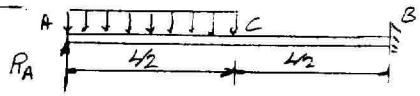
10.133




PORTION AB: $M = R_A x - \frac{1}{2} w x^2$; $\partial M/\partial R_A = x$

PORTION CB: $M = R_A x - \frac{1}{2} wL\left(x - \frac{L}{4}\right)$; $\partial M/\partial R_A = x$

$$y_A = \frac{1}{EI}\int M \frac{\partial M}{\partial R_A} ds = \frac{1}{EI}\int_0^{L/2}\left(R_A x - \frac{1}{2} w x^2\right) x\, dx + \frac{1}{EI}\int_{L/2}^{L}\left(R_A x - \frac{1}{2} wL x + \frac{1}{8} wL^2\right) x\, dx = 0$$

$$y_A = \frac{1}{EI}\left[\int_0^{L/2}\left(R_A x^2 - \frac{1}{2} w x^3\right) dx + \int_{L/2}^{L}\left(R_A x^2 - \frac{1}{2} wL x^2 + \frac{1}{8} wL^2 x\right) dx\right] = 0$$

MULTIPLY BY EI:

$$\left|\frac{R_A}{3} x^3 - \frac{w}{8} x^4\right|_0^{L/2} + \left|\frac{R_A}{3} x^2 - \frac{wL}{6} x^3 + \frac{wL^2}{16} x^2\right|_{L/2}^{L} = 0$$

$$\frac{R_A}{3}\frac{L^3}{8} - \frac{w}{8}\frac{L^4}{16} + \left(\frac{R_A}{3} L^3 - \frac{wL}{6} L^4 + \frac{wL}{16} L^4\right) - \left(\frac{R_A}{3}\frac{L^2}{4} - \frac{wL}{6}\frac{L^3}{8} + \frac{wL^2}{16}\frac{L^2}{4}\right) = 0$$

$$\frac{R_A L^3}{3} + wL^4\left(-\frac{1}{128} - \frac{1}{6} + \frac{1}{16} + \frac{1}{48} - \frac{1}{64}\right) = 0$$

$$\frac{R_A L^3}{3} - wL^4\left(\frac{41}{384}\right) = 0$$

$$R_A = \frac{41}{128} wL \uparrow$$

BENDING-MOMENT DIAGRAM