

Truss Member Forces Cheat Sheet

Method of joints and strain-gauge verification

ENGINEERING
CHEAT SHEET

Key equations

Quantity	Equation	Notes
Joint equilibrium	$\Sigma F_x = 0, \Sigma F_y = 0$	Two unknowns per joint
Section equilibrium	$\Sigma M = 0$ about a joint	Method of sections
Normal stress	$\sigma = F / A$	Axial member
Strain gauge	$\sigma = E \epsilon$	Convert measured strain to stress
Determinacy	$m + r = 2j$	Members + reactions = 2 × joints
Percent error	$\% \text{ error} = \text{theory} - \text{measured} / \text{theory} \times 100$	

Key takeaways

- Three triangular trusses are tested: 60-60-60, 30-60-90 and 45-45-90, loaded in five equal steps on a Tinius Olsen machine.
- Most results were within 20% error. In the 30-60-90 truss members AB and AC should carry zero load, so percent error is undefined; at 1,250 lbf BC carried 1,113 lbf and AB and AC under 20 lbf each.
- Member AB of the 45-45-90 truss had 19–40% error, possibly a poorly bonded or worn gauge.
- Source: Statics and Strength of Materials, 7th ed., p. 480 (as cited in the article). Its equations are images, so standard forms are shown.