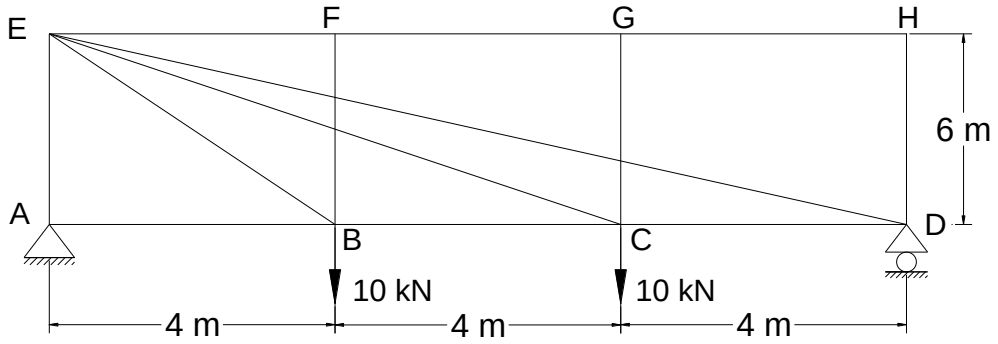
Ex1: for the simple truss shown in fig. find the axial force in bars CD, DE, CE & BE.



Solution:

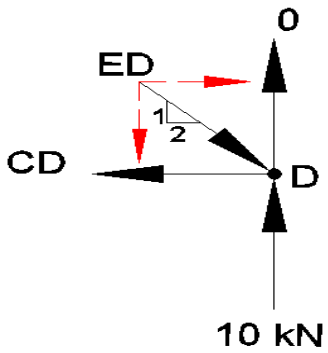
Due to symmetry of loading and distances

Dy= Ay = 10 kN ↑

Ax = 0

FB = GC = HD = HG = GF = FE = AB = 0

For CD & DE use joint D



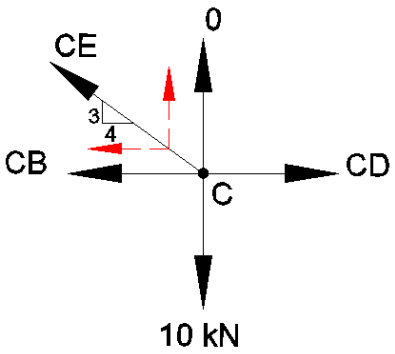
$\uparrow \sum f_y = 0$

$10 - ED * \frac{1}{\sqrt{5}} = 0 \Rightarrow ED = 10\sqrt{5}$ kN (Comp.)

$\rightarrow \sum f_x = 0$

$10\sqrt{5} * \frac{2}{\sqrt{5}} - CD = 0 \Rightarrow CD = 20$ kN (Ten.)

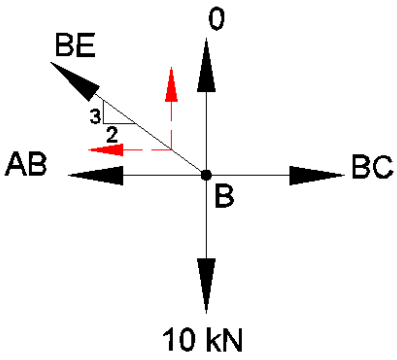
For CE use joint C



$\uparrow \sum f_y = 0$

$CE * \frac{3}{5} - 10 = 0 \Rightarrow CE = 16.67$ kN (Ten.)

