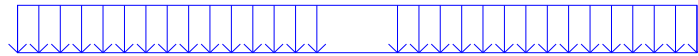


pitched trusses (non-parallel chords)

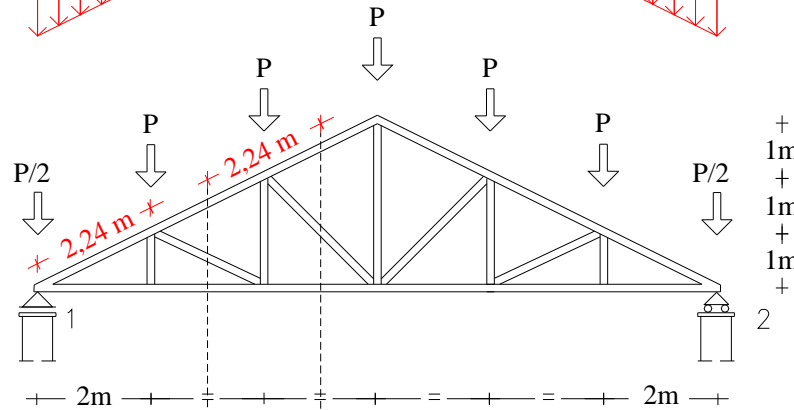
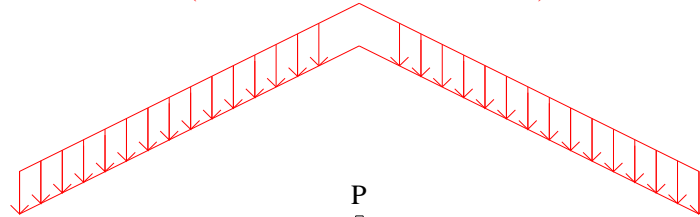


GRAVITY LOADS

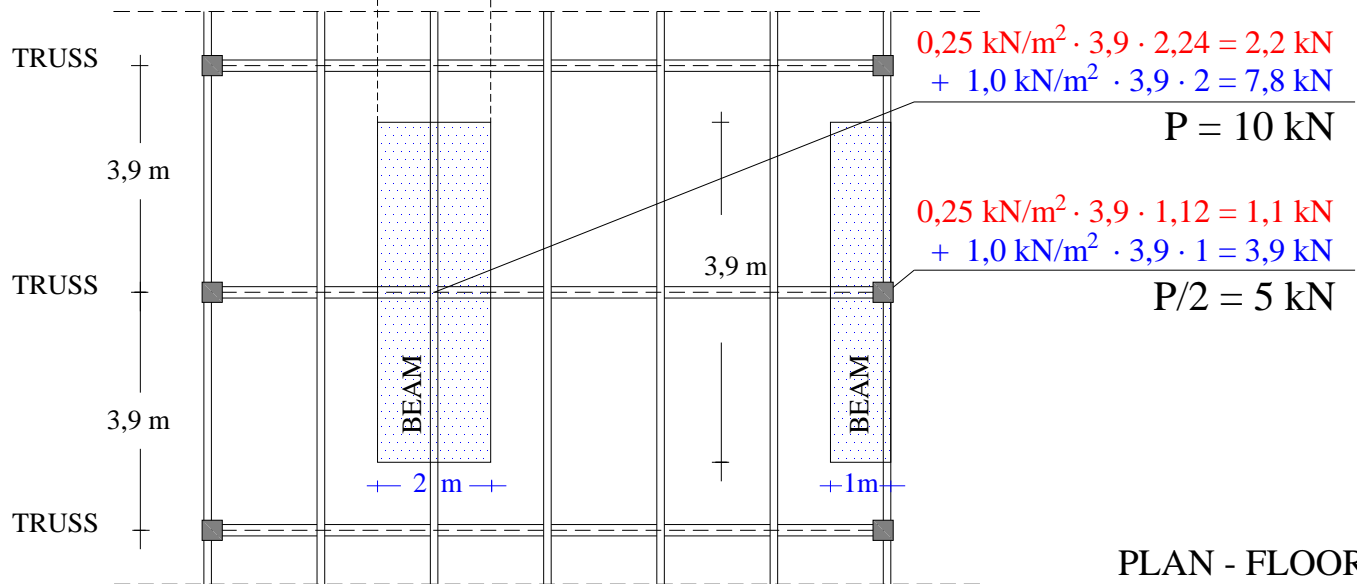
VARIABLE LOAD (SNOW LOAD): $Q = 1,0 \text{ kN/m}^2$
(MEASURED ON HORIZONTAL PLANE)



