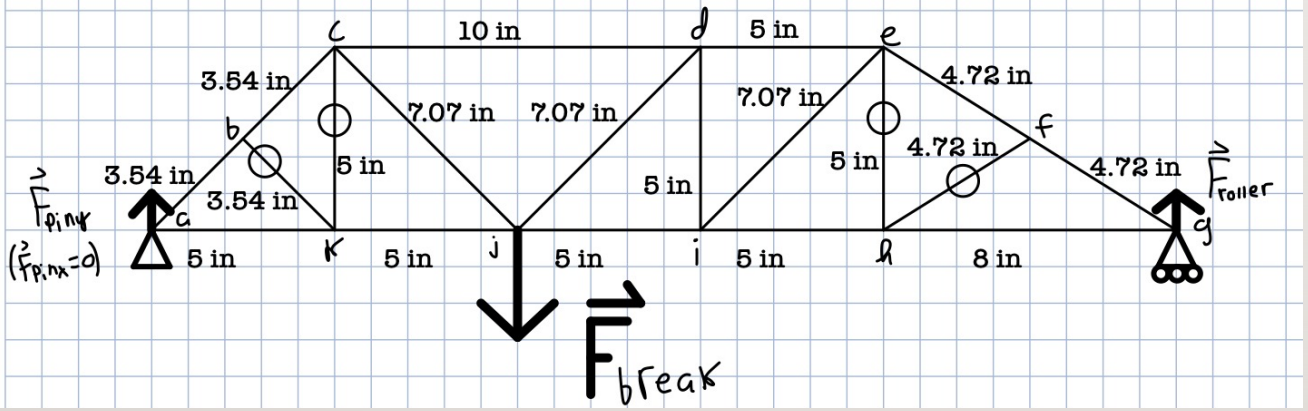
IV. MATHEMATICAL TRUSS ANALYSIS

efficiency : truss weight : $\frac{1}{4}$ lb

F_{break} : 88.5 lb

eff : $\frac{88.5}{1/4}$ = 354 load : weight ratio



11 joints — $2J = M + R$

19 members — $22 = 19 + 3$ ✓ ∴ the truss is statically determinate

3 reaction forces

External Forces

F_{break} = 88.5 lb, the load that broke our truss

88.5 lb = 394 N

$\Sigma F_x = 0$ ∴ $F_{pinx} = 0$

$M_j = 0$ ∴ $(10\text{ in})F_{piny} = 18\text{ in}\,F_{roller}$

$F_{piny} = 1.8\,F_{roller}$

$\Sigma F_y = 0$ ∴ $F_{piny} + F_{roller} - F_{break} = 0$

$2.8\,F_{roller} = F_{break}$

$F_{roller} = 140.7$ N

∴ $F_{piny} = 253.3$ N

- We calculated our load : weight ratio at failure to be 354