BEAMS

SHEAR & MOMENT DIAGRAM RULES OF THUMB
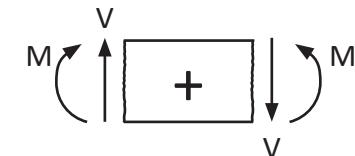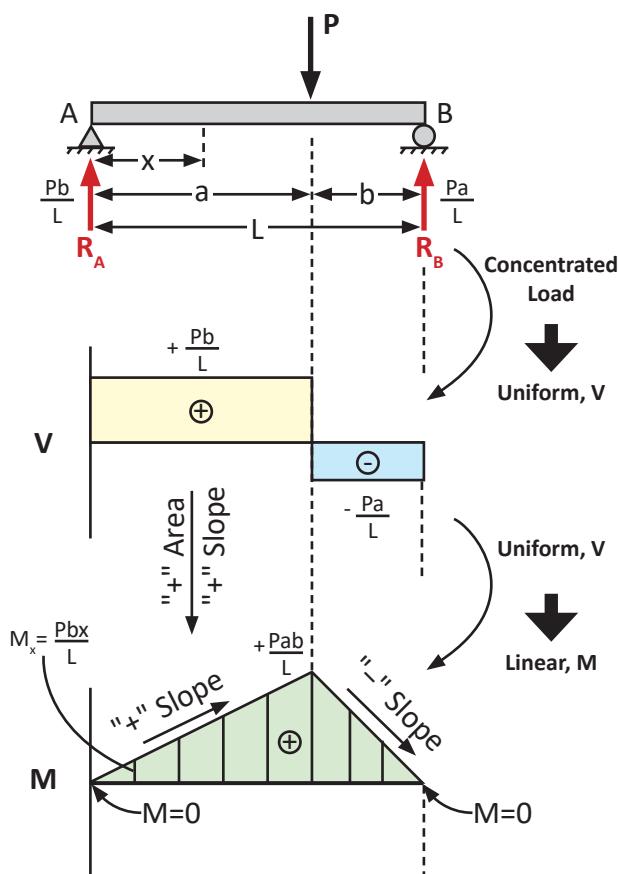
CONCENTRATED LOAD	UNIFORM DISTRIBUTED LOAD	TRIANGULAR DISTRIBUTED LOAD