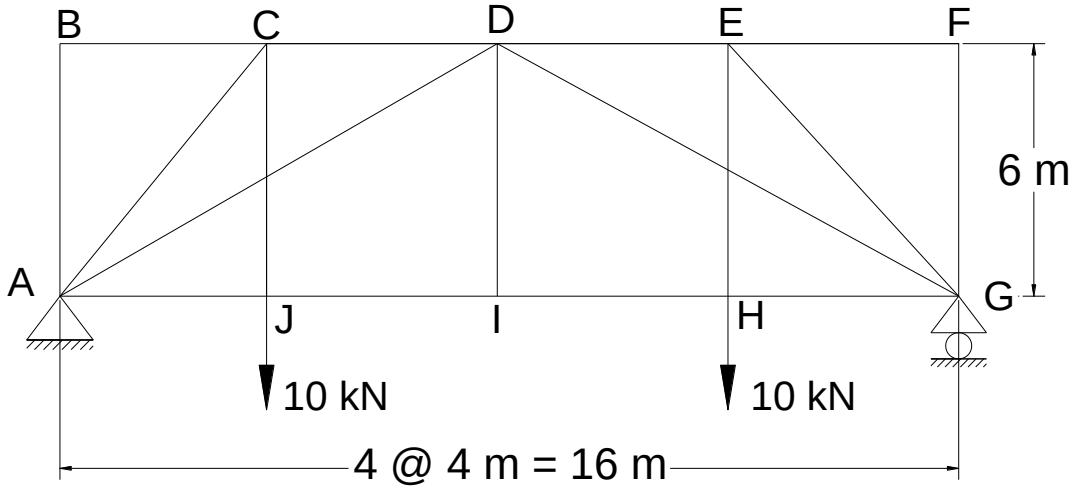
For BE use joint B



$\uparrow \sum f_y = 0$

$BE * \frac{3}{\sqrt{13}} - 10 = 0 \Rightarrow BE = 12\ kN\ (Ten.)$

Ex2: For the simple truss shown in fig. find the axial force in bars AC, AD & AJ.



Solution:

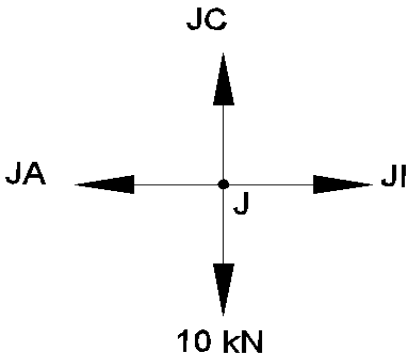
Due to symmetry of loading and distances

Ay= Gy = 10 kN ↑

Ax = 0

BC, BA, FE, FG & DI = 0

Use joint J



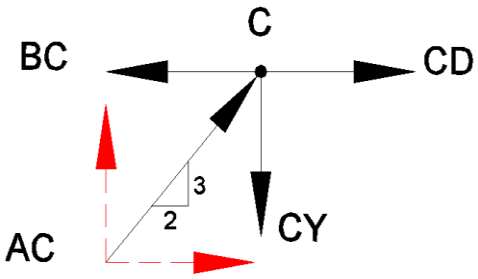
$\uparrow \sum f_y = 0$

JC – 10 = 0 => JC = 10 kN (ten.)

