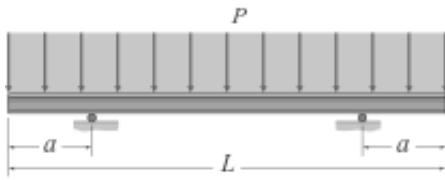# Symbolic Beam Example

Moment expression for the right side of the left support :

$$M (x > a) = p * x * \frac{x}{2} - \frac{p * L}{2} (x - a)$$

1. Moment expression is a parabolic curve with respect to x.

2. Maximum moment can appear either at the vertex of the parabola (which is the middle of the beam) or it can be at the support.
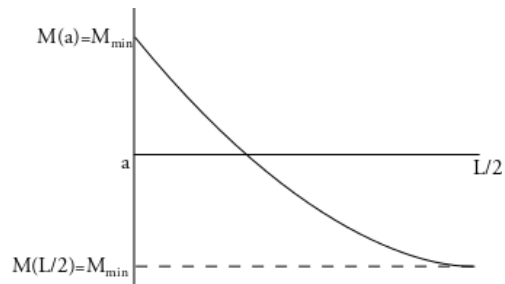
$$D\left[p * x * x / 2 - \frac{p * L}{2} * (x - a), x\right]$$

$$-\frac{L p}{2} + p x$$

$$Solve\left[-\frac{L p}{2} + p x == 0, x\right]$$

$$\left\{\left\{x \to \frac{L}{2}\right\}\right\}$$

3. The parameter **a** moves the curve up & down along the moment axis

4. The value of the **a** which makes both sides' magnitude same is the minimum

Therefore,

$$M (a) + M \left(\frac{L}{2}\right) = 01$$

$$a = \frac{\sqrt{2} - 1}{2} L \simeq 2.071 L$$