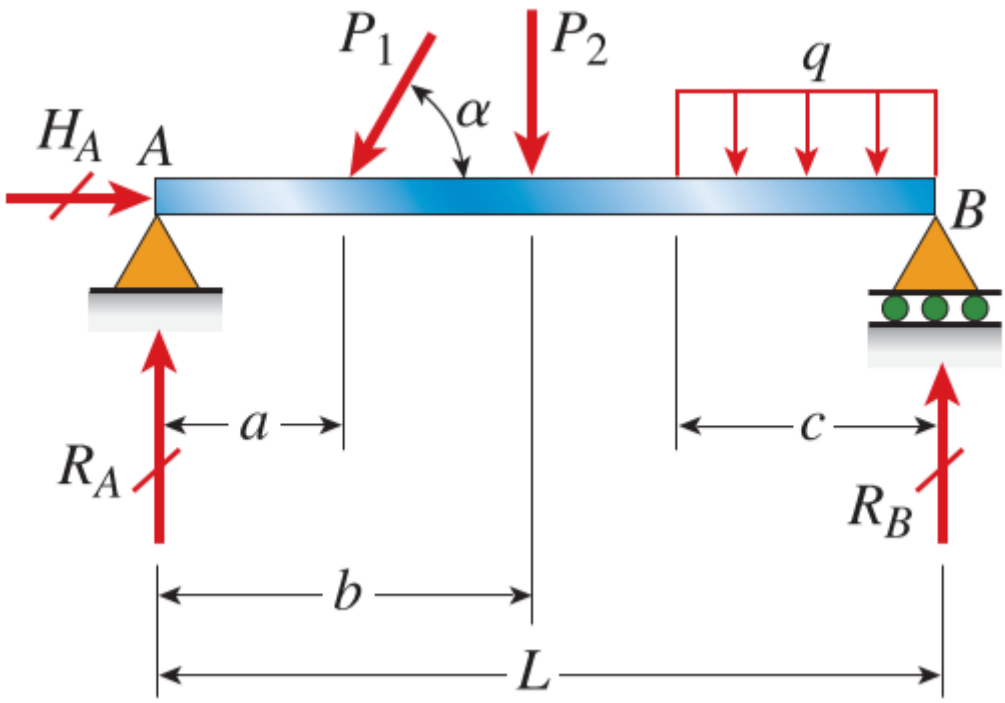
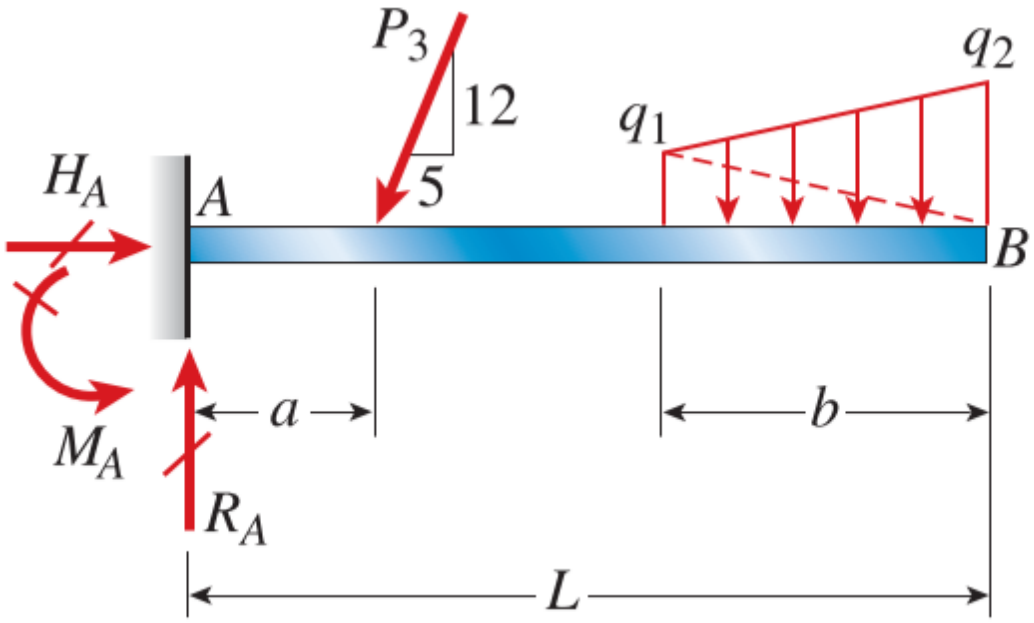
CH_4

