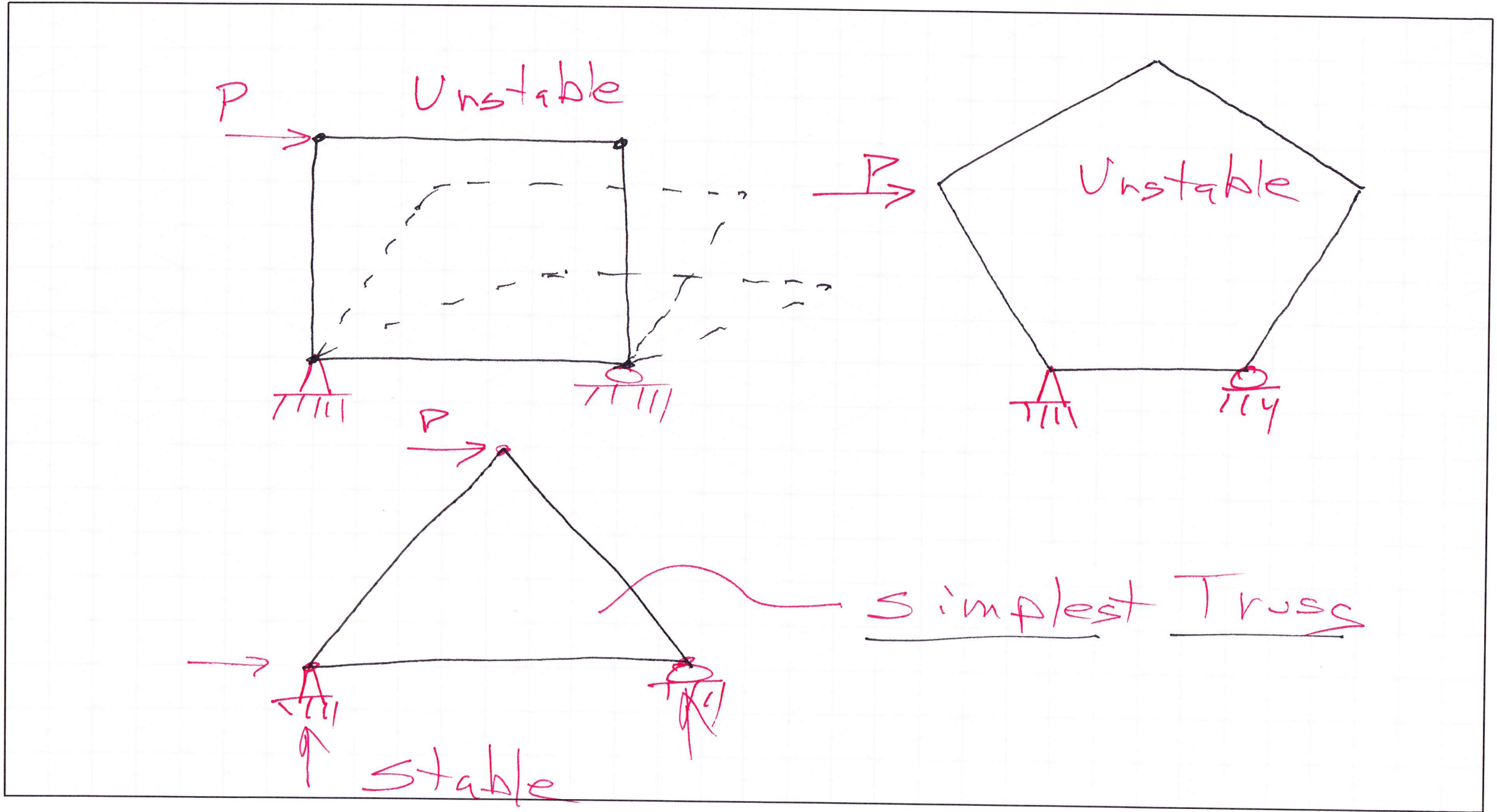


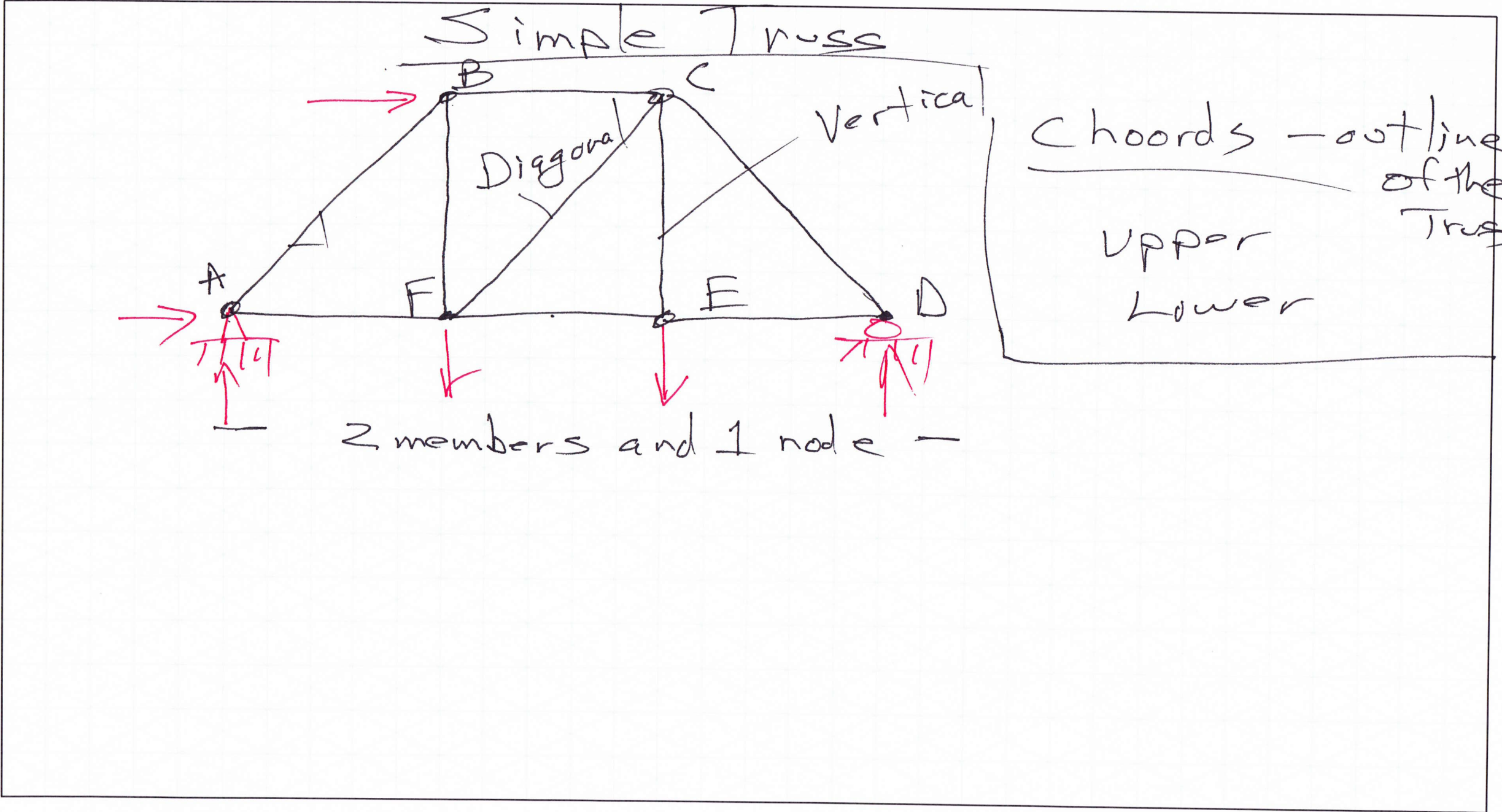
Idealized
Plane Trusses - 2-D Trusses

