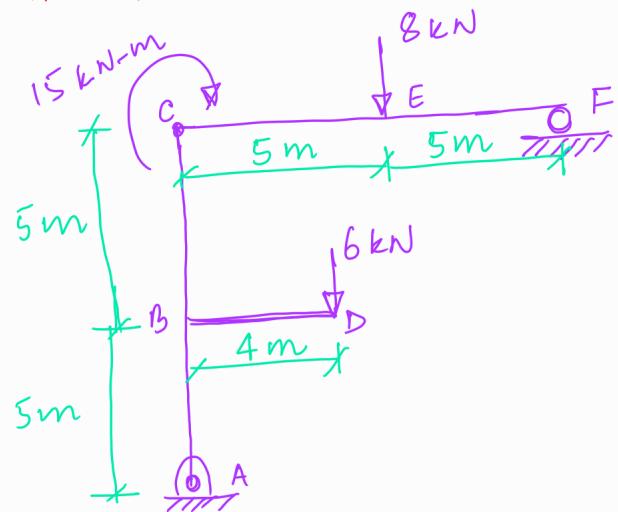
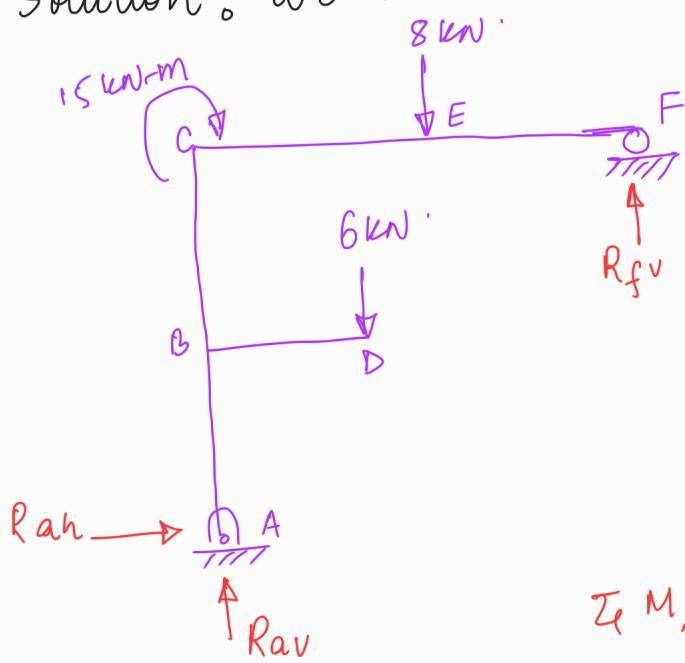


Q.1 \Rightarrow Determine the reaction for the structure given below?



Solution: We are asked to calculate reactions at A and F



- Note:
- ① Direction of reaction at A and F are assumed!
 - ② A is hinge support, so there will be two reacⁿ's
 - ③ F is roller support, so there will be one reacⁿ.

$$\sum M_A = 0 \quad \text{Ans.}$$

$$+15 + 8 \times 5 - R_{fv} \times 10 + 6 \times 4 = 0$$

$$\therefore R_{fv} = 7.9 \text{ kN} \quad \underline{\text{Ans}}$$

$$\sum F_y = 0 \quad \text{Ans.}$$

$$+R_{av} - 6 - 8 + R_{fv} = 0$$

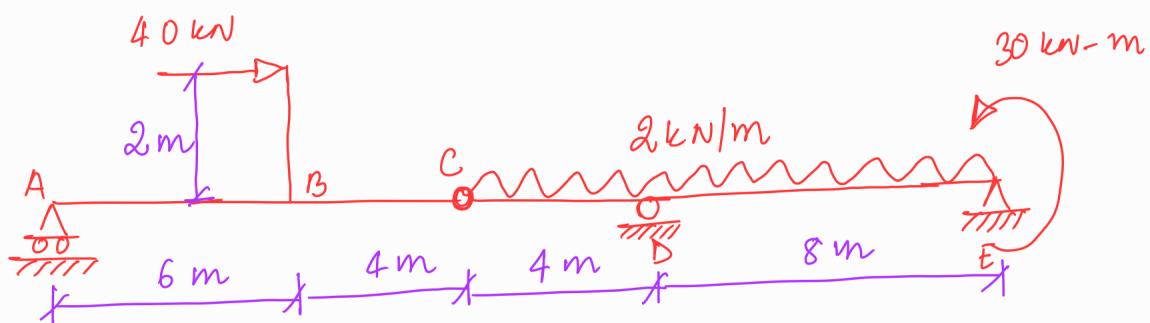
$$\therefore +R_{av} - 6 - 8 + 7.9 = 0$$

$$\Rightarrow \therefore R_{av} = 6.1 \text{ kN.} \quad \underline{\text{Ans.}}$$

$$\sum F_x = 0 \quad \text{Ans.}$$

$$+R_{ah} = 0 \quad \underline{\text{Ans.}}$$

Q.2 : Name the different supports to the given problem and find the reactions at supports; alongwith the force transmitted at the hinge at C.