4.1 Types if Beams, Loads and Reactions

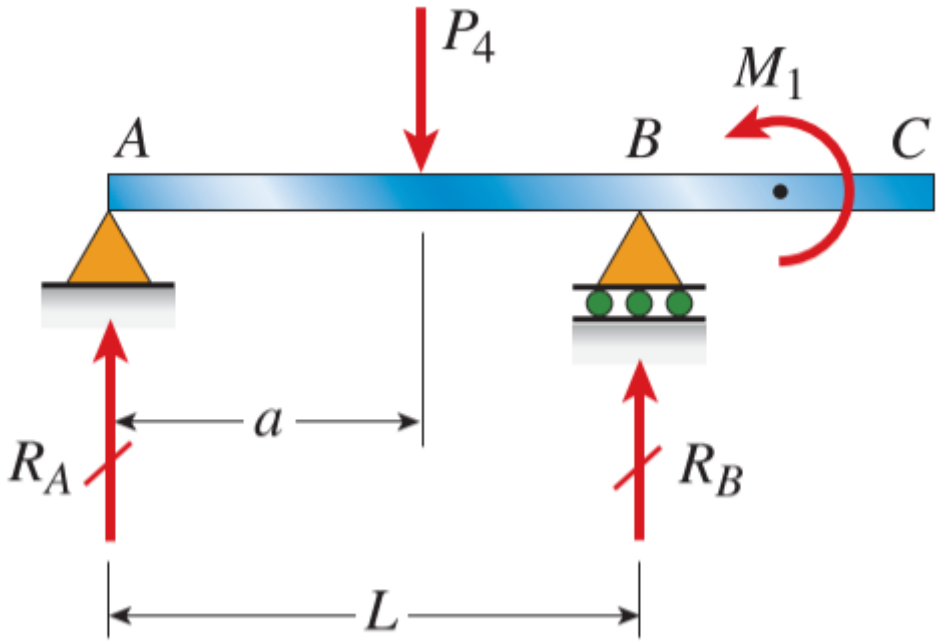
Simple Beam



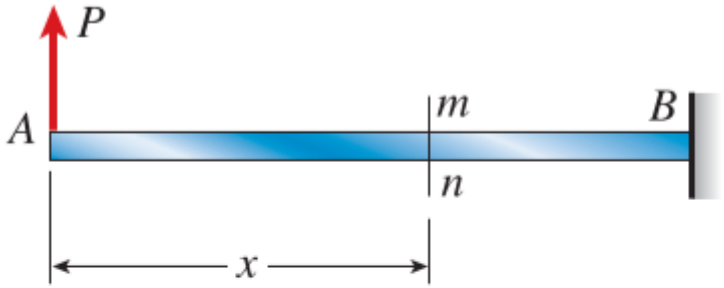
Cantilever Beam



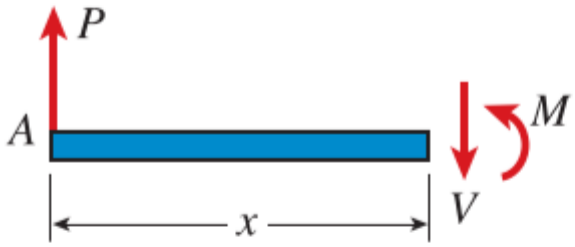
Beam with an Overhang



4.2 Shear Forces and Bending Bending Moments



(a)



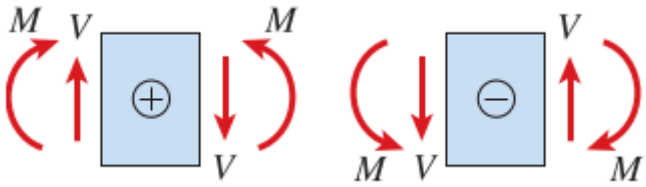
(b)