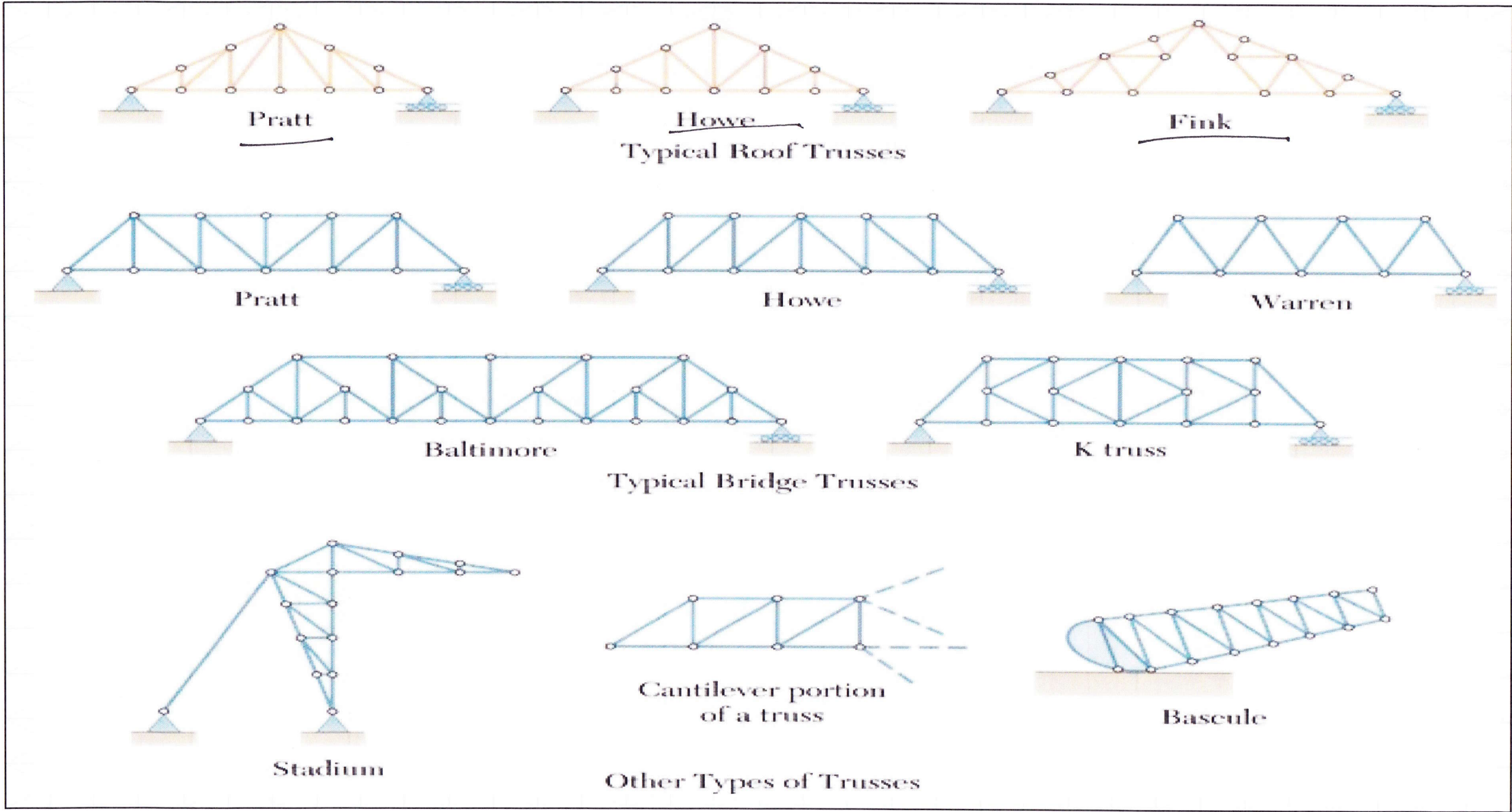
Idealized Truss Assumptions

- 1) all members are straight 2-Force Members.
- 2) all members are connected with frictionless pins only at their ends.
- 3) all forces are applied only at the connection points - joint - node

