



What is structure?

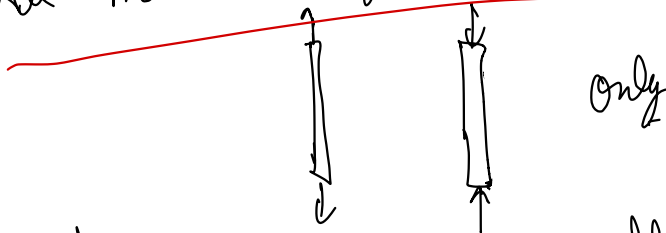
Combinations of different links which support
or transfer the force, safely withstand
the applied force



Truss \Rightarrow A framework composed of members joined
at their end to form a rigid structure.

Assumption :-

① All members of the Truss are axially loaded



\rightarrow ② weight of the member is small compare to the
force it support.

\rightarrow ③ No effect of bending on member.

\rightarrow ④ External forces are applied at pin (joints) connection

~~Structure~~ Structure is statically determinate :

static equilibrium

$$\sum F_x = 0 \quad \sum F_y = 0 \quad \sum M = 0$$

Reaction forces

forces of member
① m \rightarrow No. of member

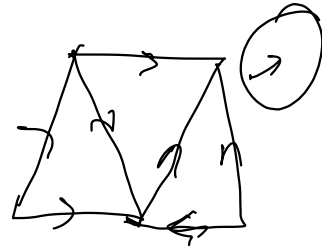
$m + 6 = 2j$
 No. of members No. of joints in Truss

m
 ↓
 member

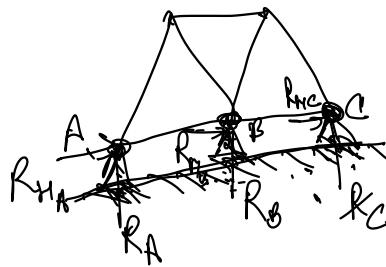
$7 + 3 = 2 \times 5$

$10 = 10$

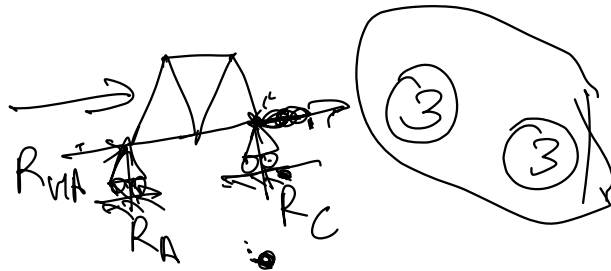
Reactions forces



$m + 3 > 2j \rightarrow$ statically indeterminate
 $m + 3 < 2j \rightarrow$ Unstable



6
 3 equation
 3 Red



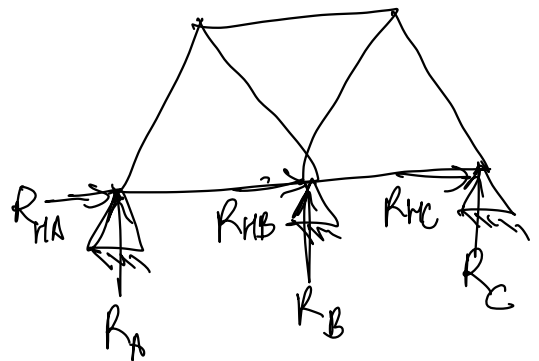
$m + 6 = 2j$

Force



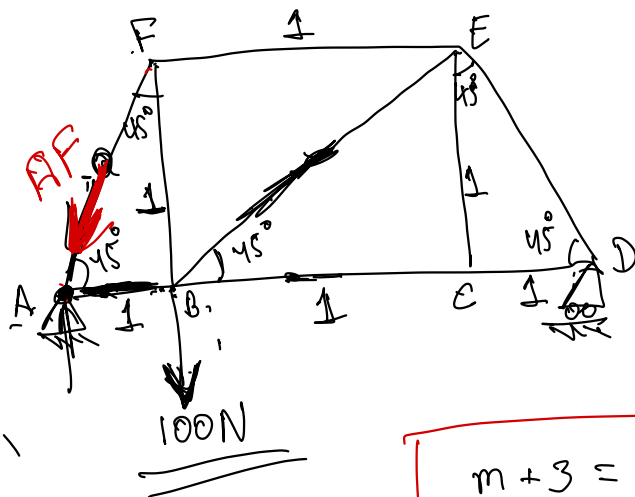
No. of member

Reactions forces on structure



7
 3 equation

Q)