Use joint C

$\uparrow \sum f_y = 0$

$AC * \frac{3}{\sqrt{13}} - 10 = 0 => AC = 12.018\ kN\ (Comp.)$



Use joint A

$\uparrow \sum f_y = 0$

$10 - AC * \frac{3}{\sqrt{13}} + AD * \frac{3}{5} = 0$

$10 - 12.018 * \frac{3}{\sqrt{13}} + AD * \frac{3}{5} = 0$

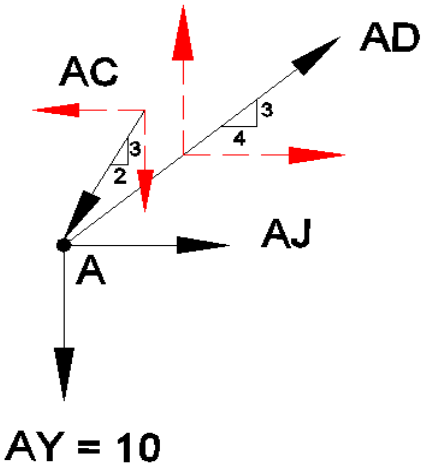
$AD = 0$

$\rightarrow \sum f_X = 0$

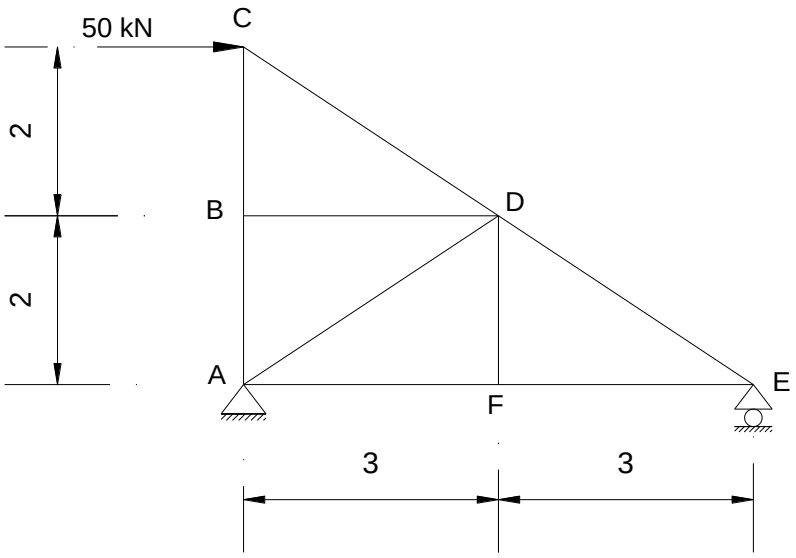
$AJ - AC * \frac{2}{\sqrt{13}} = 0$

$AJ - 12.018 * \frac{2}{\sqrt{13}} = 0$

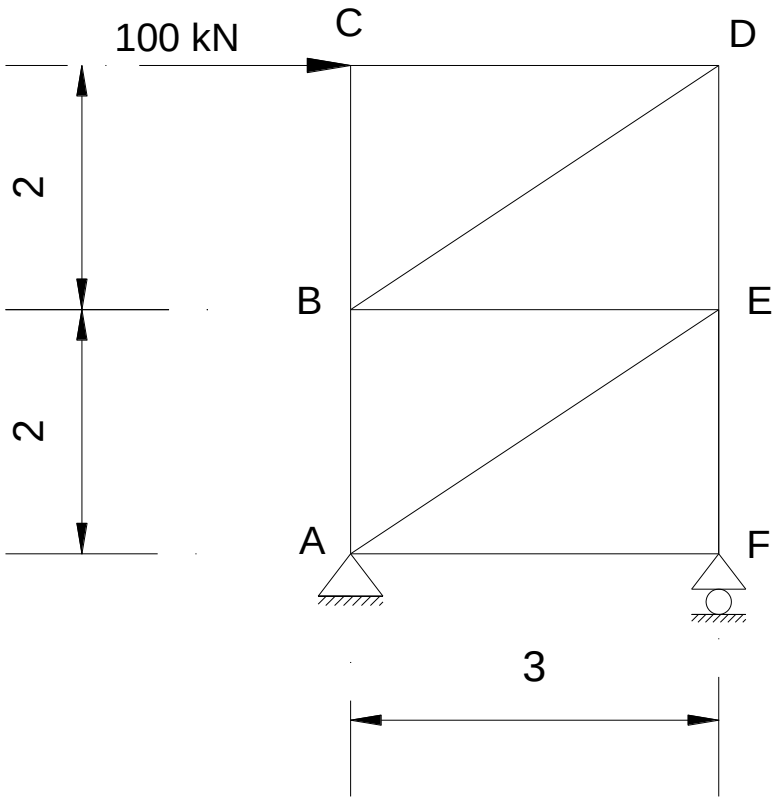
$AJ = 6.67\ kN\ (Ten.)$



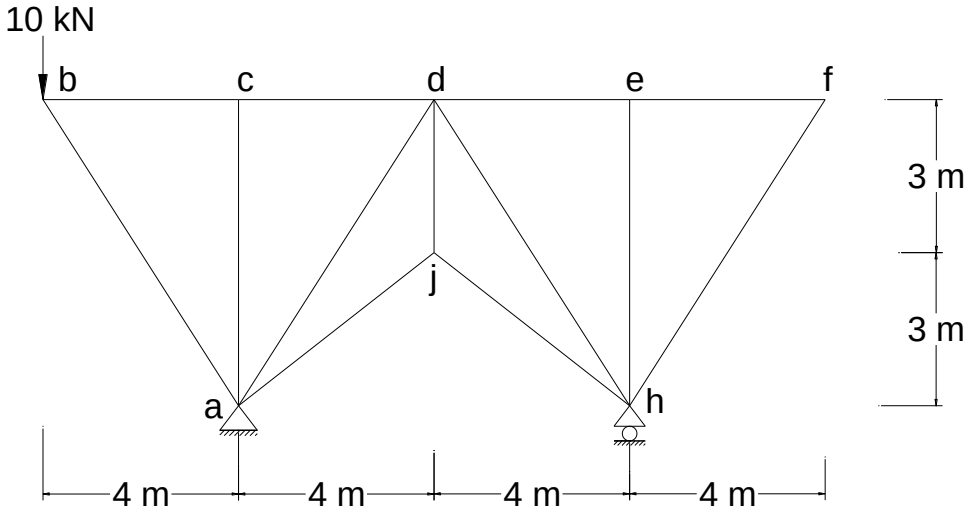
H.W1 :For the simple truss shown in fig. find the axial force in bars AB, AF,ED & CD.



H.W2 : For the simple truss shown in fig. find the axial force in bars AB, AF,AE, BC & CD.



Ex3: For the simple truss shown in fig. find the axial force in bars HD & HJ.