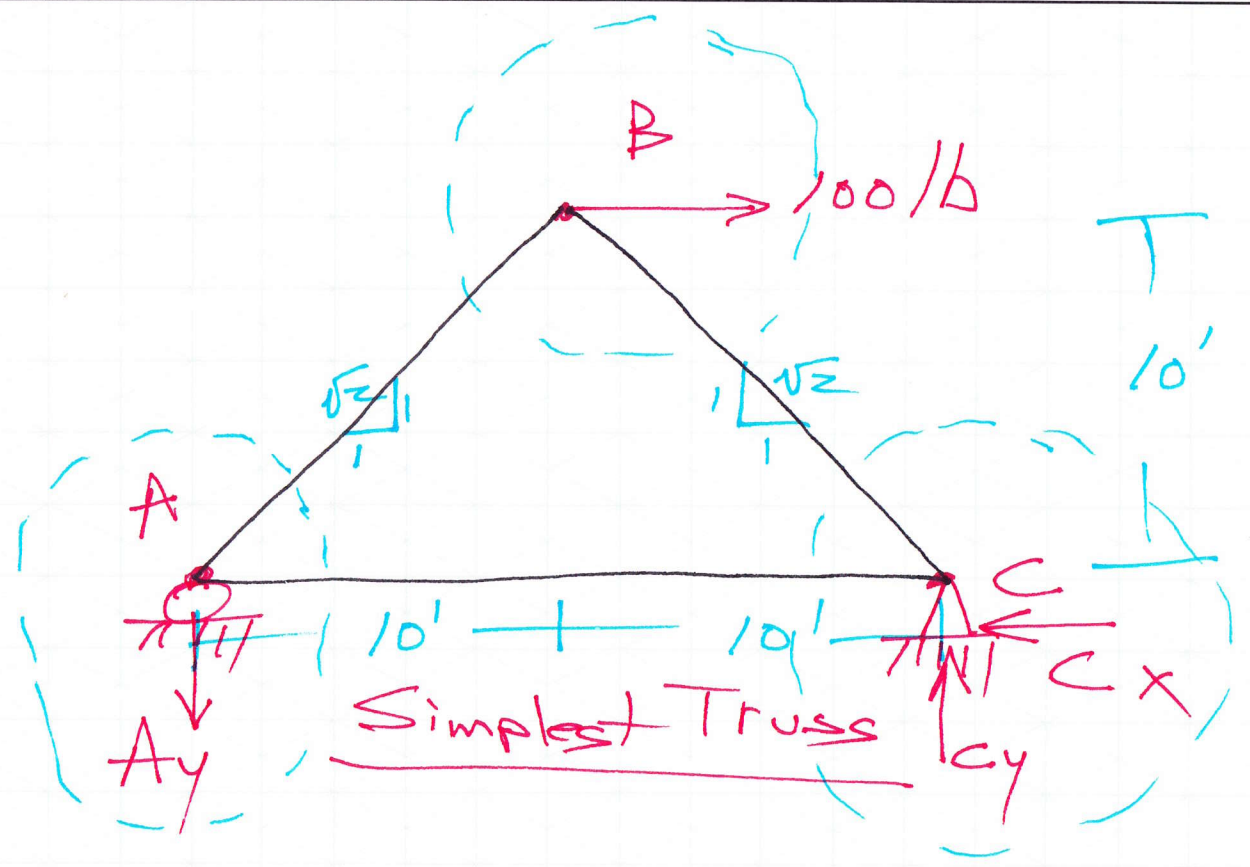


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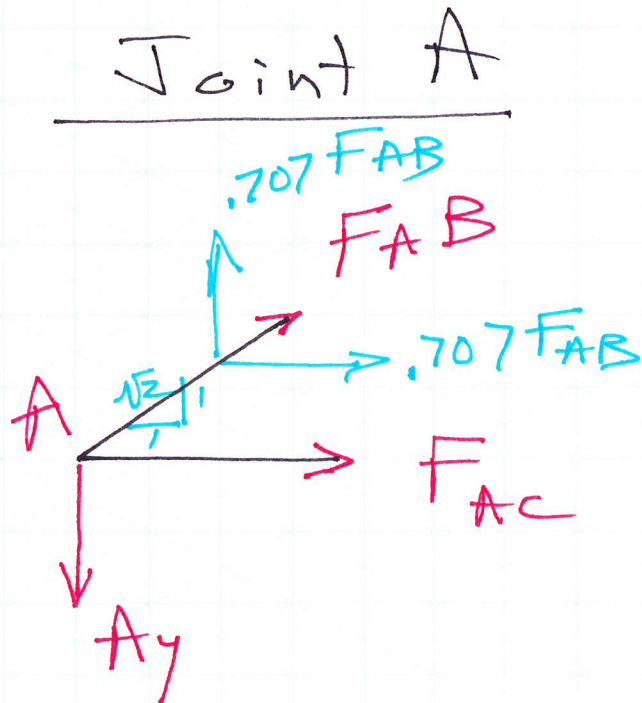
- 3 Nodes
- 3 Members
- 3 Reactions

