(a) total load.

\[ 18 \text{ ft} \times 3 \text{ kip/ft} = 27 \text{ kip} \]

\[ \Sigma M_A = 13y = 18 - 27(18^{3/2}) = 0 \quad \Rightarrow \quad By = 18 \text{ kip} \]

\[ V(x) = 9 - \int_0^x x \cdot \frac{3}{18} \, dx = 9 - \frac{x^2}{12} \quad (0, 18) \]

\[ M(x) = \int_0^x V(x) \, dx = 9x - \frac{x^3}{36} + C \]

when \( x = 0 \), \( M(x) = 0 \) \quad \Rightarrow \quad C = 0

\[ M(x) = 9x - \frac{x^3}{36} \]
Under cruising conditions the distributed load acting on the wing of a small airplane has the idealized variation illustrated below.

\[ W_1(x) = 0 \times 10 + 1600 \]
\[ W_1(0) = 1600 = 1b \]
\[ W_1(0.6) = 900 = 0(2.6) + 1600 \]
\[ a = \frac{-300}{2.6} \]
\[ W_2(x) = -\frac{300x}{0.6} + 1600 \]

where we consider \( W(x) \) positive upwards for this case.

1a) Determine the reactions (shear force and bending moment) at the inboard end of the wing.

\[ \Sigma M_A = 0 \]
\[ -M_A + 900(5.2)(2.6) + \frac{700(2.6)(2.6)}{2} + \frac{900}{2} \left(52 + \frac{1}{3}\right) = 0 \]
\[ M_A = 15446.7 \text{ Nm} \] or \[ M_A = 15.4 \text{ KN.m} \]

\[ \Sigma F_y = 0 \]
\[ R_A = \left(900(5.2) + \frac{700(2.6)}{2} + 900\right) \]
\[ R_A = 6040 \text{ N} \] or \[ R_A = 6.04 \text{ kN} \]

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Here I solved this problem using different methods!!

1b) Determine an expression for the shear force \( V_1(x) \) and bending moment \( M_1(x) \) valid for \( 0 < x < 2.6 \) m.

1c) Determine an expression for the shear force \( V_2(x) \) and bending moment \( M_2(x) \) valid for \( 2.6 < x < 5.2 \) m.

1d) Determine an expression for the shear force \( V_3(x) \) and bending moment \( M_3(x) \) valid for \( 5.2 < x < 6.2 \) m.

\[ \frac{dV_1(x)}{dx} = V_1(x) \]
\[ V_1(x) - V_1(0) = \int_0^x W(y) \, dy = \int_0^x \left(\frac{300x}{2.6} + 1600\right) \, dx = \frac{300x^2}{2.6} + 1600x \]
\[ V_1(x) = 184.6x^2 + 1600x - 6040 \text{ kN} \]
\[ \frac{dM_1(x)}{dx} = V_1(x) \]
\[ M_1(x) = M_1(0) + \int_0^x V_1(y) \, dy = M_1(0) - 184.6x^3 + 1600x^2 - 6040x \]
\[ M_1(x) = 44.8x^3 + 800x^2 - 6040x + 15446.7 \text{ kNm} \]

\[ \Sigma F_y = 0 \Rightarrow V_2(x) = 900(5.2 - x) + \frac{900}{2} = 5130 - 900x \]
\[ V_2(x) = +900x - 5130 \text{ kN} \]

\[ \Sigma M_A = 0 \Rightarrow M_2(x) - V_2(x)(5.2 - x) + \frac{900(5.2 - x)^2}{2} = 0 \]
\[ M_2(x) = -900x + 5130(5.2 - x) + 450(5.2 - x)^2 - 150 \]
or \( V(x) = V_0 \) or \( V_3(x) = 900 (1-x_3)^2 \)

or \( V_3(x) = 450 (6.2 - x)^2 \)

where \( x = 5.2 + x_3 \) or \( x_3 = x - 5.2 \)

\[ M_3(x) = +150(6.2 - x)^3 \]

**d) draw the shear and bending moment diagrams**