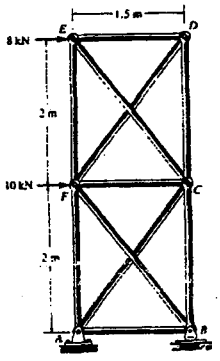
7-5. Determine (approximately) the force in each member of the truss. Assume the diagonals can support both tensile and compressive forces.



Support Reactions

$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad 8 + 10 - A_x = 0;\qquad A_x = 18\ \text{kN}$

$+\Sigma M_A = 0;\quad 8(4) + 10(2) - 1.5(B_y) = 0;\ B_y = 34.67\ \text{kN}$

$+\uparrow \Sigma F_y = 0;\qquad A_y = 34.67\ \text{kN}$

$V_{Panel} = 8\ \text{kN}$

$F_{EC} = \frac{5}{3}(4) = 6.67\ \text{kN (C)}$ **Ans**

$F_{DF} = \frac{5}{3}(4) = 6.67\ \text{kN (T)}$ **Ans**

$\circlearrowleft +\Sigma M_E = 0;\quad F_{DC}(1.5) - 6.67(\frac{4}{5})(1.5) = 0$

$F_{DC} = 5.33\ \text{kN (C)}$ **Ans**

$\circlearrowleft +\Sigma M_D = 0;\quad F_{EF}(1.5) - 6.67(\frac{4}{5})(1.5) = 0$

$F_{EF} = 5.33\ \text{kN (T)}$ **Ans**

Joint *D*

$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad F_{DE} - 6.67(\frac{3}{5}) = 0;\qquad F_{DE} = 4.0\ \text{kN (C)}$ **Ans**

$V_{Panel} = 18\ \text{kN}$

$F_{AC} = \frac{5}{3}(9) = 15.0\ \text{kN (T)}$ **Ans**

$F_{BF} = \frac{5}{3}(9) = 15.0\ \text{kN (C)}$ **Ans**

$\circlearrowleft +\Sigma M_A = 0;\quad 34.67(1.5) - F_{CB}(1.5) - 15.0(\frac{4}{5})(1.5) = 0$

$F_{CB} = 22.7\ \text{kN (C)}$ **Ans**

$\circlearrowleft +\Sigma M_B = 0;\quad 34.67(1.5) - F_{AF}(1.5) - 15.0(\frac{4}{5})(1.5) = 0$

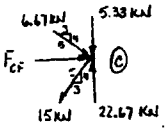
$F_{AF} = 22.7\ \text{kN (T)}$ **Ans**

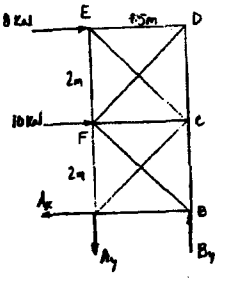
Joint *B*

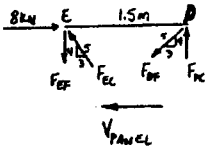
$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad -F_{AB} + 15(\frac{3}{5}) = 0;\qquad F_{AB} = 9.0\ \text{kN (T)}$ **Ans**

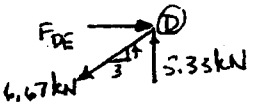
Joint *C*

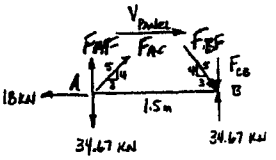
$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad 6.67(\frac{3}{5}) - 15(\frac{3}{5}) + F_{CF} = 0;\qquad F_{CF} = 5\ \text{kN (C)}$ **Ans**

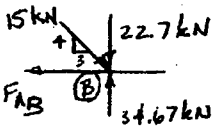




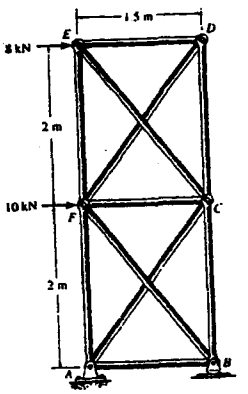


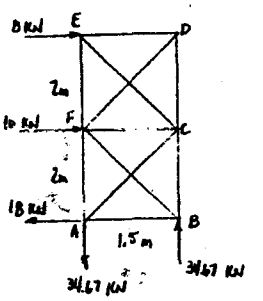






7-6. Solve Prob. 7–5 assuming that the diagonals cannot support a compressive force.





Assume the diagonals cannot support a compressive force.