Unknowns

- (3) Member forces Magnitudes
- (3) Reactions

$3 \times 2 = 6$ Knowns

6 total unknowns

Brute Force Approach

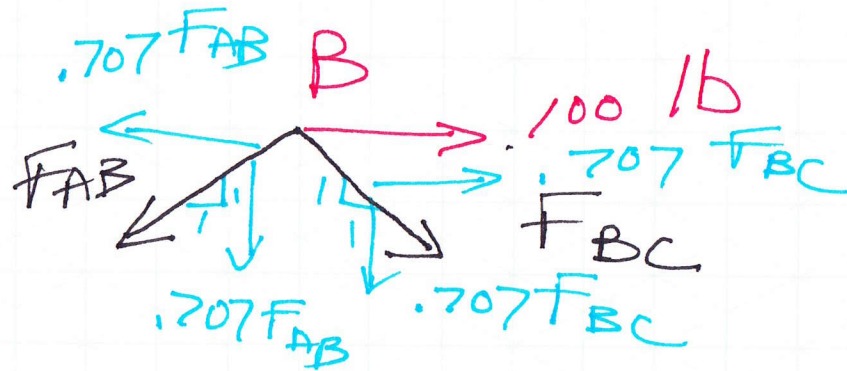
$$\rightarrow \sum F_x = 0$$

$$.707 F_{AB} + F_{AC} = 0 \quad (1)$$

$$\uparrow \sum F_y = 0$$

$$-A_y + .707 F_{AB} = 0 \quad (2)$$

Joint A

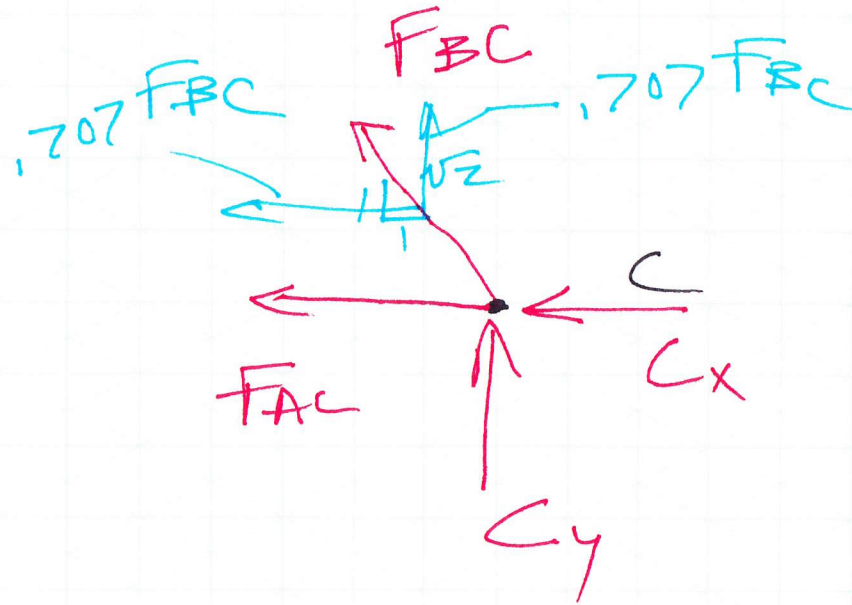


$$\rightarrow \sum F_x = 0$$

$$-.707 F_{AB} + 100 + .707 F_{BC} = 0 \quad (B)$$

$$\uparrow \sum F_y = 0$$

