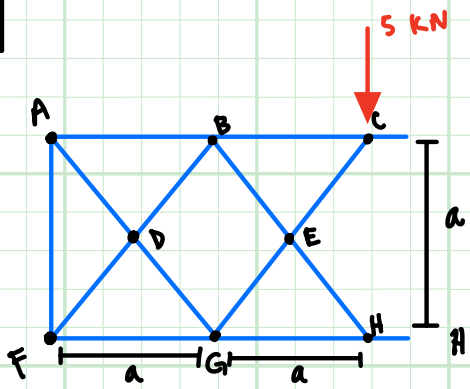
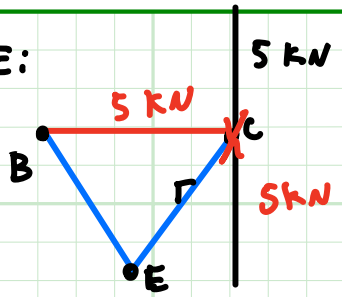
6.14



H = 5kN

Joint E:



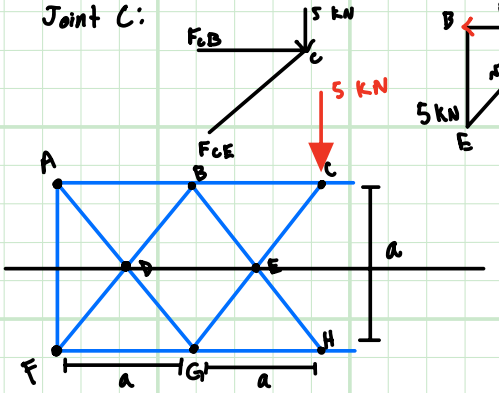
$F_{EC} = 5\sqrt{2} = 7.07$ kN C

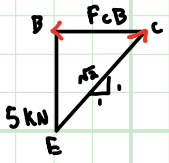
$F_{EG} = 7.07$ kN C

$F_{EH} = 7.07$ kN C

$F_{EB} = 7.07$ kN C

Joint C:





$F_{CB} = 5.00$ kN T

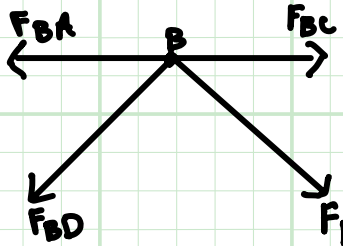
$F_{CE} = 5 \cdot \sqrt{2}$

$F_{CE} = 7.07$ kN C

$F_{HG} = 5.00$ kN T

$F_{HE} = 7.07$ kN C

Joint B:

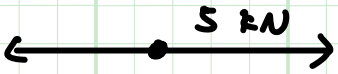


- We know $F_{BE} = 7.07$ kN

$\sum F_y = 0 : \frac{1}{\sqrt{2}}(7.07) - \frac{1}{\sqrt{2}}(F_{BD}) = 0$

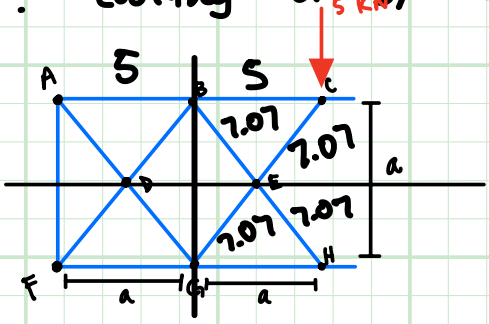
$F_{BD} = 7.07$ kN T

- we know $F_{BC} = 5.00$ kN



$5 - F_{BA} = 0$ $F_{BA} = 5.00$ kN C

Joint D: Looking at Symmetry :