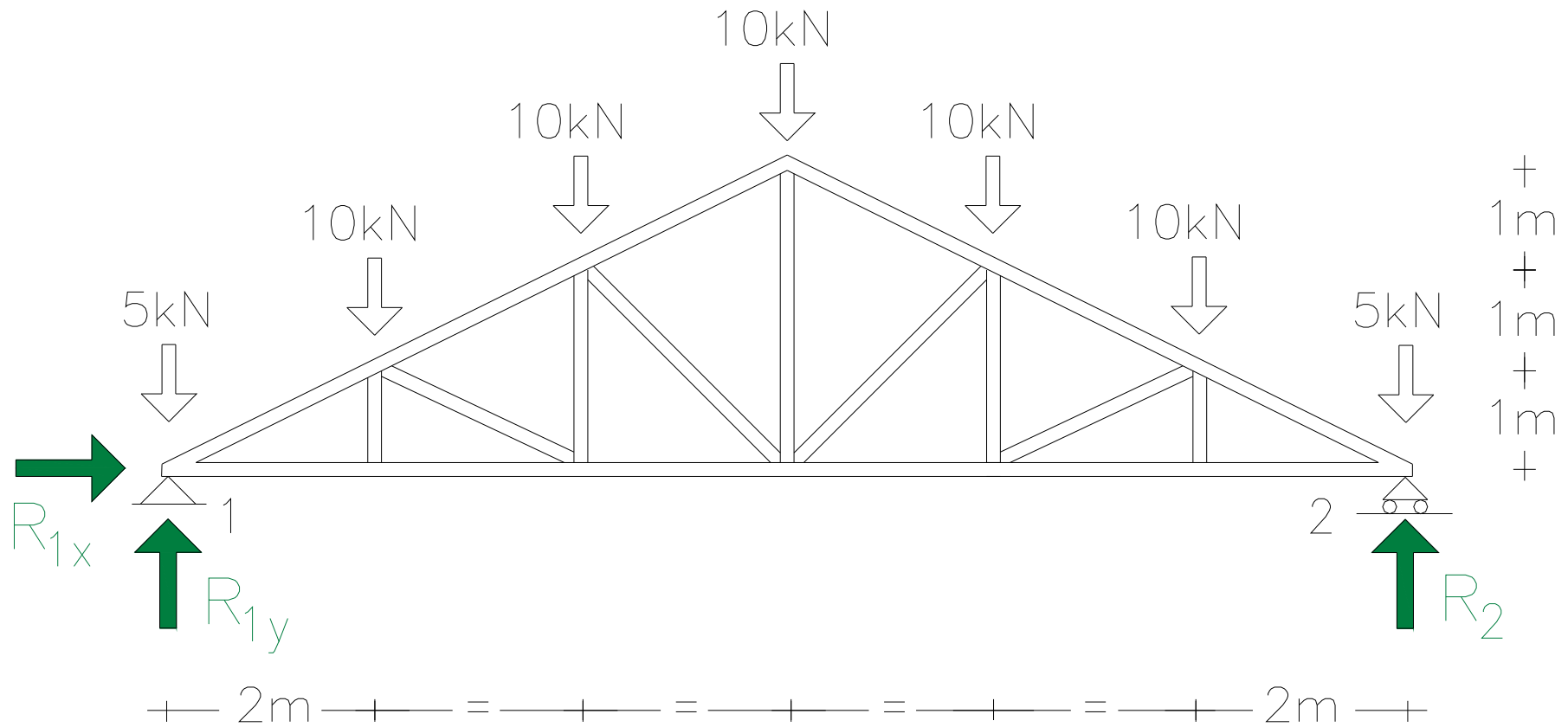
SELF WEIGHT STRUCTURE AND ROOF: $G = 0,25 \text{ kN/m}^2$
(MEASURED ON ROOF PLANE)