$$-.707 F_{AB} - .707 F_{BC} = 0 \quad (A)$$

Joint C

$$\rightarrow \sum F_x = 0$$

$$-.707 F_{BC} - F_{AC} - C_x = 0 \quad (5)$$

$$\uparrow \sum F_y = 0$$

$$.707 F_{BC} + C_y = 0 \quad (6)$$

$$.707 F_{AB} + F_{AC} = 0$$

$$- A_y + .707 F_{AB} = 0$$

$$- .707 F_{AB} + 100 + .707 F_{BC} = 0$$

$$- .707 F_{AB} - .707 F_{BC} = 0$$

$$- .707 F_{BC} - F_{AC} - C_x = 0$$

$$.707 F_{BC} + C_y = 0$$

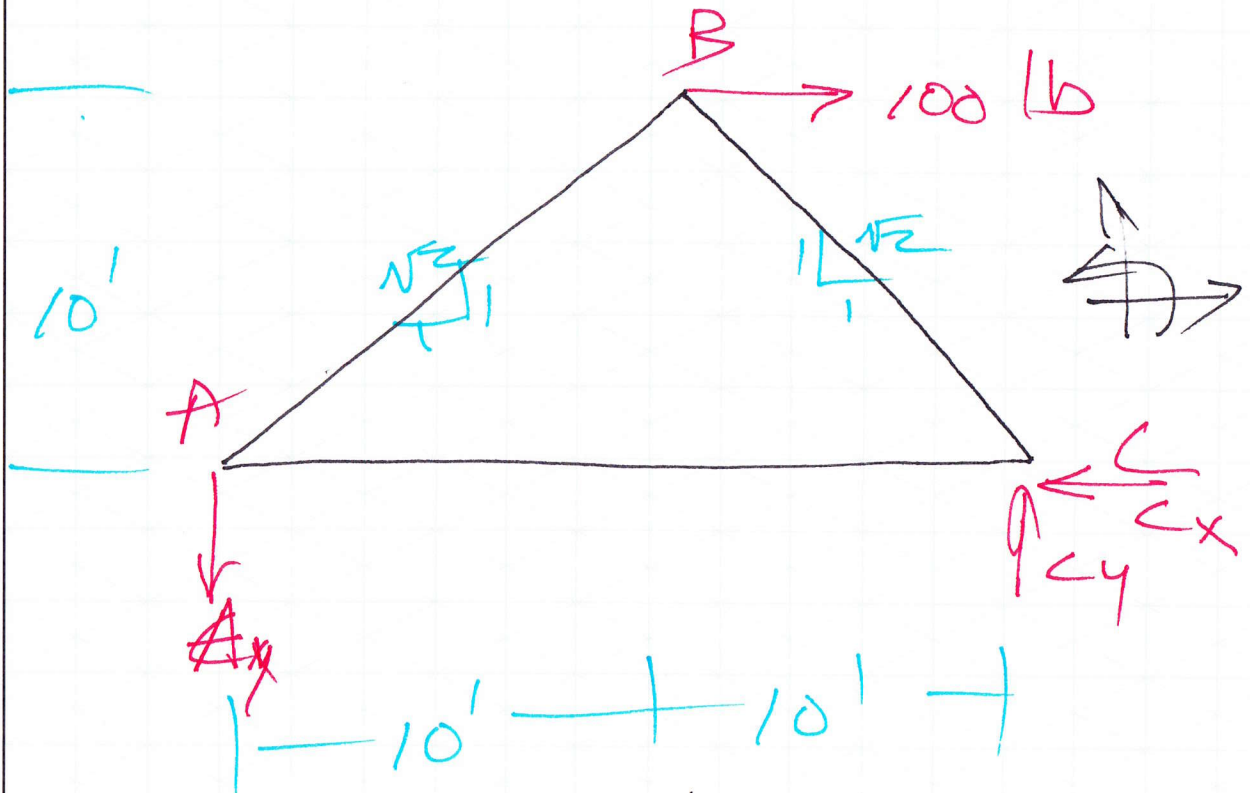
6 knowns — 6 unknowns

[] [] = []

