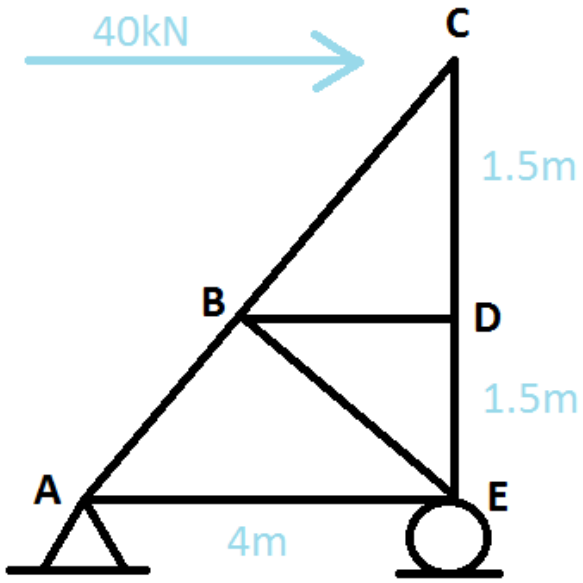
TRUSS DEFLECTION

28th December '15

Q: Find the bar forces in AB, BC, BD, CD, DE, BE, AE & the value of Δ_C.



Solution:

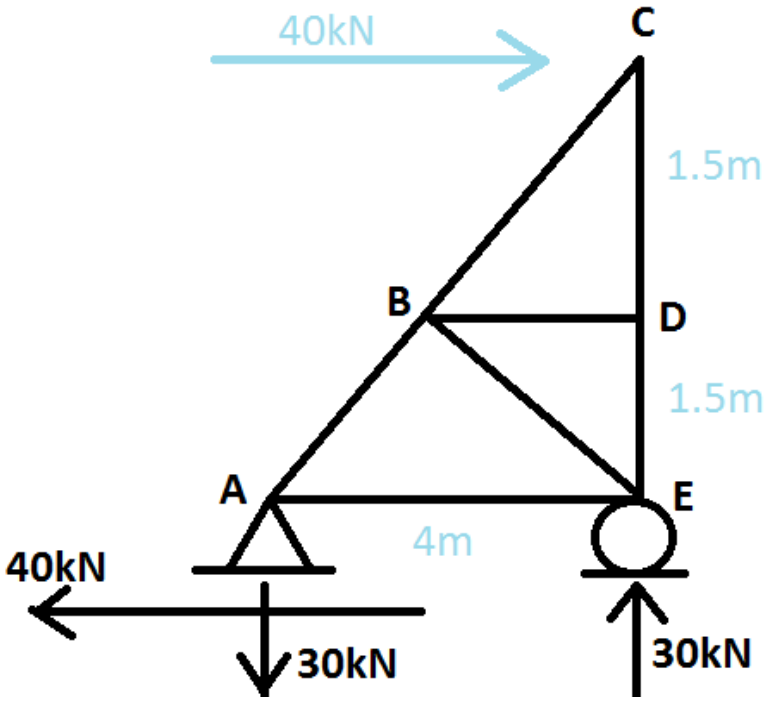
$\Sigma F_x = 0$

or, $R_{AX} + 40 = 0$

$\therefore R_{AX} = -40kN$

$\Sigma M_A = 0$

or, $-R_{EY}*4 + 40*3 = 0$



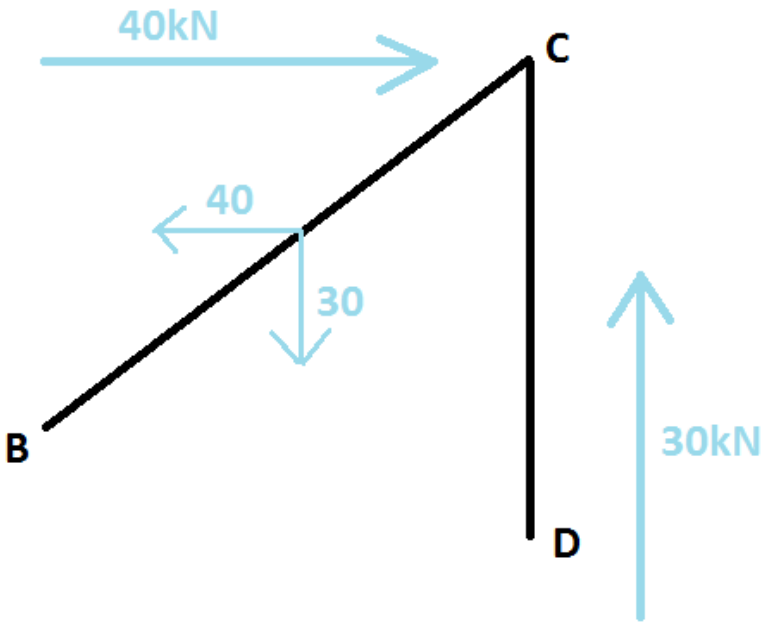
$\therefore R_{EY} = 30kN$

