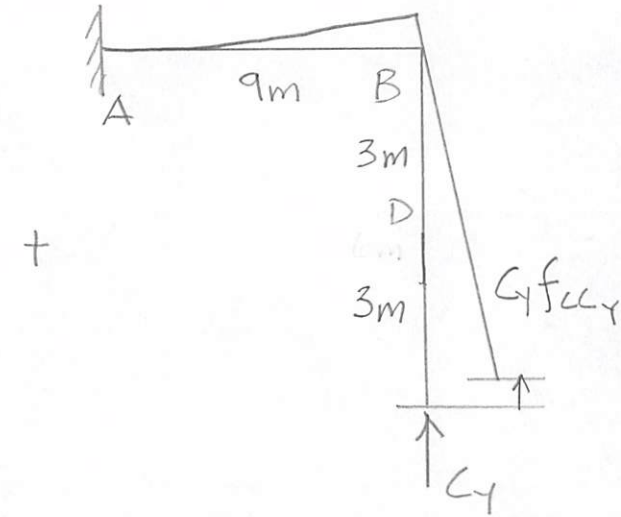
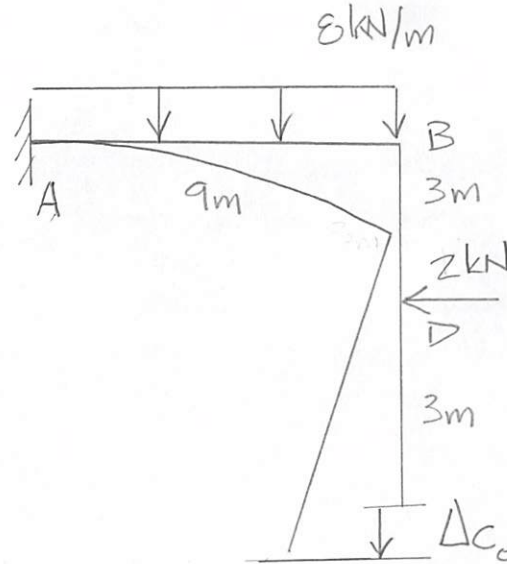
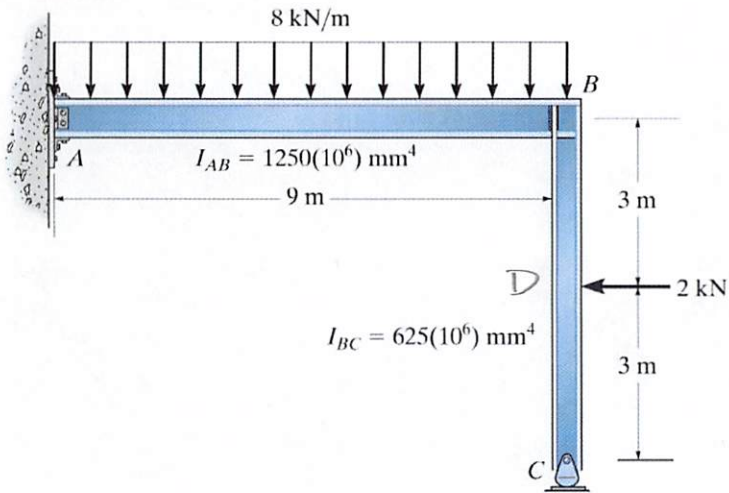


**Problem 9-19** - Determine the reactions at the fixed support A and rocker C. The moment of inertia of each segment is listed in the figure. Take  $E=200\text{ GPa}$ .

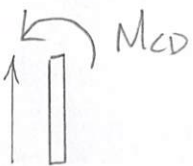


$$\Delta C_y = 0 = \Delta C_0 + C_y f_{C_y}$$

\* VIRTUAL WORK FOR DISPLACEMENTS

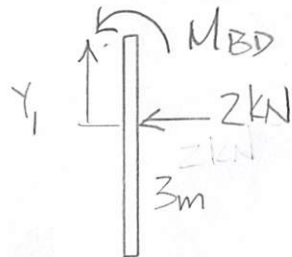
REAL MOMENTS

SECTION CD



$$\sum M_{cut} = 0 = M_{CD}$$

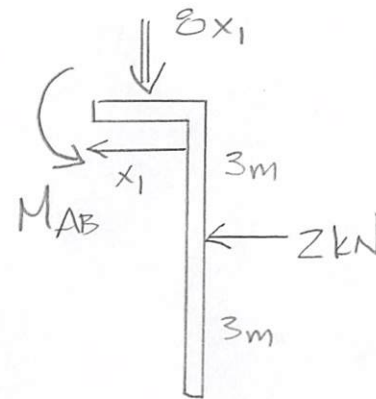
SECTION BD



$$\sum M_{cut} = 0 = M_{BD} - 2y_1$$

$$M_{BD} = [2y_1] \text{ kNm}$$

SECTION AB



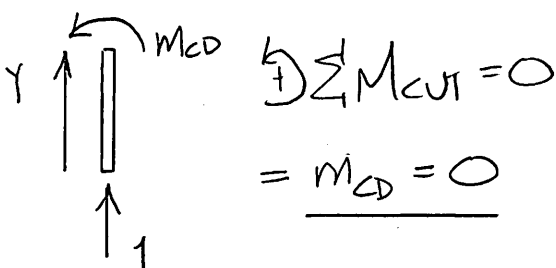
$$\begin{aligned} \sum M_{cut} &= 0 \\ &= M_{AB} - 8x_1 \left( \frac{x_1}{2} \right) - 2(3\text{m}) \end{aligned}$$