FES

Intuitive Approach

1st calculate External Reactions



$$\sum \curvearrowright M_C = 0$$

$$-100(10) + A_y(20) = 0$$

$$\underline{A_y = +50 \text{ lb} \downarrow}$$

$$\sum F_y = 0$$

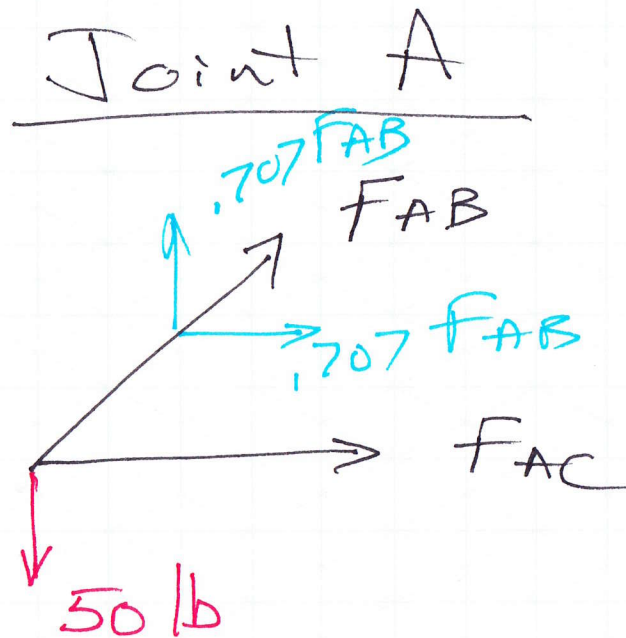
$$-50 + C_y = 0$$

$$\underline{C_y = +50 \text{ lb} \uparrow}$$

$$\sum F_x = 0$$

$$100 - C_x = 0$$

$$\underline{C_x = 100 \text{ lb} \leftarrow}$$



$$\uparrow \sum F_y = 0$$

$$+0.707 F_{AB} - 50 = 0$$