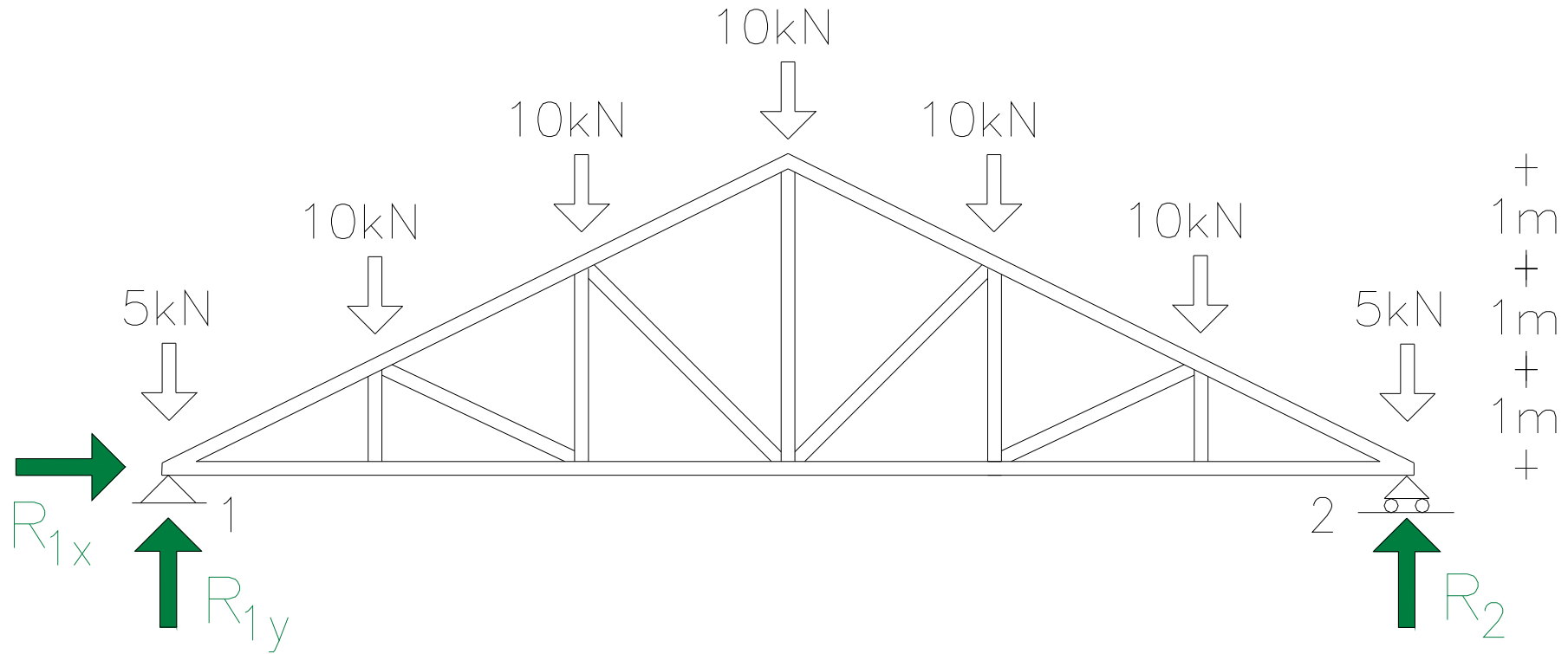
SECTION - ELEVATION



pithed truss: 1st solution



static determinacy

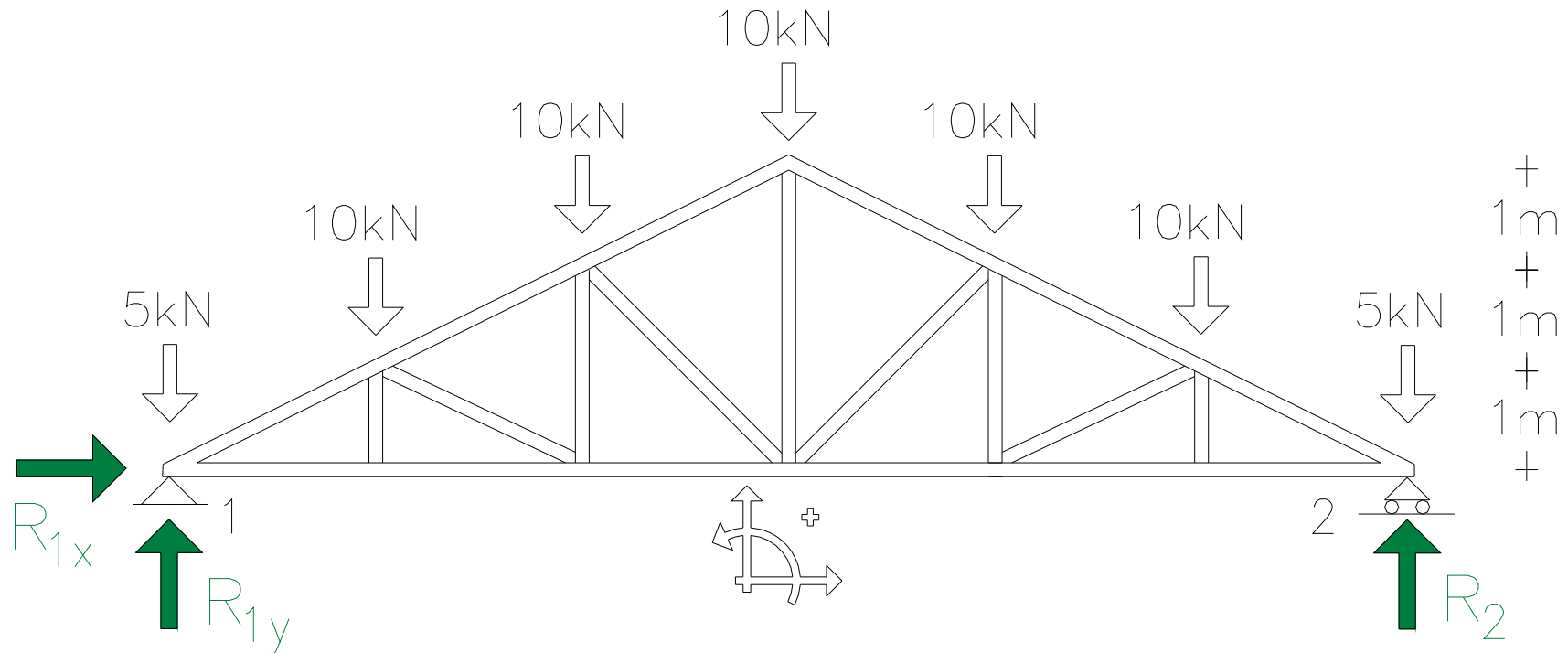


Unknowns: 3 reactions + 21 axial forces = 24

Equations: 12 joints x 2 equations/joint = 24