$$M_{AB} = [4x_1^2 + 6] \text{ kNm}$$

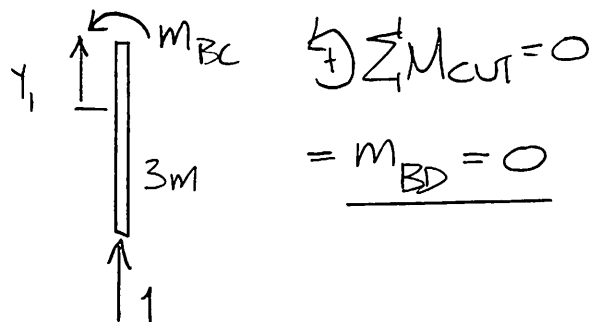
**Problem 9-19** - Determine the reactions at the fixed support A and rocker C. The moment of inertia of each segment is listed in the figure. Take  $E=200\text{ GPa}$ .

## VIRTUAL MOMENTS

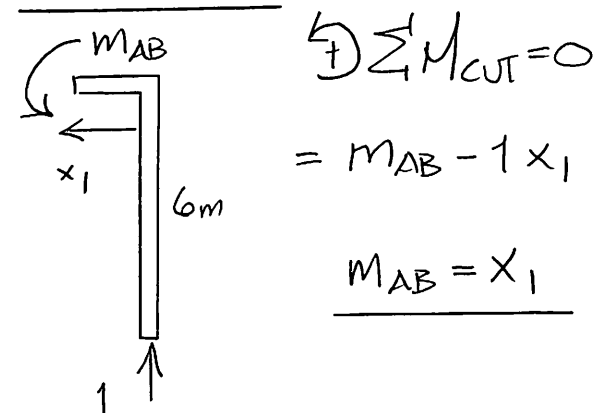
### SECTION CD



### SECTION BD



### SECTION AB

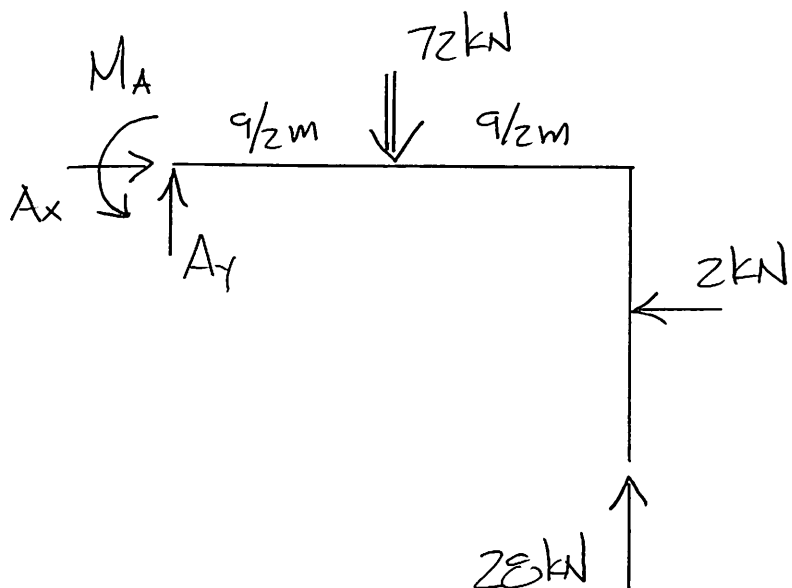


$$\Delta C_o = \frac{1}{EI_{AB}} \int_0^9 [4x_1^2 + 6][x_1] dx_1 = \frac{1}{EI_{AB}} \left[ x_1^4 + 3x_1^3 \right]_0^9 = \frac{6,804 \text{ kNm}^3}{EI_{AB}}$$

$$f_{C_y} = \frac{1}{EI_{AB}} \int_0^9 (x_1)^2 dx_1 = \frac{x_1^3}{3} \Big|_0^9 = \frac{243 \text{ m}^3}{EI_{AB}}$$

$$\Delta C_o = C_y f_{C_y} \quad C_y = \frac{\Delta C_o}{f_{C_y}} = \underline{\underline{28 \text{ kN}}}$$

**Problem 9-19** - Determine the reactions at the fixed support A and rocker C. The moment of inertia of each segment is listed in the figure. Take  $E=200\text{ GPa}$ .



$$\curvearrowleft \sum M_A = 0 = M_A - 72\text{ kN}(4.5\text{ m}) - 2\text{ kN}(3\text{ m}) + 28\text{ kN}(9\text{ m})$$

$$\underline{\underline{M_A = 78\text{ kNm}}}$$

$$+\uparrow \sum F_y = 0 = A_y - 72\text{ kN} + 28\text{ kN}$$

$$\underline{\underline{A_y = 44\text{ kN}}}$$

$$+\rightarrow \sum F_x = 0 = A_x - 2\text{ kN}$$

$$\underline{\underline{A_x = 2\text{ kN}}}$$