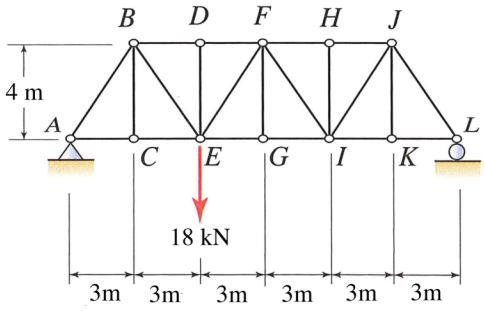
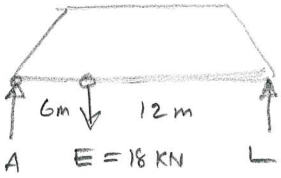
Determine the reactions and the forces in all members of the truss shown.



Step 1 Draw FBD of whole truss; solve for reactions at ***A*** and ***L***.



$\Sigma M_A = 0$

$E(6) = L(18)$

$L = 6$ KN

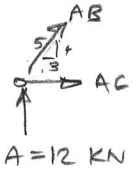
$\Sigma F_y = 0$

$A + L - E = 0$

$A = E - L = 12$ KN

Step 2 Draw FBD of Joint ***A***; solve for forces in members ***AB*** and ***AC***.

JOINT A



$\Sigma F_y = 0$

$\frac{4}{5}AB + A = 0$

$AB = -15$ KN

$= 15$ KN (C)

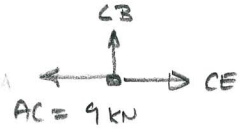
$\Sigma F_x = 0$

$AC = 3/5\ AB$

$AC = 9$ KN (T)

Step 3 Draw FBD of Joint ***C***; solve for forces in members ***CB*** and ***CE***.
Note this is Special Case y

JOINT C



$\Sigma F_x = 0$

$CE = AC$

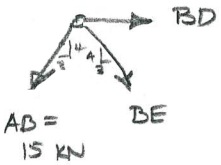
$CE = 9$ KN

$\Sigma F_y = 0$

$CB = 0$

Step 4 Draw FBD of Joint ***B***; solve for forces in members ***BE*** and ***BD***.

JOINT B



$\Sigma F_y = 0$

$-\frac{4}{5}AB - \frac{4}{5}BE = 0$

$BE = -AB$

$BE = 15$ KN (T)

$\Sigma F_x = 0$

$-\frac{3}{5}AB + \frac{3}{5}BE + BD = 0$

$BD = -(-9) - 9 = -18$ KN

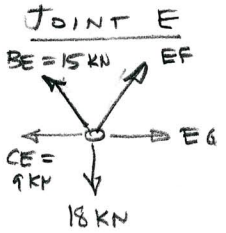
$BD = 18$ KN (C)

Step 5 Joint ***D*** is Special Case y; determine forces ***DF*** and ***DE***.

$DF = BD = 18$ KN (C)

$DE = 0$

Step 6 Draw FBD of Joint ***E***; solve for forces ***EF*** and ***EG***.



$\Sigma F_y = 0$

$\frac{4}{5}BE + \frac{4}{5}EF - 18 = 0$

$EF = \frac{5}{4}(18 - \frac{4}{5}15)$

$EF = 7.5 \text{ KN } (T)$

$\Sigma F_x = 0$

$-CE - \frac{3}{5}BE + \frac{3}{5}EF + EG = 0$

$EG = 9 + \frac{3}{5}(15) - \frac{3}{5}(7.5)$

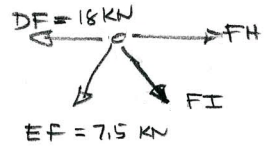
$EG = 13.5 \text{ KN } (T)$

Step 7 Joint ***G*** is Special Case y; determine Forces ***GF*** and ***GI***.

$GI = EG = 13.5 \text{ KN } (T)$

$GF = 0$

Step 8 Draw FBD of Joint ***F***; solve for forces ***FH*** and ***FI***.



$\Sigma F_y = 0$

$-\frac{4}{5}EF - \frac{4}{5}FI = 0$

$FI = -EF = -7.5$

$FI = 7.5 \text{ KN } (C)$

$\Sigma F_x = 0$

$DF - \frac{3}{5}EF + \frac{3}{5}FI + FH = 0$

$FH = -18 + \frac{3}{5}(7.5) - \frac{3}{5}(-7.5) = -9 \text{ KN}$

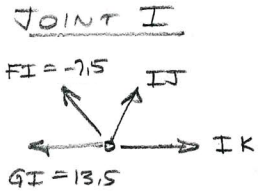
$FH = 9 \text{ KN } (C)$

Step 9 Joint ***H*** is Special Case y; determine forces ***HJ*** and ***HI***.

$HJ = FH = 9 \text{ KN } (C)$

$HI = 0$

Step 10 Draw FBD of Joint ***I***; solve for forced ***IJ*** and ***IK***.



$\Sigma F_y = 0$

$\frac{4}{5}IJ + \frac{4}{5}FI = 0$

$IJ = 7.5 \text{ KN } (T)$

$\Sigma F_x = 0$

$-GI - \frac{3}{5}FI + \frac{3}{5}IJ + IK = 0$

$IK = 13.5 - 4.5 - 4.5$

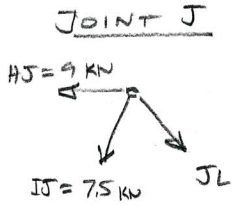
$IK = 4.5 \text{ KN } (T)$

Step 11 Joint ***K*** is Special Case y; determine forces ***KJ*** and ***KL***.

$KL = IK = 4.5 \text{ KN } (T)$

$KJ = 0$

Step 12 Draw FBD of Joint ***J***; determine force ***JL***.

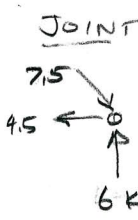


$\Sigma F_y = 0$

$-\frac{4}{5}JL - \frac{4}{5}IJ = 0$

$JL = -7.5 = 7.5 \text{ KN } (C)$

Step 13 Draw FBD of Joint ***L***; Verify that it is in equilibrium to check your work.



$\Sigma F_y = 0$

$\frac{4}{5}(7.5) = 6$

$\Sigma F_x = 0$

$\frac{3}{5}(7.5) = 4.5$

CHECK