necessary but not sufficient condition !

'external' forces equilibrium: applied forces → reaction forces



$$\Sigma F_x = 0 : \boxed{R_{1x} = 0}$$

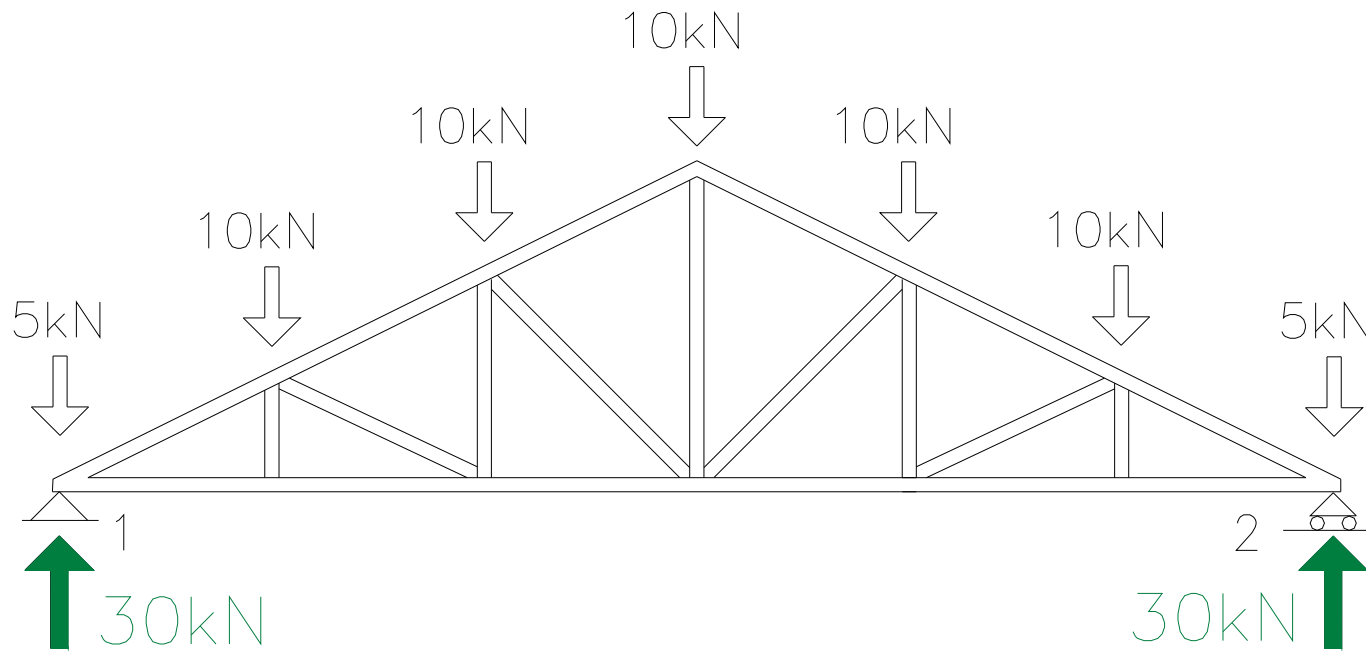
$$\Sigma F_y = 0 : -2 \cdot 5 - 5 \cdot 10 + R_{1y} + R_2 = 0 : R_{1y} + R_2 = 60\text{kN}$$

