

Beam Reactions

Civil Engineering

Equilibrium, and where to take moments.

A beam in equilibrium has zero net horizontal force, zero net vertical force and zero net moment.

$$\Sigma F_x = 0 \cdot \Sigma F_y = 0 \cdot \Sigma M = 0$$

UDL w over span L

Simply supported.

$wL/2$ at each end

Load P at mid-span

By symmetry.

$P/2$ at each end

P at a from left

Moments about right.

Left = $P(L - a)/L$

THE COMMON MISTAKE

✗ Taking moments about a random point

✓ Take moments about a support

Moments about a support delete one unknown reaction, leaving one equation in one unknown. Any other point leaves two unknowns in one equation.

Educational reference. Reactions are analysis, not design. Codes and a qualified engineer govern member sizing.