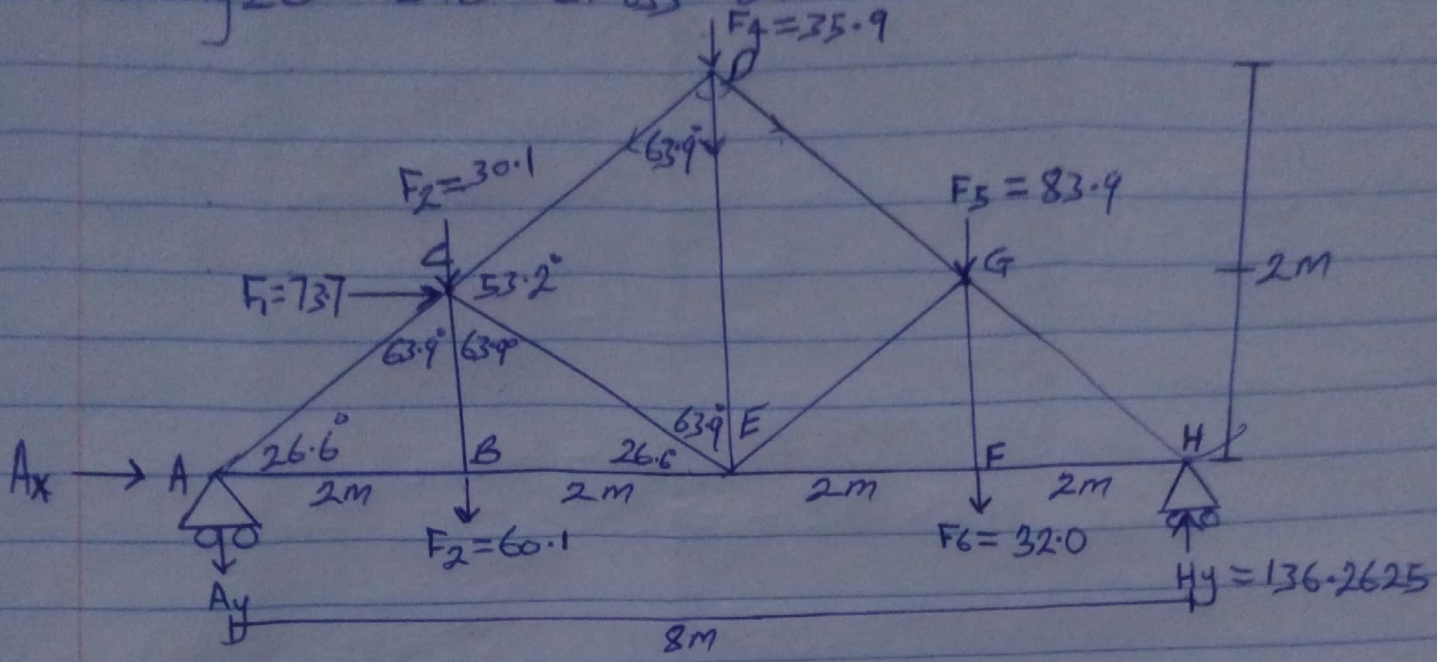