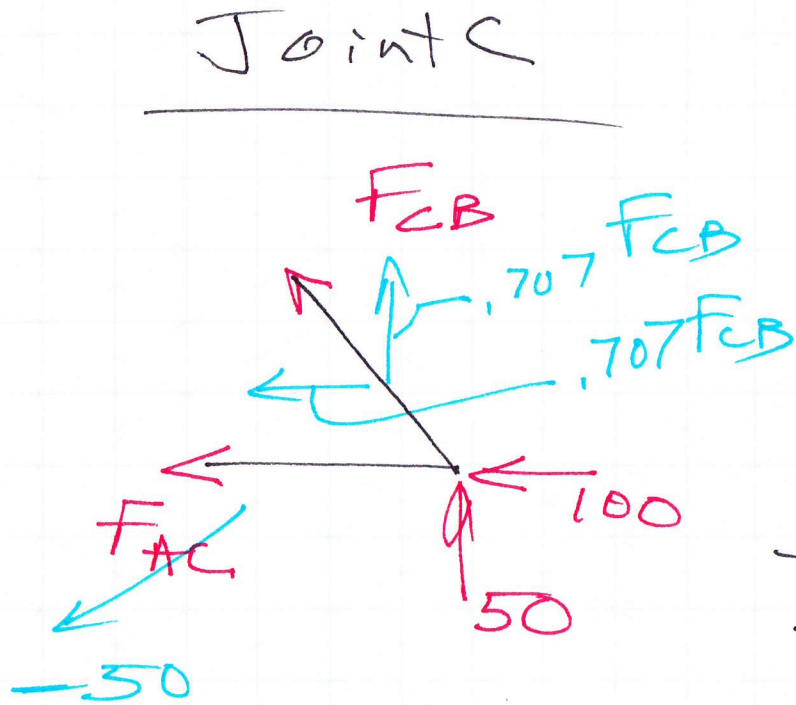
$$F_{AB} = +70.7 \text{ lb T}$$

$$\rightarrow \sum F_x = 0$$

$$-0.707 F_{AB} + F_{AC} = 0$$

$$F_{AC} = -50 \text{ lb}$$

C



$$\uparrow \sum F_y = 0$$

$$+0.707 F_{CB} + 50 = 0$$

$$F_{CB} = \frac{-70.7 \text{ lb}}{C}$$

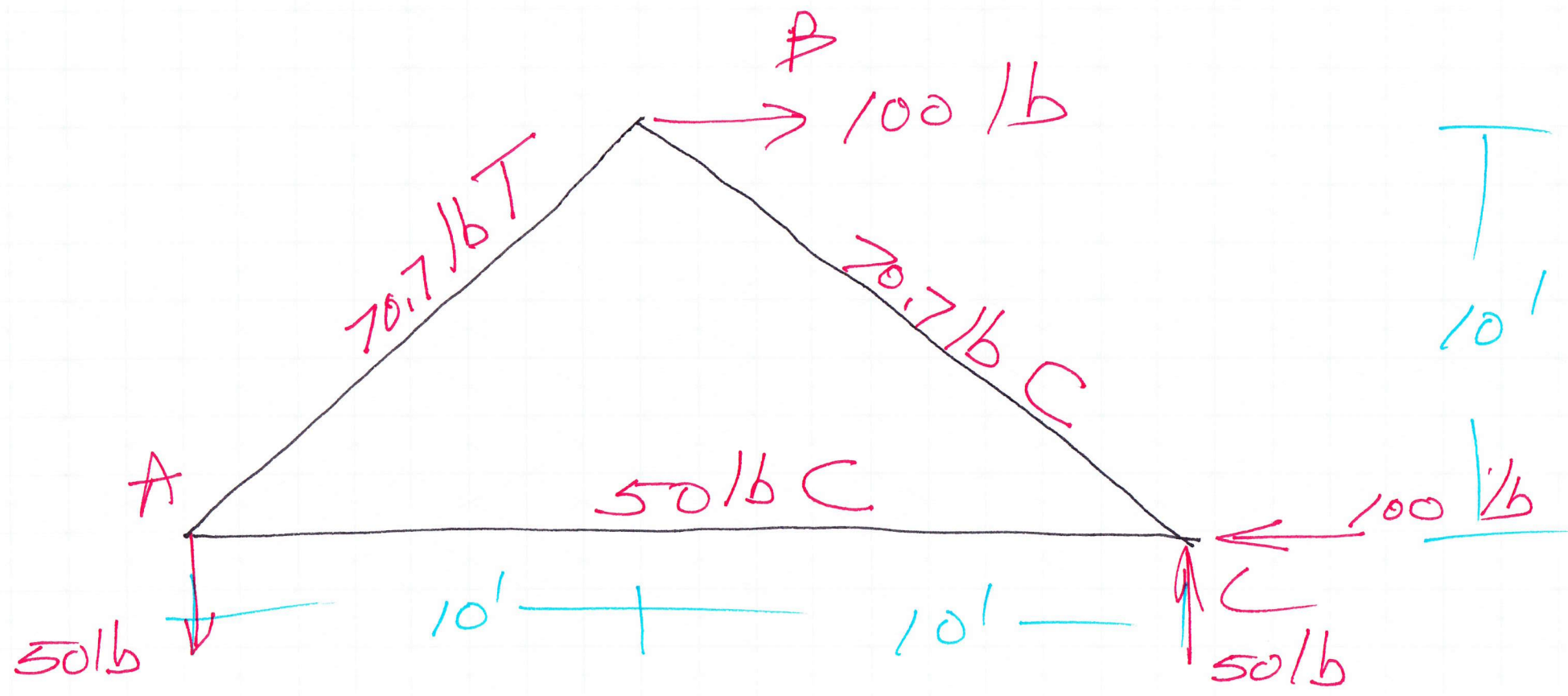
Check

$$\rightarrow \sum F_x = 0$$

$$-0.707 F_{CB} - F_{AC} - 100 = 0$$

$$+50 + 50 - 100 = 0$$

$$0 = 0$$



Summary of Reso Hs