$F_{DG} = 7.07$ kN T

$F_{DF} = 7.07$ kN T

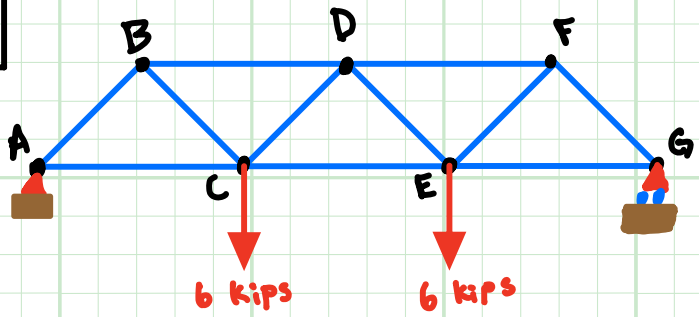
$F_{DA} = 7.07$ kN T

$F_{DB} = 7.07$ kN T

$F_{GF} = 5.00$ kN C

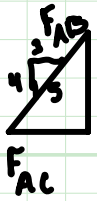
$F_{AF} = 5.00$ kN C

6.18



$A_y = G = \frac{1}{2}$ Total load $= 6$ kips

Joint A: $\frac{F_{AB}}{5} = \frac{F_{AC}}{3} = \frac{6}{4}$ kips



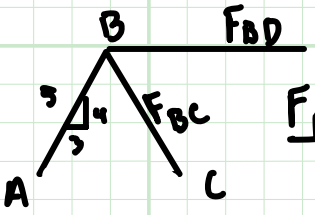
$\frac{F_{AB}}{5} = \frac{6}{4}$

$F_{AB} = 7.50$ kips C

$\frac{F_{AC}}{3} = \frac{6}{4}$

$F_{AC} = 4.50$ kips T

Joint B:

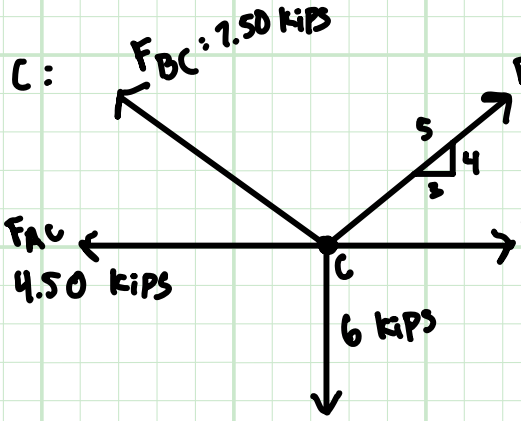


$\frac{F_{BC}}{5} = \frac{F_{BD}}{6} = \frac{7.50}{5}$

$F_{BC} = 7.50$ kips T

$F_{BD} = 9.00$ kips C

Joint C:



F_{CD}: $\sum F_y = 0$: $\frac{4}{5}(7.50) + \frac{4}{5}F_{CD} - 6 = 0$

$F_{CD} = 0$

F_{CE}: $F_{CE} - 4.5 - \frac{3}{5}(7.5) = 0$

$F_{CE} - 9 = 0$

$F_{CE} = 9.00$ kips T

Symmetry:

$F_{FG} = 7.50$ kips C

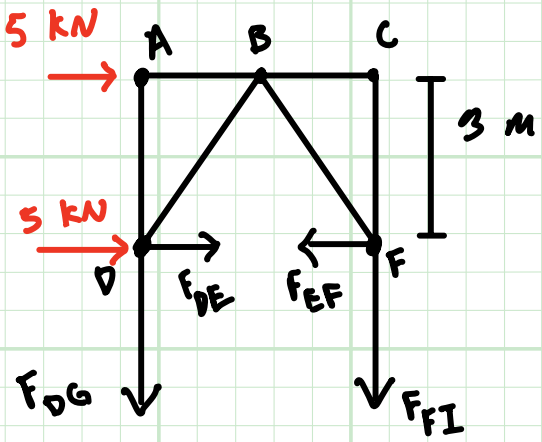
$F_{EG} = 4.50$ kips T

$F_{EF} = 7.50$ kips T

$F_{DF} = 9.00$ kips C

$F_{DE} = 0$

6.41



$\sum M_F = 0 : F_{DG}(4) - (5)(3) = 0$

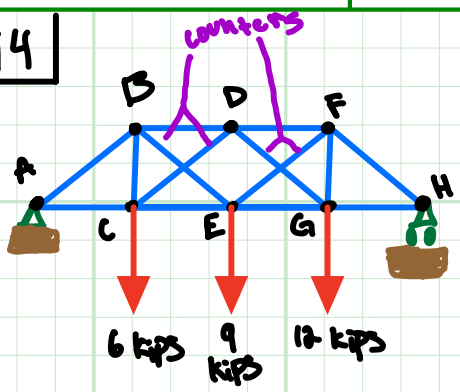
$F_{DG} = 3.75 \text{ kN T}$

$\sum F_{FI} = 0 : \quad -3.75 - F_{FI} = 0$

$F_{FI} = -3.75 \text{ kN C}$

$F_{FI} = 3.75 \text{ kN C}$

6.44



- need BE, CD, DG, EF

moment H:

$-6(8) - 9(16) - 12(24) + H_y(32) = 0$

$M_H = H_y(32) = 480$

$H_y = 15$ kips

- A_y: $\sum F_y = 0$

$-6 - 9 - 12 + H_y + A_y = 0$

$-27 + 15 + A_y = 0$

$A_y = 12$ kips

Joint C: 3, 4

$\tan^{-1}\left(\frac{3}{4}\right)$

$\theta = 36.87°$

$\sum F_{CD} = 0$

$-F_{CD} - F_{GD} = 0$

$-F_{CD} = F_{GD}$

$F_{CD} = 0$ $\quad F_{GD} = 0$

$\sum F_{BE} = 0$

$A_y - 6 - F_{BE}\sin(36.87°) + F_{CD}(\sin 36.87°) = 0$

$12 - 6 - F_{BE}(\sin 36.87) + 0 = 0$

$F_{BE} = 9.999$ kips $=$ 10.00 kips

$\sum F_{FE} = 0$

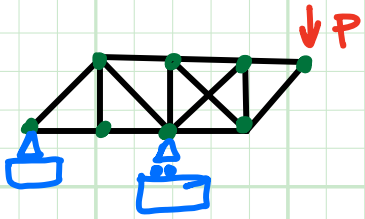
$H_y - 12 - F_{FE}(\sin 36.87) + F_{GD}(\sin 36.87) = 0$

$15 - 12 - F_{FE}(\sin 36.87) + 0 = 0$

$F_{FE} = 4.999 =$ 5.00 kips

6.48

a)



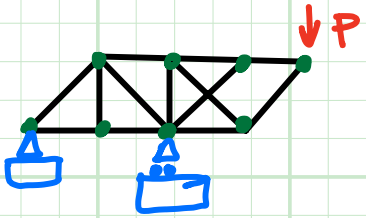
$n = 8$
$m = 14$
$r = 3$

- rigid truss

$r + m = 17$
$2n = 16$

$17 > 16$ ∴ completely constrained but indeterminate

b)



- simple truss

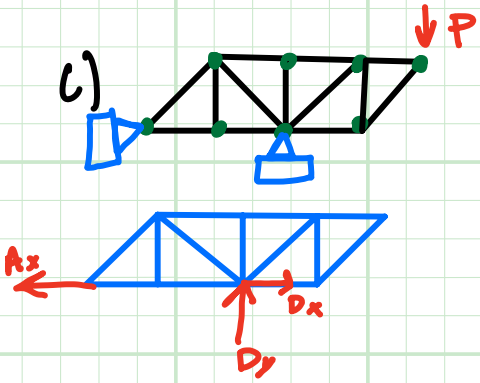
$n = 8$ ∴ $m = 2(8) - 3 = 13$

$r = 3$

$r + m = 16$
$2n = 16$

$16 = 16$ ∴ completely constrained and determinate

c)