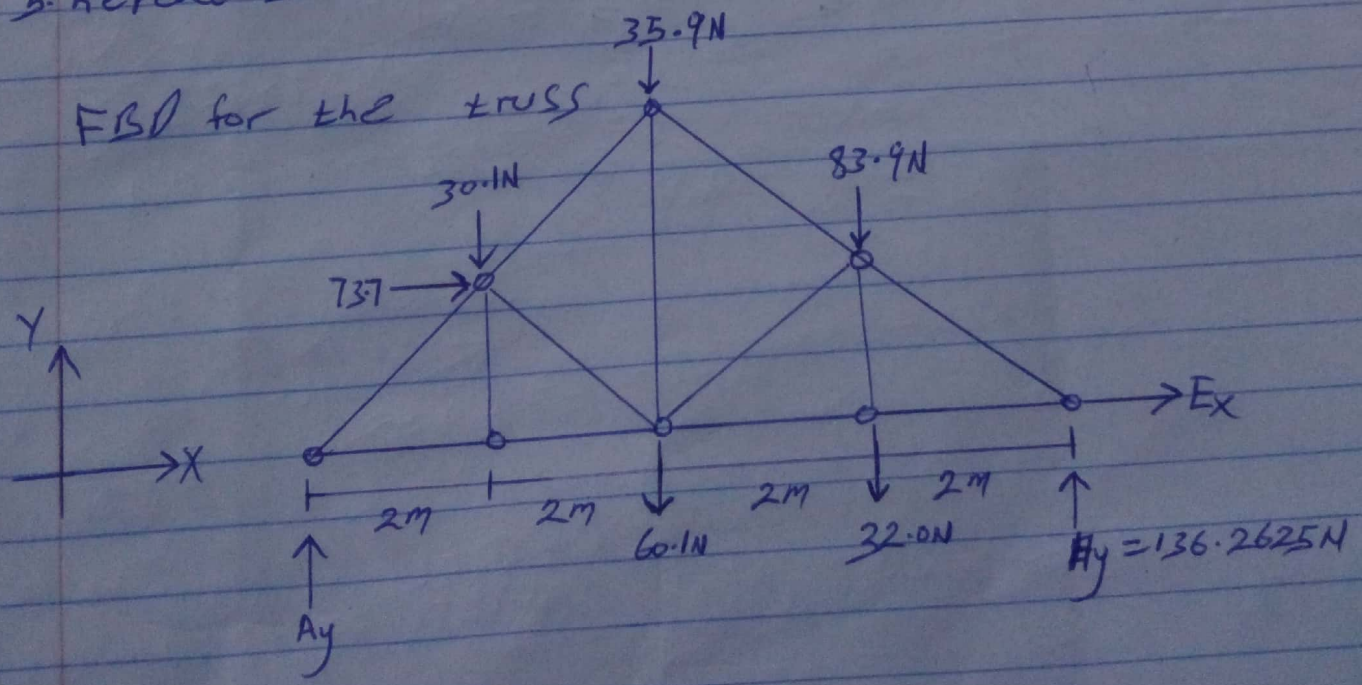
Analyze the truss below.