$$\Sigma M_2 = 0 : 5 \cdot 12 + 10 \cdot (10 + 8 + 6 + 4 + 2) - R_{1y} \cdot 12 = 0$$

$$\boxed{R_{1y} = 30\text{kN}}$$

$$\boxed{R_2 = 30\text{kN}}$$

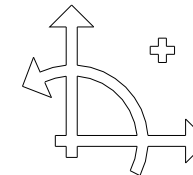
'external' equilibrium → reactions



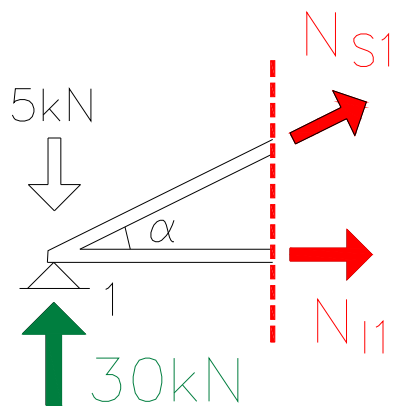
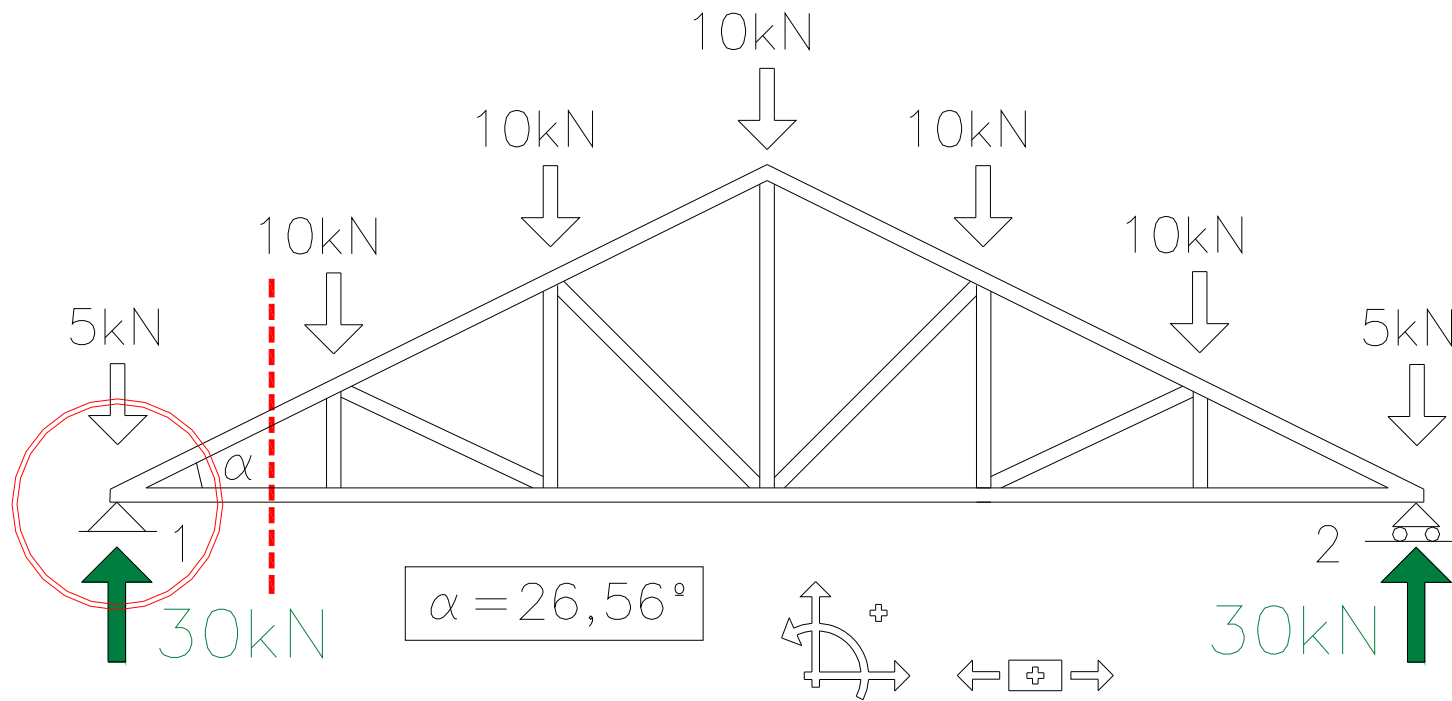
$$R_{1x} = 0$$