$V_{Panel} = 8$ kN

$F_{EC} = 0$ (Assumption) Ans

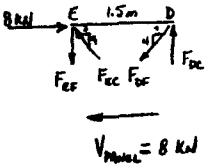
$F_{DF} = (\frac{5}{3})(8) = 13.33 = 13.3$ kN (T) Ans

$(+\Sigma M_D = 0;\quad F_{EF}(1.5) = 0$

$F_{EF} = 0$ Ans

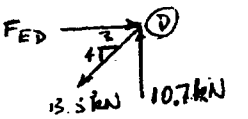
$(+\Sigma M_E = 0;\quad F_{DC}(1.5) - 13.33(\frac{4}{5})(1.5) = 0$

$F_{DC} = 10.7$ kN (C) Ans



Joint *D*

$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad F_{ED} - 13.33(\frac{3}{5}) = 0;\quad F_{ED} = 8.0$ kN (C) Ans



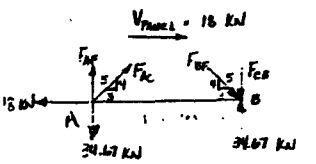
$V_{Panel} = 18$ kN

$F_{BF} = 0$ (Assumption) Ans

$F_{AC} = (\frac{5}{3})(18) = 30.0$ kN (T) Ans

$(+\Sigma M_A = 0;\quad 34.67(1.5) - F_{CB}(1.5) = 0$

$F_{CB} = 34.7$ kN (C) Ans



$(+\Sigma M_B = 0;\quad 34.67(1.5) - F_{AF}(1.5) - 30.0(\frac{4}{5})(1.5) = 0$

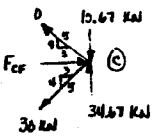
$F_{AF} = 10.7$ kN (T) Ans

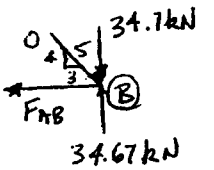
Joint *B*

$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad F_{AB} = 0$ Ans

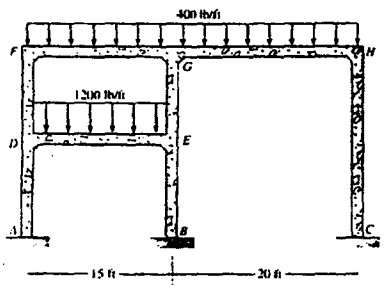
Joint *C*

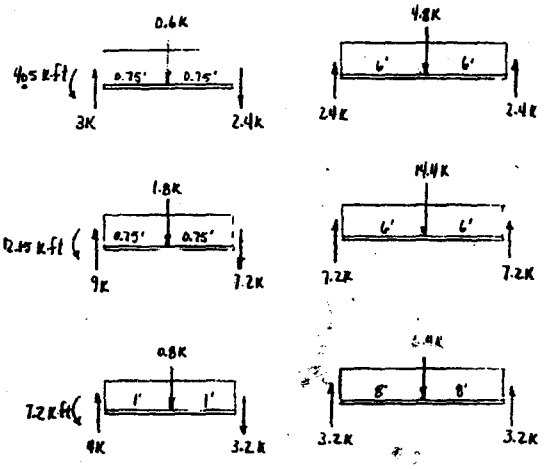
$\overset{+}{\rightarrow}\Sigma F_x = 0;\quad F_{CF} - 30(\frac{3}{5}) = 0;\quad F_{CF} = 18.0$ kN (C) Ans

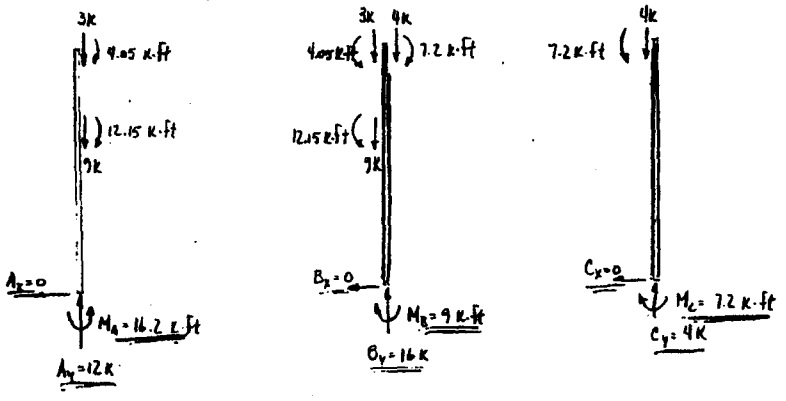




7-10. Determine (approximately) the support actions at *A*, *B*, and *C* of the frame.







$A_x = 0$	$B_x = 0$	$C_x = 0$	Ans
$A_y = 12$ k	$B_y = 16$ k	$C_y = 4$ k	Ans
$M_A = 16.2$ k·ft	$M_B = 9$ k·ft	$M_C = 7.2$ k·ft	Ans