Let's apply Method of Joint to analyze the truss as per the Procedure below.

1. Find reaction forces
2. Identify joints with two unknowns
3. Draw FBD of the joint
4. Apply equation of equilibrium to solve for unknowns.
5. Repeat the Procedure as needed.

FBD for the truss



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Support reaction Forces

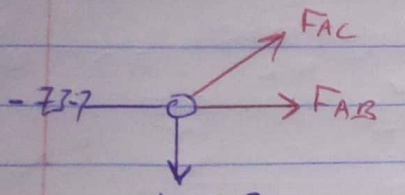
$\Sigma F_y = 0$

$30.1 + 60.1 + 35.9 + 83.9 + 32.0 - 126.2625 - A_y = 0$

$A_y = 105.7375$

$A_x = -73.7$ since $\Sigma f_x = 0 = A_x + 73.7$

FBD of node A



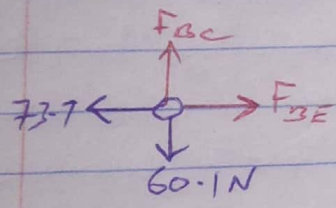
$\Sigma f_y = 0 = 105.7375 - F_{AC} \sin 26.6°$

$F_{AC} = 236.148N\ (T)$

$\Sigma f_x = 0 = -73.7 + F_{AB}$

$F_{AB} = 73.7N$

FBD of node B



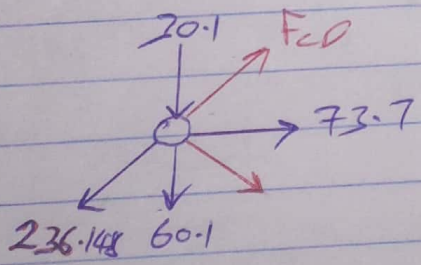
$\Sigma f_y = 0 = -60.1 + F_{BC} = 0$

$F_{BC} = 60.1N\ (T)$

$\Sigma f_x = 0 = 73.7 + F_{BE} = 0$

$F_{BE} = -73.7\ (C)$

FBD of node C



$\Sigma f_y = 0 = -30.1 - 60.1 - 236.148 \cos 63.9 + F_{CD} \sin 26.6 - F_{CE} \cos 63.9°$

$0.4478 F_{CD} - 194.09 - 0.8980 F_{CE} = 0$ ----(i)

$\Sigma f_x = 0 = 73.7 - 236.148 \sin 63.9 + F_{CD} \cos 26.6 + F_{CE} \cos 63.9$

$0.8942 F_{CD} - 138.37 + 0.4399 F_{CE} = 0$ ----(ii)

Solving the two eqns simultaneously $F_{CD} = 209.64N(T)$

$F_{CE} = -111.60N(C)$

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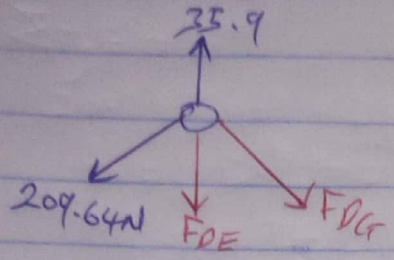
FBD of node D



$\Sigma f_y = 0 = 35.9 - F_{DE} - 113.12 \cos 63.9 - F_{DG} \cos 63.9$

$-35.9 - F_{DE} - 209.64 \cos 63.9 - F_{DG} \cos 63.9$

$-F_{DE} - 0.4399 F_{DG} = 128.13$

$F_{DE} + 0.4399 F_{DG} = -128.13$ ---(i)

$\Sigma f_x = 0 = -209.64 \sin 63.9 + F_{DG} \sin 63.9$

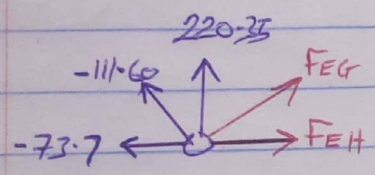
$-188.26 + 0.8980 F_{DG}$ ---(ii)

~~$\Sigma f_x = 0$~~ $F_{DG} = 209.64 (T)$

Substituting F_{DG} in eqn (i) above;

$F_{DE} = 220.35N (T)$

FBD of node E



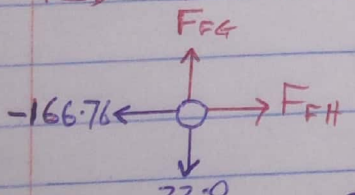
$\Sigma f_y = 0 = -111.60 \sin 26.6 + 220.35 + F_{EG} \sin 26.6 = 0$

$F_{EG} = -380.52N (C)$

$\Sigma f_x = 0 = -73.7 + F_{EF} + F_{EG} \cos 26.6 - 111.60 \cos 26.6 = 0$

$F_{EF} = -166.76 (C)$

FBD of node F



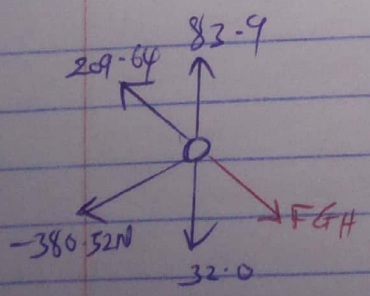
$\Sigma f_y = 0 = F_{FG} - 32.0 = 0$

$F_{FG} = 32.0 (T)$

$\Sigma f_x = 0 = -166.76 + F_{FH} = 0$

$F_{FH} = 166.76 N (T)$

FBD of node G



$\Sigma F_y = 0 = -83.9 + 32 - 380.52 \cos 63.9 + 209.64 \sin 26.6 + F_{GH} \cos 63.9 = 0$

$F_{GH} = 285.12N (T)$

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