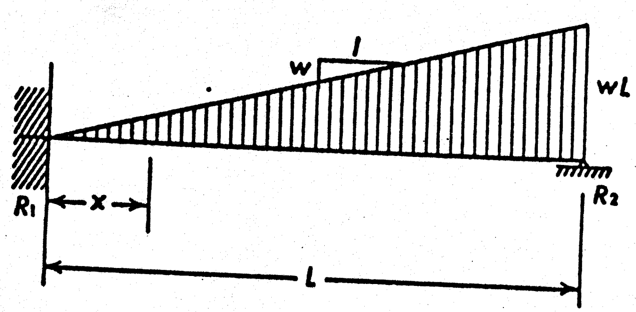
BEAM FORMULAS

Case 1[illegible]

BEAM FIXED AT ONE END, SUPPORTED AT OTHER UNIFORMLY VARYING LOAD



$$R_1 = \frac{9wL^2}{40}$$

$$R_2 = \frac{11wL^2}{40}$$

$$M_1 = M_{max.\ negative} = -\frac{7wL^3}{120}$$

$$\text{at } x = \frac{3L}{2\sqrt{5}} = 0.6708L$$

$$M_{max.\ positive} = \frac{wL^3}{120\sqrt{5}}(27 - 7\sqrt{5}) = 0.04229wL^3$$

$$\text{at } x = 0.5975L$$

$$\Delta_{max.} = -0.003048\frac{wL^5}{EI}$$

when $0 < x < L$

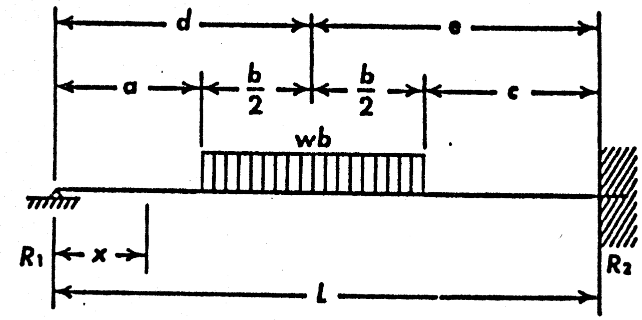
$$M_x = M_1 + R_1x - \frac{wx^3}{6}$$

$$\Delta_x = \frac{x^2}{120EI}(60M_1 + 20R_1x - wx^3)$$

BEAM FORMULAS

Case 7

BEAM FIXED AT ONE END, SUPPORTED AT OTHER UNIFORM LOAD PARTIALLY DISTRIBUTED



$$R_1 = \frac{wb}{8L^3}(12e^2L - 4e^3 + b^2d)$$

$$R_2 = wb - R_1$$

$$M_2 = M_{max.\ negative} = \frac{wb}{8L^2}(12e^2L - 4e^3 + b^2d - 8eL^2)$$

$$\text{at } x = a + \frac{R_1}{w}$$

$$M_{max.\ positive} = R_1\left(a + \frac{R_1}{2w}\right)$$

when $0 < x < a$

$$M_x = R_1x$$

$$\Delta_x = \frac{x}{24EI}[4R_1(x^2 - 3L^2) + wb(b^2 + 12e^2)]$$

when $a < x < (a+b)$

$$M_x = R_1x - \frac{w}{2}(x-a)^2$$

$$\Delta_x = \frac{1}{24EI}[4R_1x(x^2 - 3L^2) + wbx(b^2 + 12e^2) - w(x-a)^4]$$

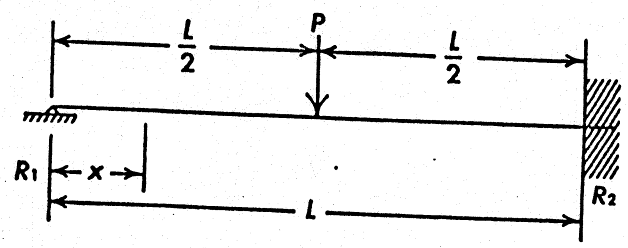
when $(a+b) < x < L$

$$M_x = R_1x - wb(x-d)$$

$$\Delta_x = \frac{1}{6EI}[3M_2(L-x)^2 + R_2(L-x)^3]$$

simple

BEAM FIXED AT ONE END, SUPPORTED AT OTHER CONCENTRATED LOAD AT CENTER



$$R_1 = \frac{5P}{16}$$

$$R_2 = \frac{11P}{16}$$

$$M_2 = M_{max.\ negative} = -\frac{3PL}{16}$$

at $x = \frac{L}{2}$

$$M_{max.\ positive} = \frac{5PL}{32}$$

$$\Delta = -\frac{7PL^3}{768EI}$$

when $x = \frac{L}{\sqrt{5}} = 0.4472L$

$$\Delta_{max.} = -0.009317\frac{PL^3}{EI}$$

when $0 < x < \frac{L}{2}$

$$M_x = \frac{5Px}{16}$$

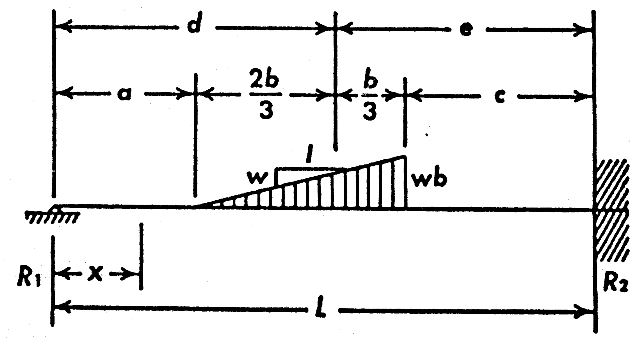
$$\Delta_x = \frac{Px}{96EI}(5x^2 - 3L^2)$$

when $\frac{L}{2} < x < L$

$$M_x = \frac{P}{16}(8L - 11x)$$

$$\Delta_x = \frac{P}{96EI}(L-x)^2(2L-11x)$$

BEAM FIXED AT ONE END, SUPPORTED AT OT UNIFORMLY VARYING LOAD PARTIALLY DISTRIBUTED



$$R_1 = \frac{wb^2}{1080L^3}[45ab^2 + 28b^3 + 270e^2(2L+d)]$$

$$R_2 = \frac{wb^2}{2} - R_1$$

$$M_2 = M_{max.\ negative} = R_1L - \frac{wb^2e}{2}$$

at $x = a + \sqrt{\frac{2R_1}{w}}$

$$M_{max.\ positive} = R_1\left(a + \frac{2}{3}\sqrt{\frac{2R_1}{w}}\right)$$

when $0 < x < a$

$$M_x = R_1x$$

$$\Delta_x = \frac{x}{72EI}[12R_1(x^2 - 3L^2) + wb^2(b^2 + 18e^2)]$$

when $a < x < (a+b)$

$$M_x = R_1x - \frac{w}{6}(x-a)^3$$

$$\Delta_x = \frac{1}{360EI}[60R_1(x^2 - 3L^2)x + 5wb^2(b^2 + 18e^2)x - 3w(x-a)^5]$$

when $(a+b) < x < L$

$$M_x = R_1x - \frac{wb^2}{2}(x-d)$$

$$\Delta_x = \frac{1}{6EI}[3M_2(L-x)^2 + R_2(L-x)^3]$$