$$R_{1y} = 30\text{kN}$$

$$R_2 = 30\text{kN}$$



internal equilibrium: section #1



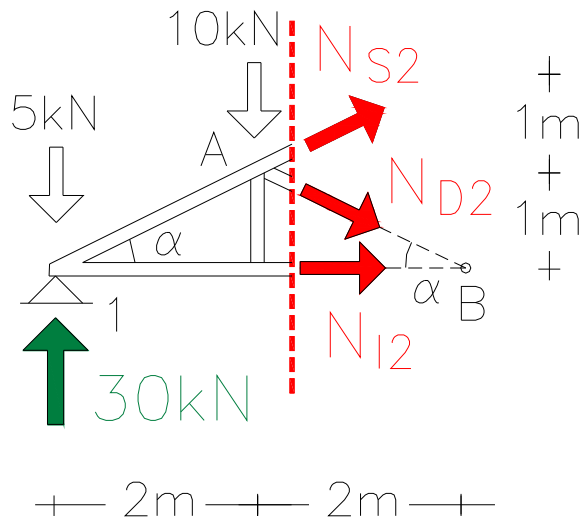
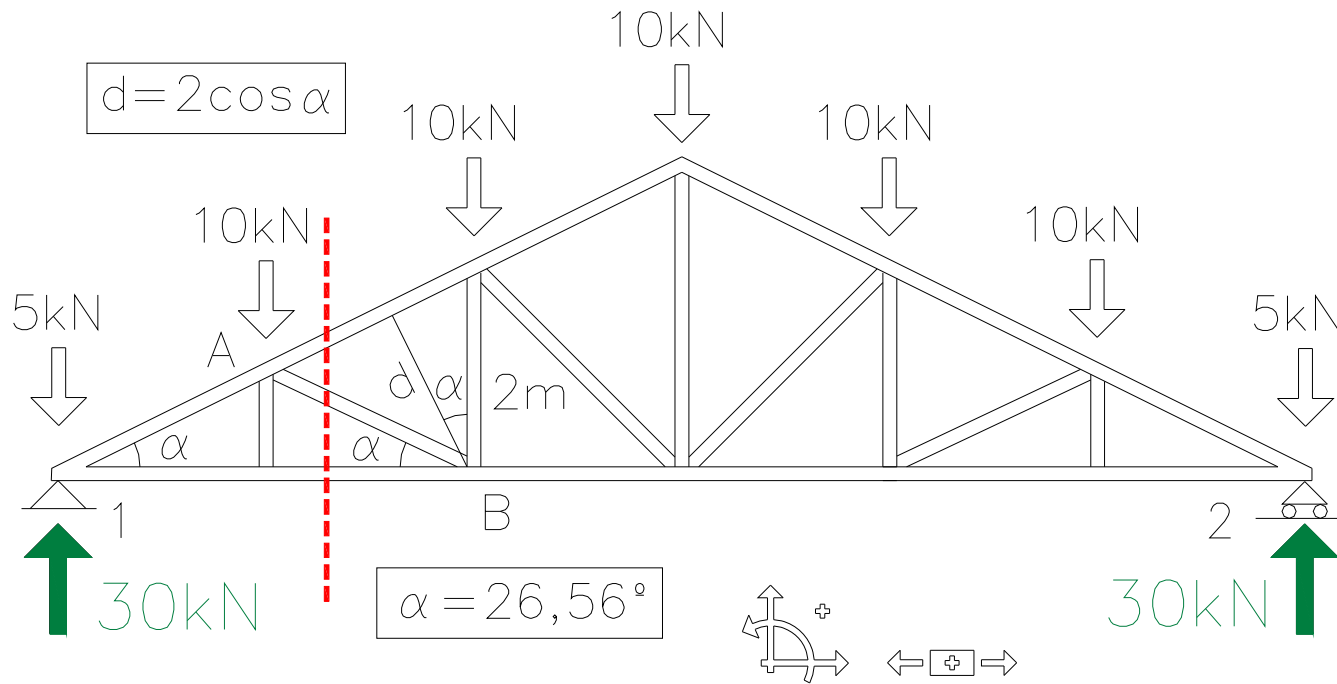
$$\sum F_y = 0 : 30 - 5 + N_{S1} \sin \alpha = 0$$