- simple truss

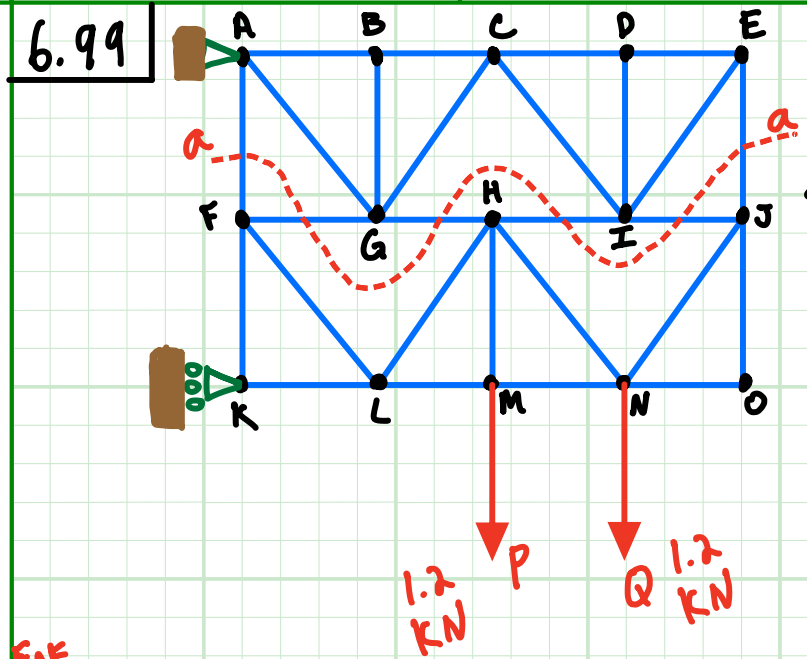
$r = 3$ $n = 8$ $m = 2(8) - 3 = 13$

$r + m = 16$
$2 \cdot n = 16$

$16 = 16$ but now A_x and D_x are collinear

∴ improperly constrained

6.99

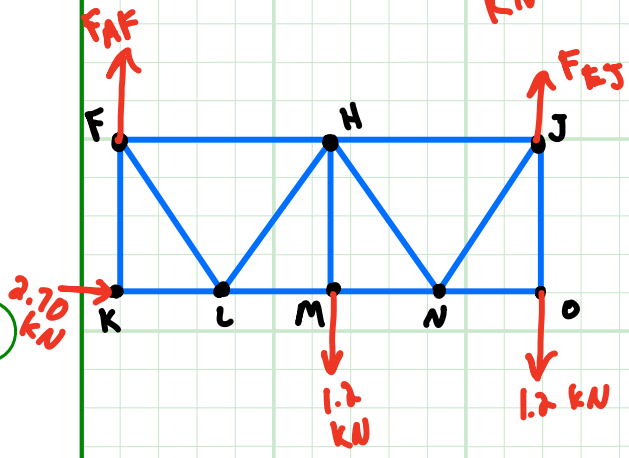


AF = ? EJ = ?

- can take moment A:

$\sum M_A$: K(8) - 1.2(6) - 1.2(12) = 0

K = +2.70 kN



- take moment F:

$\sum M_F$: $F_{EJ}(12) + 2.70(4) - 1.2(6) - 1.2(12) = 0$

$F_{EJ}(12) = 10.8$

$F_{EJ} = 0.900$ kN

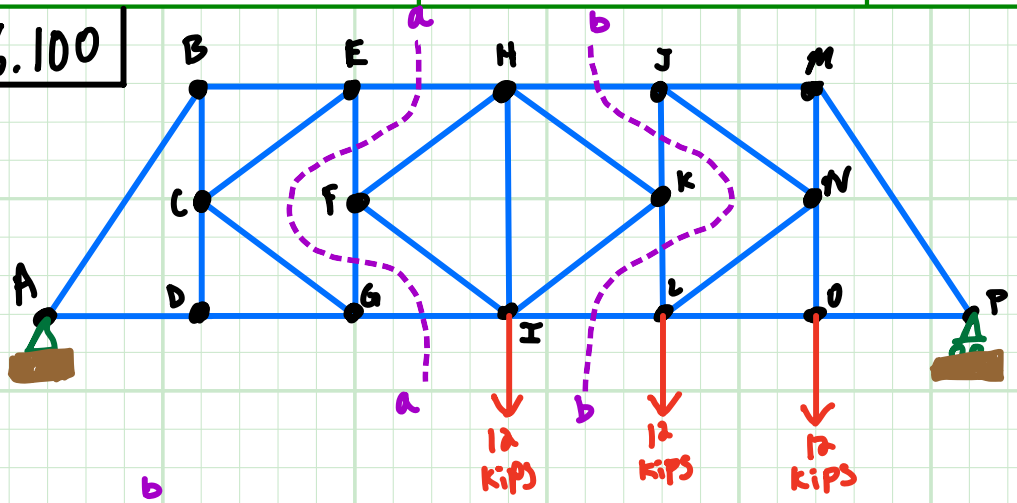
- now take F_{AF} :

$F_{AF} + 0.9 - 1.2 - 1.2 = 0$

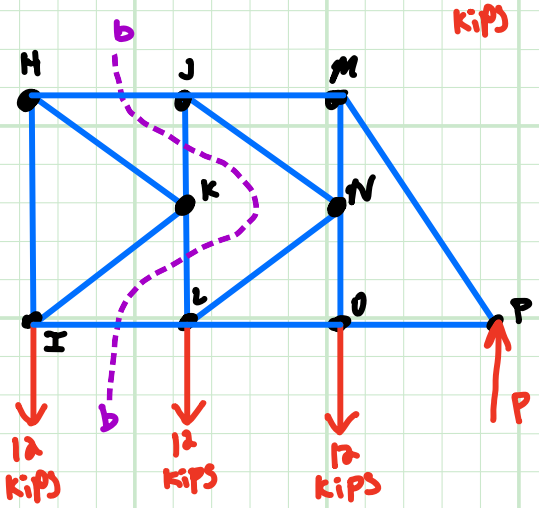
$F_{AF} = 1.5$ kN

$F_{AF} = 1.500$ kN

6.100



- want HJ and IL
- cut it in half and take moment P



$\sum M_P$: $12(45) + 12(30) + 12(15) - A_y(90)$

$A_y = 12$ kips ↑

P: $12 - 12 - 12 - 12 + P = 0$

$P = 24$ kips

$\sum M_L$: $F_{HJ}(16) - 12(15) + 24(30) = 0$

$F_{HJ} = -33.75$ kips

$F_{HJ} = 33.8$ kips

$\sum F_x = 0$: $-33.75 - F_{IL} = 0$

$F_{IL} = 33.75$

$F_{IL} = 33.8$ kips