2

Determine the moments at the supports. Assume *A* and *C* are fixed, and *E* is constant.



$$FEM_{AB} = \frac{PL}{8} = \frac{20^k(16ft)}{8} = \pm 40kft$$

$$FEM_{BC} = \frac{PL}{8} = \frac{10^k(12ft)}{8} = \pm 15kft$$

$$I_{AB} = 1{,}200\ in^4 = 3/2\ I_{BC}$$

$$I_{BC} = 800\ in^4$$

$$M_{AB} = \frac{2E(3/2\ I_{BC})}{L_{AB}}\left[\theta_B\right] - 40kft \quad (1)$$

$$M_{BA} = \frac{2E(3/2\ I_{BC})}{L_{AB}}\left[2\theta_B\right] + 40kft \quad (2)$$

JOINT B

$$M_{BA} + M_{BC} = 0 \quad (5)$$

$$M_{BC} = \frac{2EI_{BC}}{L_{BC}}\left[2\theta_B\right] - 15kft \quad (3)$$

$$M_{CB} = \frac{2EI_{BC}}{L_{BC}}\left[\theta_B\right] + 15kft \quad (4)$$

$$(5)\ M_{BA} + M_{BC} = 0 = \frac{2E(3/2\ I_{BC})}{16'}\left[2\theta_B\right] + 40kft + \frac{2EI_{BC}}{12'}\left[2\theta_B\right] - 15kft$$

$$\Rightarrow \frac{17}{24}\theta_B = -\frac{25kft^2}{EI_{BC}}$$

$$\theta_B = -\frac{600kft^2}{17EI_{BC}}$$

$$M_{AB} = \frac{2E(3/2\, I_{BC})}{16'}[\theta_B] - 40\text{k ft} = \underline{-46.62\text{k ft}}$$

$$M_{BA} = \frac{2E(3/2\, I_{BC})}{16'}[2\theta_B] + 40\text{k ft} = \underline{26.76\text{k ft}}$$

$$M_{BC} = \frac{2EI_{BC}}{12'}[2\theta_B] - 15\text{k ft} = \underline{-26.76\text{k ft}}$$

$M_{BA} + M_{BC} = 0$

$$M_{CB} = \frac{2EI_{BC}}{12'}[\theta_B] + 15\text{ k ft} = \underline{9.12\text{k ft}}$$