$$N_{S1} = -55,9 \text{ kN}$$

$$\sum F_x = 0 : N_{S1} \cos \alpha + N_{I1} = 0$$

$$N_{I1} = 50 \text{ kN}$$

internal equilibrium: section #2



$$\Sigma M_A = 0 : -30 \cdot 2 + 5 \cdot 2 + N_{I2} \cdot 1 = 0$$

$$N_{I2} = 50 \text{ kN}$$

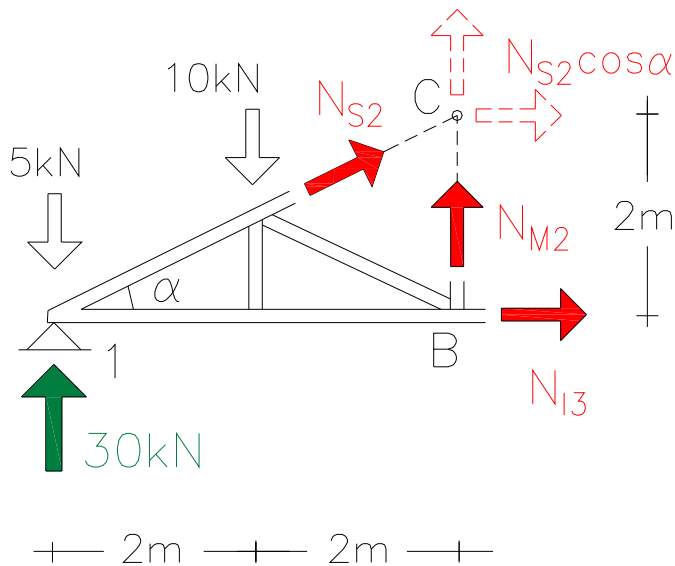
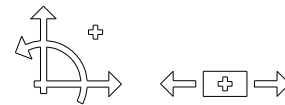
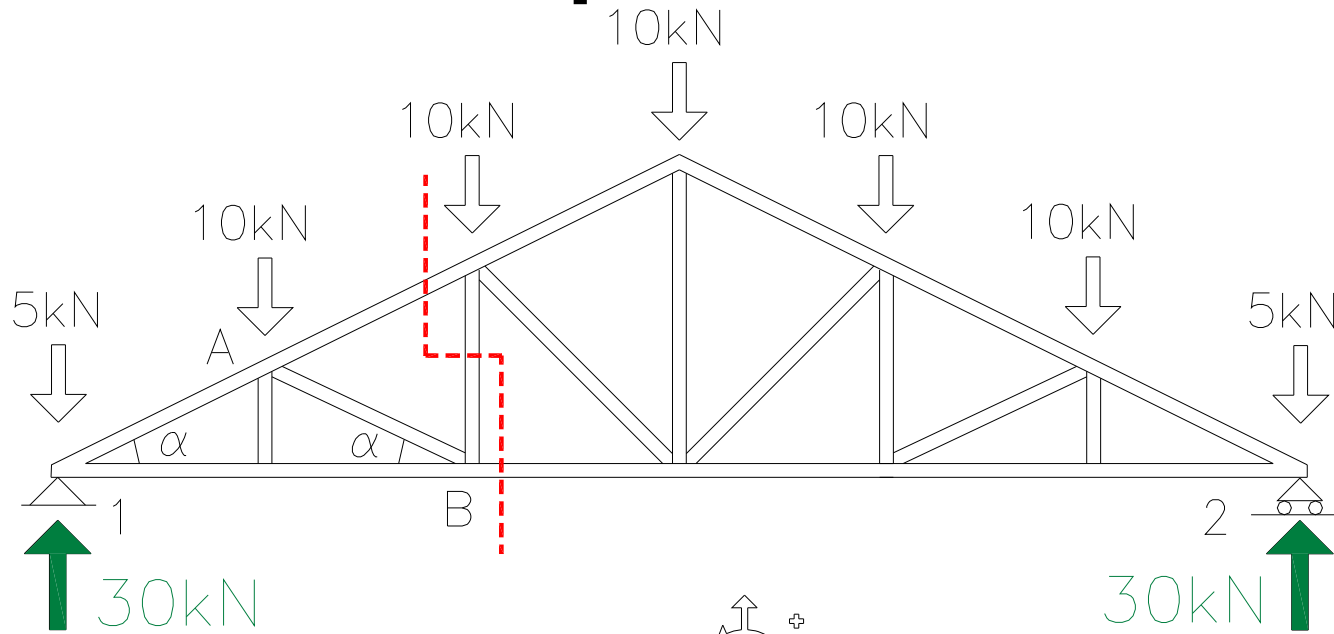
$$\Sigma M_B = 0 : -30 \cdot 4 + 5 \cdot 4 + 10 \cdot 2 - N_{S2} \cdot d = 0$$