CONCENTRATED LOAD

P

$\frac{Pb}{L}$ a b $\frac{Pa}{L}$

L

R_A R_B

Concentrated Load ↓ **Uniform, V**

$+\frac{Pb}{L}$ ⊕

V

⊖ $-\frac{Pa}{L}$

Uniform, V ↓ **Linear, M**

"+" Area "+" Slope

$M_x = \frac{Pbx}{L}$ $+\frac{Pab}{L}$

"+" Slope "−" Slope

M ⊕

$M=0$ $M=0$
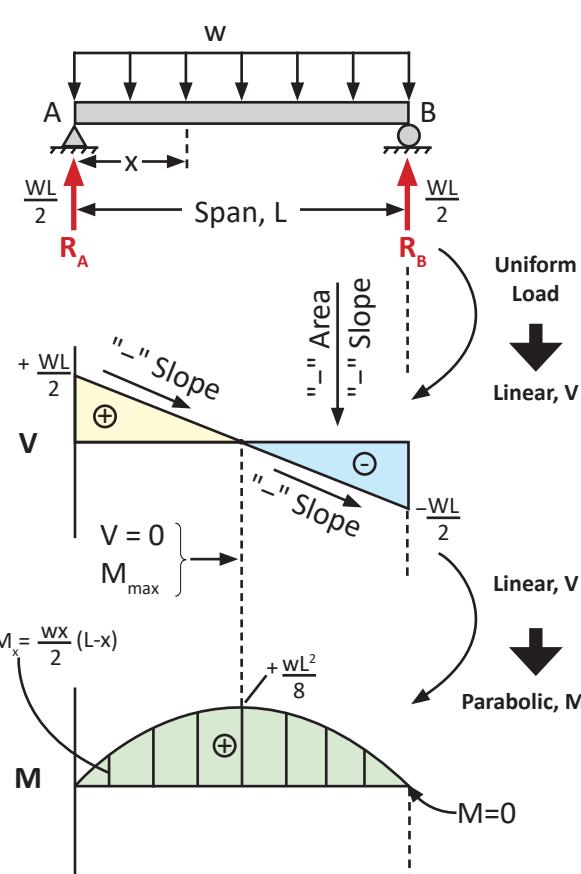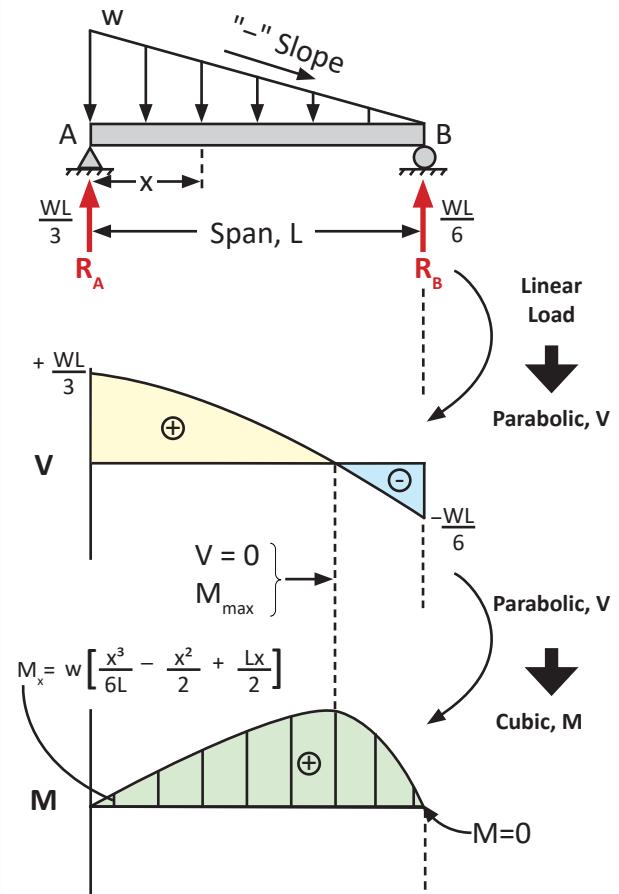
When Shear V, crosses axis (V=0), than local min or max, M

UNIFORM DISTRIBUTED LOAD

w

$\frac{WL}{2}$ ←— Span, L —→ $\frac{WL}{2}$

R_A R_B

Uniform Load ↓ **Linear, V**

$+\frac{WL}{2}$ "−" Slope "−" Area "−" Slope

V ⊕

⊖ $-\frac{WL}{2}$

"−" Slope

$V = 0$
M_{max} →

Linear, V ↓ **Parabolic, M**

$M_x = \frac{wx}{2}(L-x)$ $+\frac{wL^2}{8}$

M ⊕

$M=0$

* **Note**
"−" Slope, V ⇨ Concave, M
"+" Slope, V ⇨ Convex, M

TRIANGULAR DISTRIBUTED LOAD

w "−" Slope

$\frac{WL}{3}$ ←— Span, L —→ $\frac{WL}{6}$

R_A R_B

Linear Load ↓ **Parabolic, V**

$+\frac{WL}{3}$

V ⊕

⊖ $-\frac{WL}{6}$

$V = 0$
M_{max} →

Parabolic, V ↓ **Cubic, M**

$M_x = w\left[\frac{x^3}{6L} - \frac{x^2}{2} + \frac{Lx}{2}\right]$

M ⊕

$M=0$

* **Note**
"−" Slope, w ⇨ Concave, V
"+" Slope, w ⇨ Convex, V