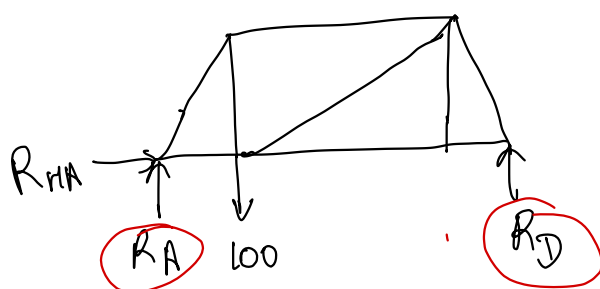


External forces

$$m + 3 = 2j$$

$$9 + 3 = 2 \times 6$$

$$12 = 12$$



free body dia

Reaction forces

$$\sum F_x = 0 \quad \sum F_y = 0 \quad \sum M = 0$$

$$\sum F_x = 0 \Rightarrow R_{HA} = 0$$

$$\sum F_y = 0 \Rightarrow R_A + R_D - 100 = 0$$

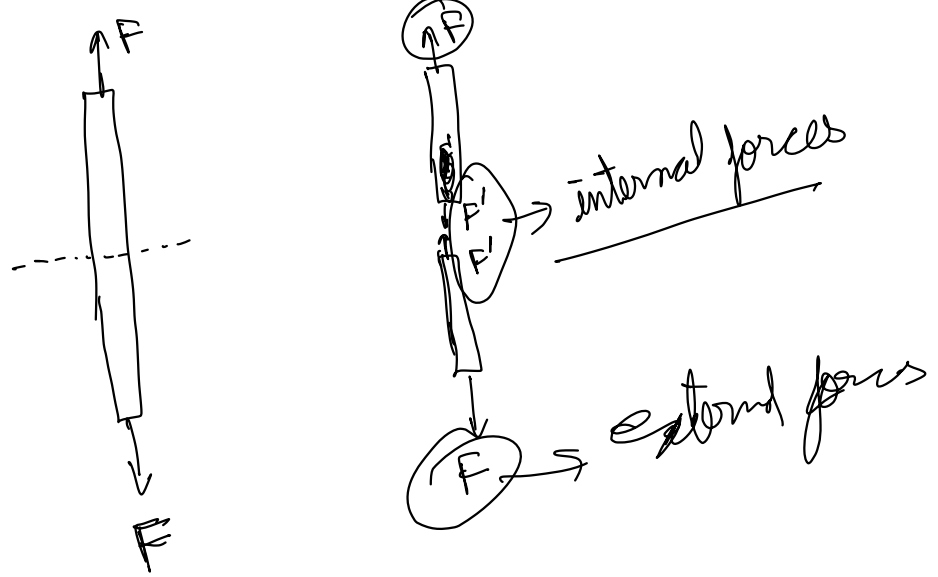
$$\sum M_A = 0 \Rightarrow 100 - 3R_D = 0$$