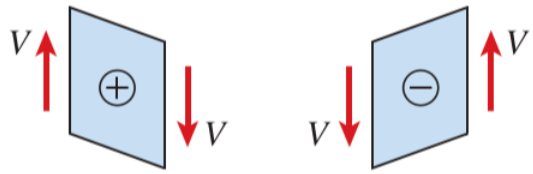
(c)

$$\sum F_{vert} = 0 \qquad P - V = 0$$

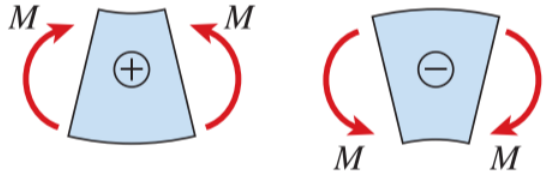
$$\sum M = 0 \qquad M - Px = 0$$

Sign Convention





(a)



(b)

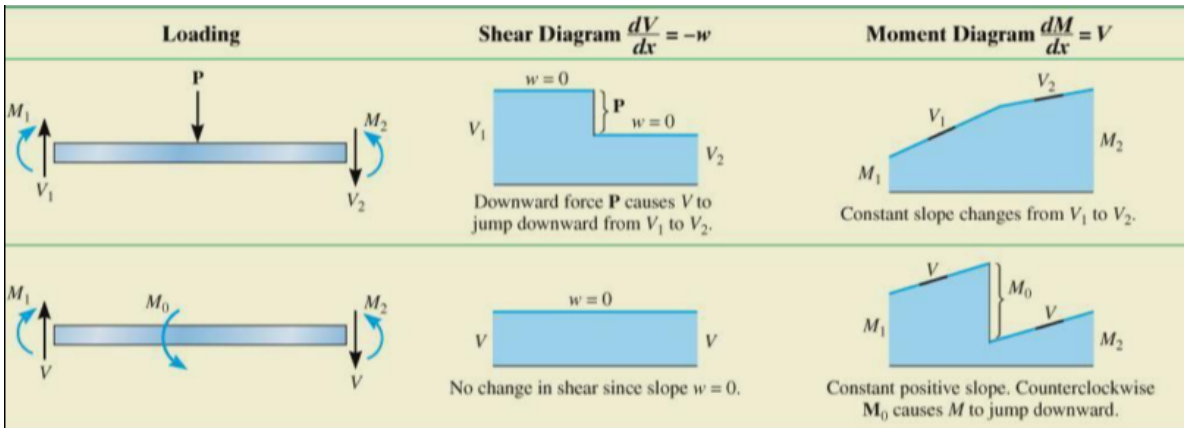
4.3 Relationship between Loads, Shear forces, and Bending Moments

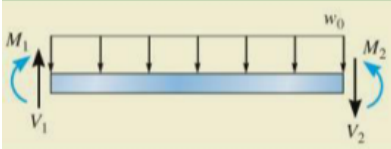
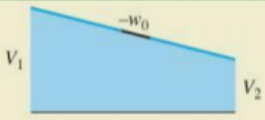
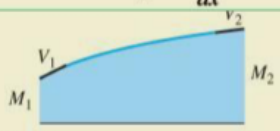
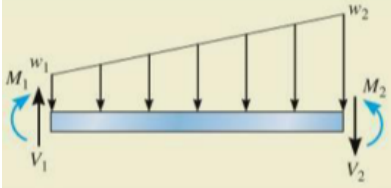
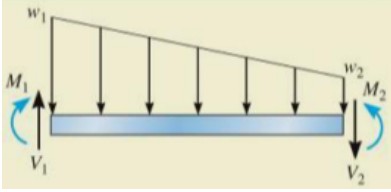
Regions of Distributed Load

$$\frac{\mathrm{d}V}{\mathrm{d}x} = -w(x) \qquad \frac{\mathrm{d}M}{\mathrm{d}x} = V$$

$$\Delta V = \int -w(x)\mathrm{d}x \qquad \Delta M = \int V\mathrm{d}x$$

Shear Diagram



Loading	Shear Diagram $\frac{dV}{dx} = -w$	Moment Diagram $\frac{dM}{dx} = V$
	 Constant negative slope.	 Positive slope that decreases from V_1 to V_2.
	 Negative slope that increases from $-w_1$ to $-w_2$.	 Positive slope that decreases from V_1 to V_2.
	 Negative slope that decreases from $-w_1$ to $-w_2$.	 Positive slope that decreases from V_1 to V_2.