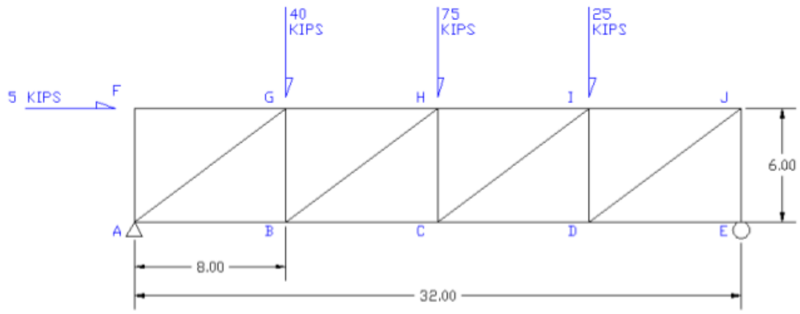
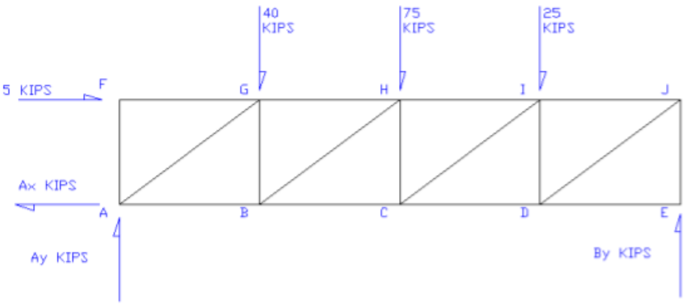
in this example, we are given a truss (see figure below) and we are tasked with finding the force in members HI, CI, & CD.

an alternative method to the method of joints for determining the internal forces for trusses is called the method of sections (MOS).

we will solve for the reactions as normal. once we have these reactions, we will seek the forces in selected members of the truss. since we don't need to determine the force in every member, it would be better to utilize a method which targets just the forces we want to determine (e.g. HI, CI, CD). hence, the MOS.



check out the free-body diagram (reactions removed and replaced with force vectors)

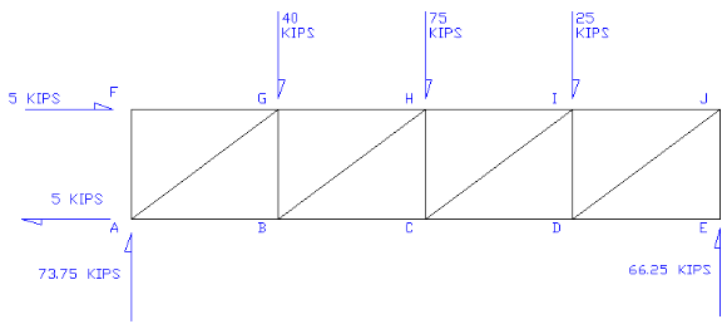


see the force table below - verify the answers before proceeding on to the MOS solution.

problem description
*note: load locations are referenced to left edge of beam

beam length		32	ft
item	label	desc	location*
reaction	A	pin	0
reaction	B	roller	32
point loads (Y/N)			Y
mag (lbs)	40000	75000	25000
location*	8	16	24
A-momen	320000	1200000	600000
B-arms	24	16	8
B-momen	960000	1200000	200000
By	66250		
	32		
Ay	73750		
check?	0		

see the figure below for the solution labels

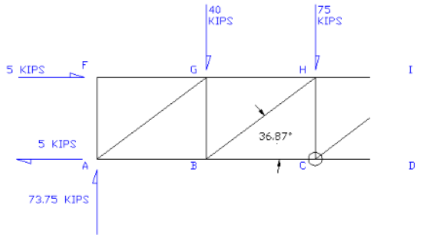


now that the reactions are set, we can target solutions for HI, CI, & CD.

for the MOS we
1) cut or "section" the truss. we can only cut through three unknowns, as we have only 3 equations of equilibrium to help us solve for these unknowns.
2) where we cut depends on the unknowns. we will cut the truss through the desired unknowns, leaving them as "external forces"
3) we solve the problem just like we are determining reactions. that's right, just like determining reactions.

all external forces come into play (reactions and applied loads). the "unknowns" are treated as external forces as mentioned above.

solution overview: we will have to do at least one moment sum. often, after the moment sum a force sum in both the vertical and horizontal directions will determine all the unknowns for a particular problem.



see the "sectioned" truss above. note that HI, CI, & CD are now external forces.

we will use the equations of equilibrium to solve for the unknowns. now, if we sum moments about point C (small circle in above figure) CI & CD drop out (no moment arm - no moment) we can solve for HI. we assume all the unknowns are tensile (pull away from truss).

sum Mc=0 (kips-ft)
0=-(73.75)(16)-(5)(6)+(40)(8)-HI(6)

[note: if HI is tensile, it creates a negative moment]

0=-890-HI(6)
HI=-148.33 kips
HI=148.33 kips (C)

[note: the negative sign means the we assumed the wrong direction for HI. HI should be compressive]

next, we utilize a vertical force sum to determine CI. why? because CI is the only unknown with a vertical (or "y") component.

sum Fy = 0 (kips)
0=+73.75-40-75+CI*sin(36.87)
0=-41.25+CI*sin(36.87)
CI=68.75 kips (T)

[note: positive sign indicates correct assumption (tensile)

next, we utilize a horizontal force sum to determine CD. since we've used a moment sum about C and summed forces in the y-direction, we can sum forces in the x-direction to determine CD.

sum Fx = 0 (kips)
0=-5+5+CI*cos(36.87)+CD
0=55+CD
CD=-55 kips
CD=55 kips (C)

[note: negative sign indicates incorrect assumption (tensile). CD is actually compressive.