$$N_{S2} = -44,7 \text{ kN}$$

$$\Sigma F_y = 0 : 30 - 5 - 10 + N_{S2} \sin \alpha - N_{D2} \sin \alpha = 0$$

$$N_{D2} = -11,2 \text{ kN}$$

internal equilibrium: section #3



$$\sum M_C = 0 : -30 \cdot 4 + 5 \cdot 4 + 10 \cdot 2 + N_{I3} \cdot 2 = 0$$

$$N_{I3} = 40 \text{ kN}$$

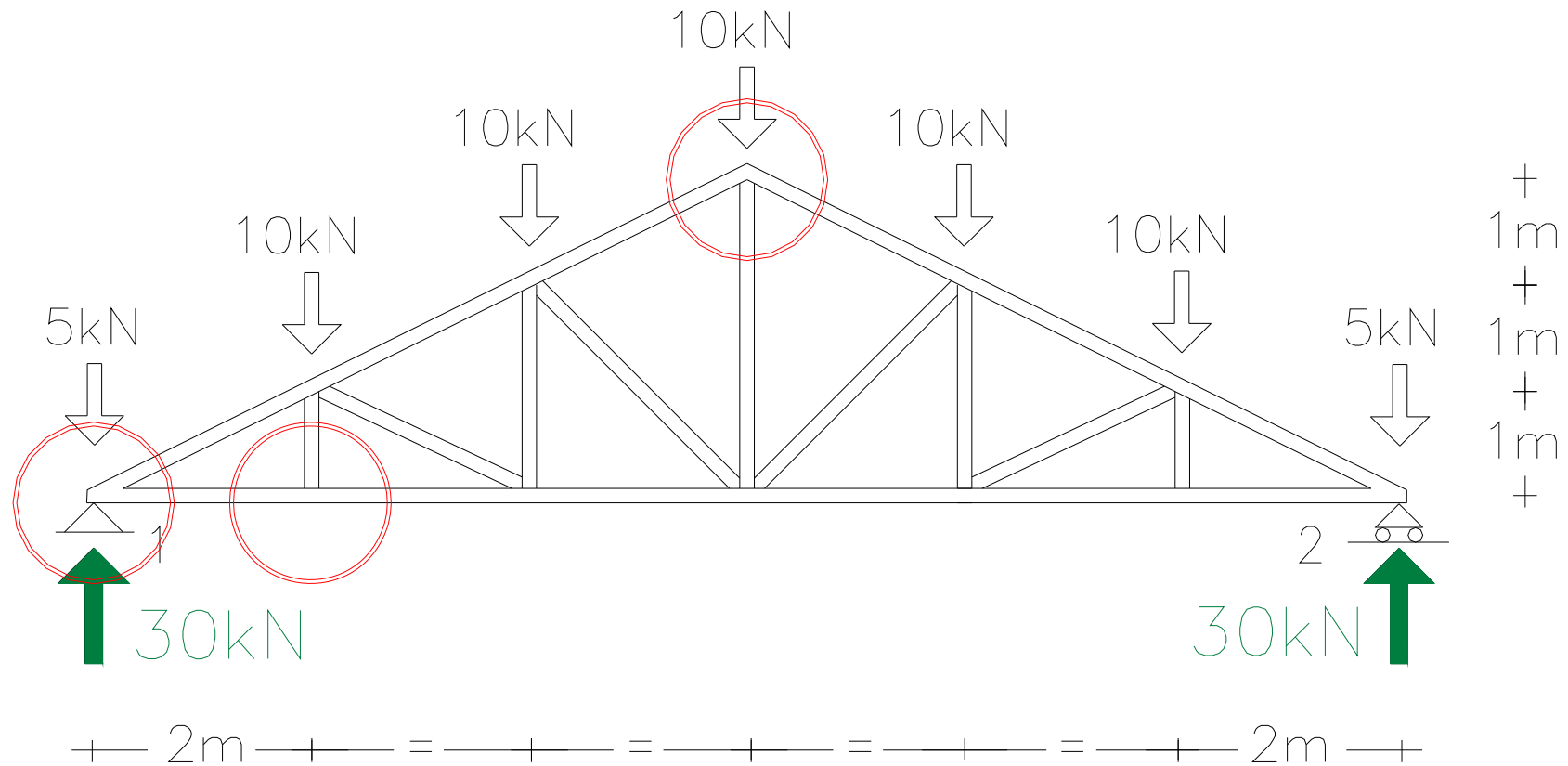
$$\sum M_B = 0 : -30 \cdot 4 + 5 \cdot 4 + 10 \cdot 2 - N_{S2} \cos \alpha \cdot 2 = 0$$

$$N_{S2} = -44,7 \text{ kN}$$

$$\sum M_1 = 0 : -10 \cdot 2 + N_{M2} \cdot 4 = 0$$

$$N_{M2} = 5 \text{ kN}$$

internal equilibrium: method of joints only selected joints!



axial forces in bars