$\Sigma F_Y = 0$

or, $R_{AY} + 30 = 0$

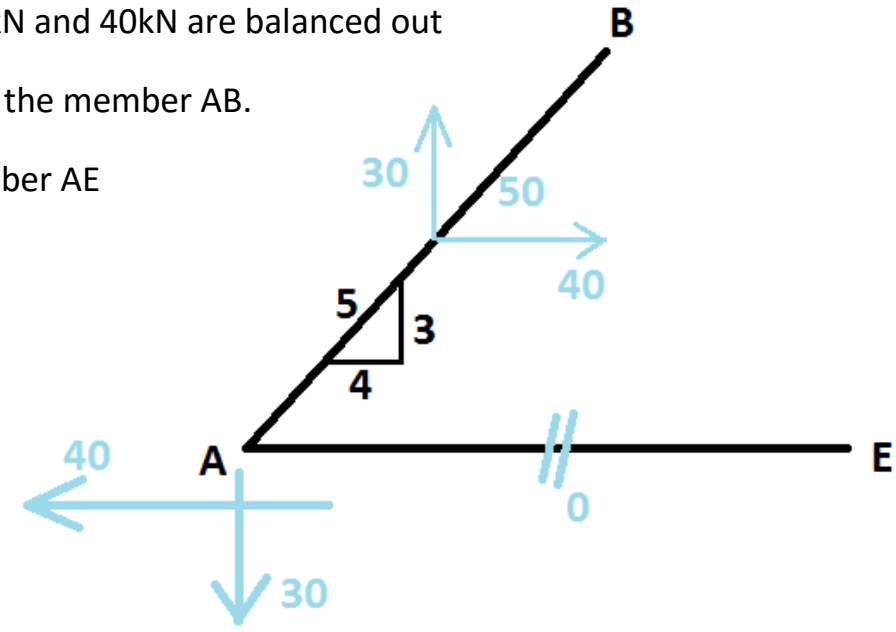
$\therefore R_{AY} = -30kN$

At C, the vertical 30kN load and the horizontal 40kN are being balanced out by the components in the member BC.



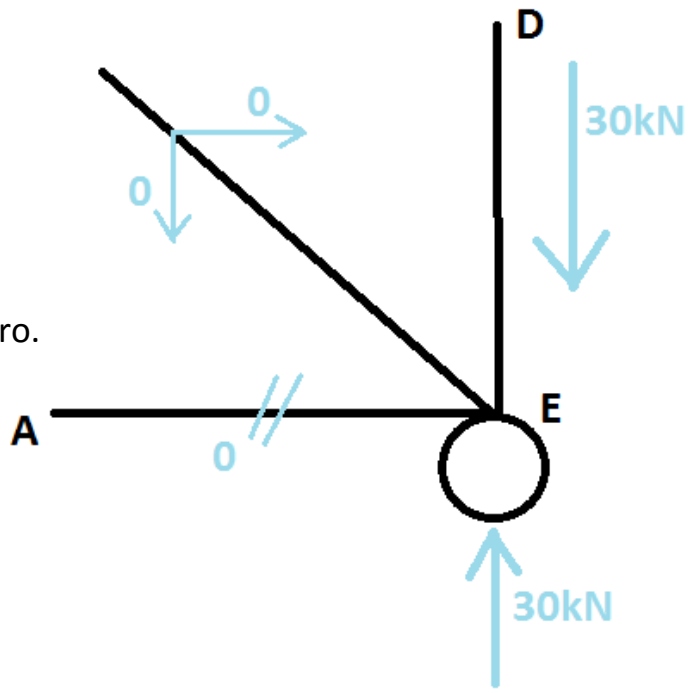
At A, the reactions 30kN and 40kN are balanced out by the components in the member AB.

The axial force in member AE is zero.