$$R_D = \frac{100}{3} \text{ N}$$

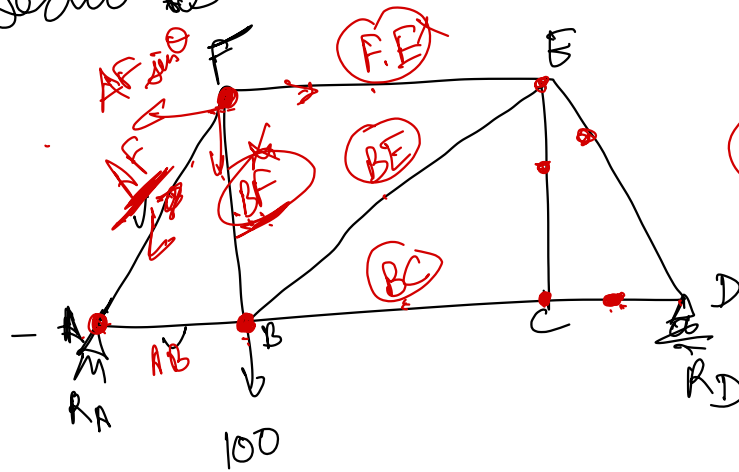
$$R_A + \frac{100}{3} - 100 = 0$$

$$R_A - \frac{200}{3} = 0$$

$$R_A = \frac{200}{3}$$



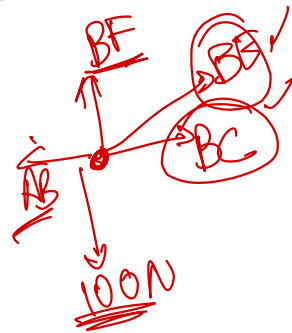
- Method of joints
- Method of sections



$$\sum F_x = 0$$

$$FE = AF \sin \theta$$

$$AF \cos \theta + BF = 0$$



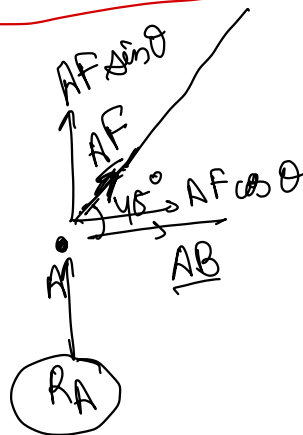
$$\sum F_x = 0$$

$$\sum F_y = 0$$

→ Method joints

→ joint → see known at least 1 force
 less than more than 2 unknown force

joint A



$$\sum F_x = 0$$

$$\sum F_y = 0$$

$$\sum M = 0$$

$$\sum F_y = 0 \Rightarrow RA + AF \sin \theta = 0$$

$$\theta = 45^\circ$$

$$\sum F_x = 0$$

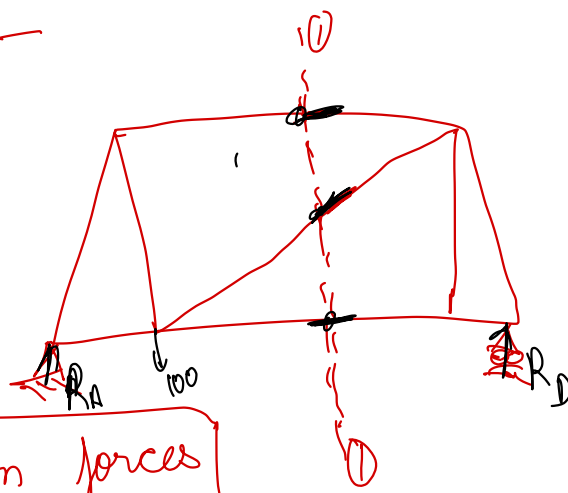
$$AB + AF \cos \theta = 0$$

$$AB = -\frac{200}{3}$$

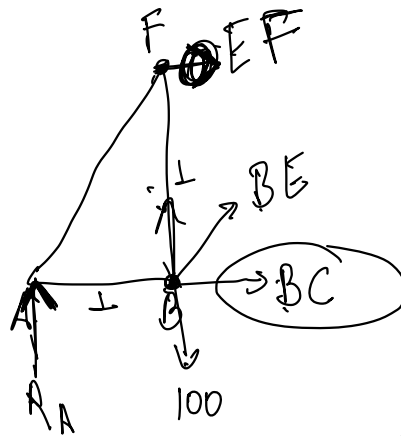
$$AF = -94.2 \text{ N}$$

$$RA = -\frac{200}{3}$$

Method of section:-



Not more than 3 unknown forces



$$\sum M_B = 0$$

$$\begin{aligned} \sum M_B = 0 & \Rightarrow R_A \cdot EF = 0 \\ & \Rightarrow EF = +R_A = +\frac{200}{3} \end{aligned}$$

$$\sum F_x = 0 \Rightarrow EF + BC + BE \cos \theta = 0$$

$$\sum F_y = 0 \Rightarrow BE \sin \theta + R_A - 100 = 0$$