Solution

$\sum M_a = 0$

(hy *8) – (10*4) = 0 => hy = 5 kN

$\uparrow \sum f_y = 0$

ay – 10 – 5 = 0 => ay= 15 kN

ca, eh, fh, fe & ed = 0

For hd & hj use joint h

$\uparrow \sum f_y = 0$

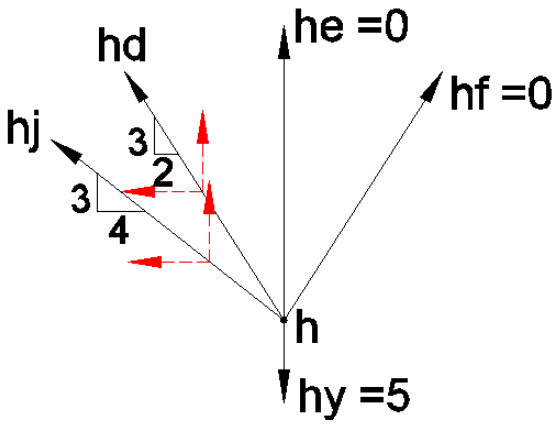
$hd * \frac{3}{\sqrt{13}} + hj * \frac{3}{5} = 5 \quad \ldots\ldots\ldots\ldots 1$

$\rightarrow \sum f_x = 0$

$-hd * \frac{2}{\sqrt{13}} - hj * \frac{4}{5} = 0$

$hd = -\frac{\sqrt{13}}{2} * \frac{4}{5} * hj \quad \ldots\ldots\ldots\ldots 2$

Sub equation 2 in equation 1



$$\left(-\frac{\sqrt{13}}{2} * \frac{4}{5} * \text{hj}\right) * \frac{3}{\sqrt{13}} + \left(\text{hj} * \frac{3}{5}\right) = 5$$

hj = -8.34 kN = 8.34 kN (Comp.)

$$\text{hd} = -\frac{\sqrt{13}}{2} * \frac{4}{5} * (-8.34) = 12 \text{ kN (Ten.)}$$

H.W: For the same example find axial force in bars aj & ad