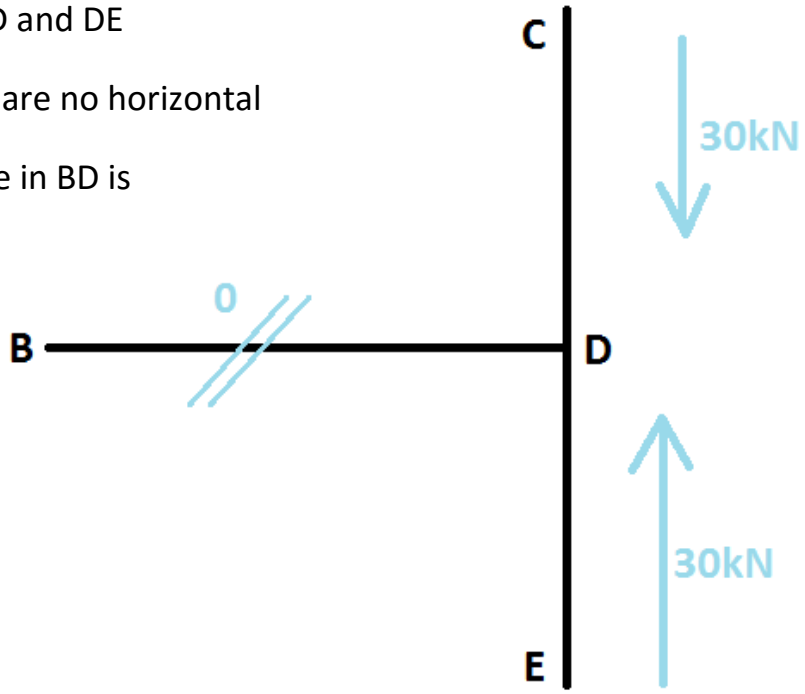


At E, the reaction of 30kN and the axial force in member DE balance each other out.

The vertical and horizontal components of BE are zero. The acial force in AE is also zero.

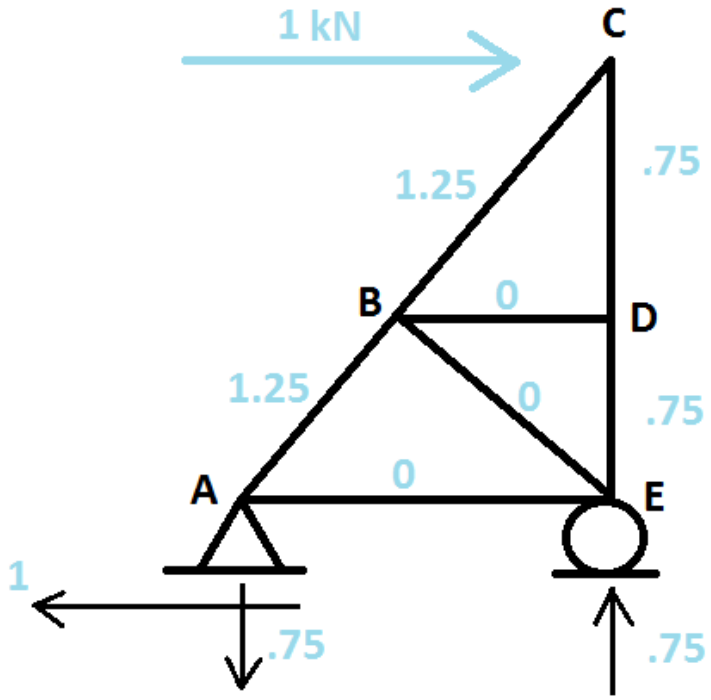


At D, the axial forces in members CD and DE balance each other out. Since there are no horizontal loads or forces acting, the axial force in BD is zero.



For Δ_C :

The virtual loading diagram is-



Bar	Length (m)	Constant A&E	Bar force due to actual load,N0(kN)	Bar force due to virtual load,N1(kN)	$N_0 N_1 L/AE$
AB	2.5	-	+50	+1.25	156.25/AE
BC	2.5	-	+50	+1.25	156.25/AE
CD	1.5	-	-30	-0.75	33.75/AE
DE	1.5	-	-30	-0.75	33.75/AE
AE	4	-	0	0	0
BD	-	-	0	0	0
BE	-	-	0	0	0
					$\Sigma N_0 N_1 L/AE = 380.0/AE$

$\therefore \Delta_c = 380/AE.$

So, the deflection will be to the right direction.

Done by: Ms. Sama Ahmed