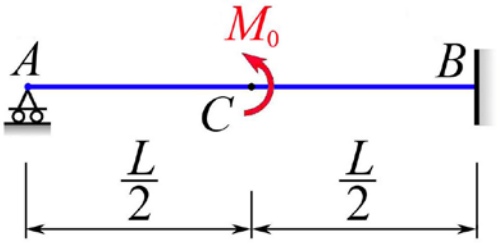
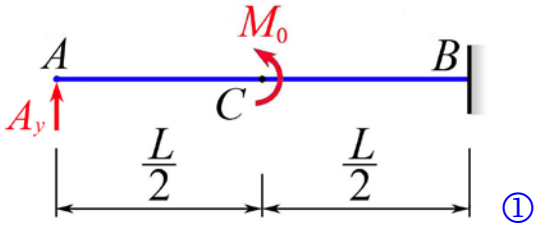
MEEG 3013 Quiz #9.m23.092

A beam with constant flexural rigidity *EI* is supported and loaded by a moment $\mathbf{M}_0$ as shown. Using *method of model formulas*, determine for this beam (*a*) the reaction $\mathbf{A}_y$ at *A*, (*b*) the slope θ_A at *A*, (*c*) the deflection y_C at *C*.





①

$$0 = \theta_A + \frac{A_y L^2}{2EI} + 0 - 0 + \frac{-M_0}{EI}\left(L - \frac{L}{2}\right) - 0 - 0 + 0 + 0 + 0 - 0 \quad ②$$

$$0 = 0 + \theta_A L + \frac{A_y L^3}{6EI} + 0 - 0 + \frac{-M_0}{2EI}\left(L - \frac{L}{2}\right)^2 - 0 - 0 + 0 + 0 + 0 - 0 \quad ②$$

$$A_y = \frac{9M_0}{8L} \qquad \mathbf{A}_y = \frac{9M_0}{8L}\uparrow \quad ① \qquad \theta_A = -\frac{M_0 L}{16EI} \qquad \theta_A = \frac{M_0 L}{16EI}\circlearrowright \quad ①$$

$$y_C = y\big|_{x=L/2}$$

$$= 0 + \theta_A\left(\frac{L}{2}\right) + \frac{A_y}{6EI}\left(\frac{L}{2}\right)^3 + 0 - 0 + 0 - 0 - 0 + 0 + 0 + 0 - 0 \quad ②$$

$$y_C = -\frac{M_0 L^2}{128EI} \qquad y_C = \frac{M_0 L^2}{128EI}\downarrow \quad ①$$