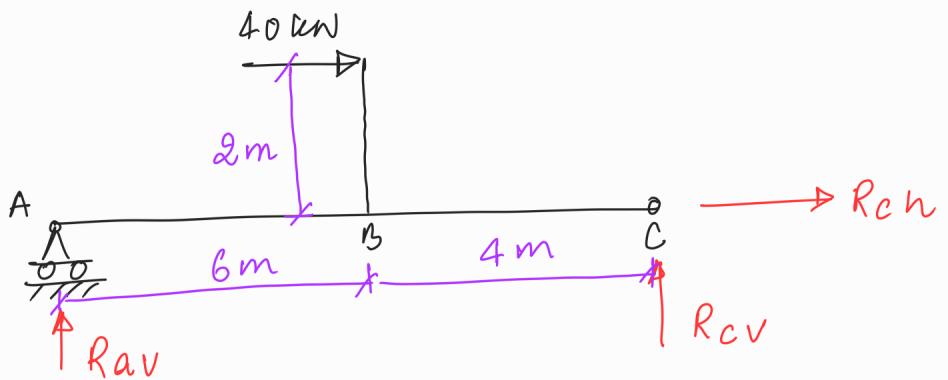


Solution : A = Roller support (only one reaction). (Rav)

B = Roller support (only one reaction). (Rav)

C = Simple support (two reactions) (Reh, Rev)

- Since in the question it has been asked to calculate the force transmitted at point C, that's why, we will break this structure into two elements/members.
- Let us say first member is (ABC) and second member is (CDE).
- Now solve this problem by drawing the Free body diagram (FBD) and writing down equation of equilibrium.



$$\text{If } M_A = 0 \quad \rightarrow +\text{ve}$$

$$+ 40 \times 2 - R_{cv} \times 10 = 0$$

$$\therefore R_{cv} = 8 \text{ kN} \quad \uparrow$$

$$\text{If } F_x = 0 \quad \rightarrow +\text{ve}$$

$$+ 40 + R_{ch} = 0$$

$$\therefore R_{ch} = -40 \text{ kN} \quad \leftarrow$$

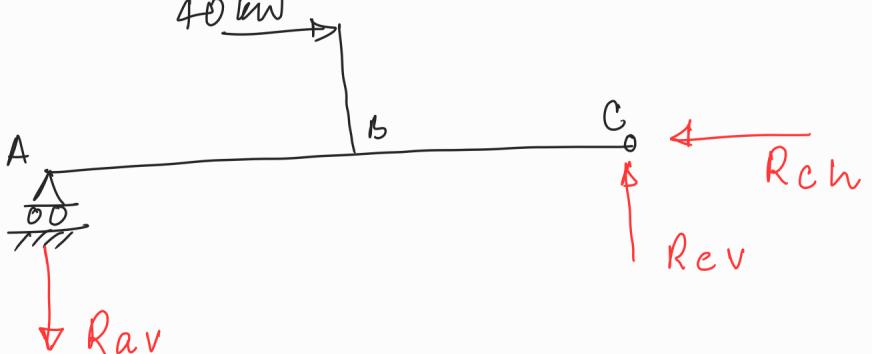
$$\text{If } F_y = 0 \quad \uparrow +\text{ve}$$

$$+ R_{av} + R_{cv} = 0$$

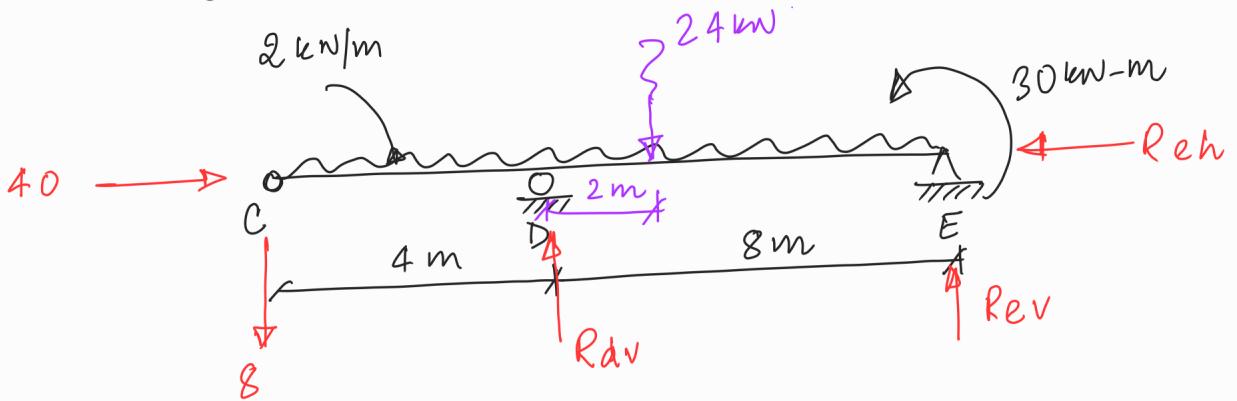
$$+ R_{av} + 8 = 0$$

$$\therefore R_{av} = -8 \text{ kN} \quad \downarrow$$

So final diagram for the forces in member ABC



Now Free body diagram for member C DE



$$\sum M_D = 0 \quad \text{Ans.}$$

$$+ 24 \times 2 - Rev \times 8 - 8 \times 4 - 30 = 0$$

$$\therefore Rev = -1.75 \text{ kN} \quad \text{Ans.}$$

$$\sum F_y = 0 \quad \text{Ans.}$$

$$-8 - 1.75 + Radv - 24 = 0$$

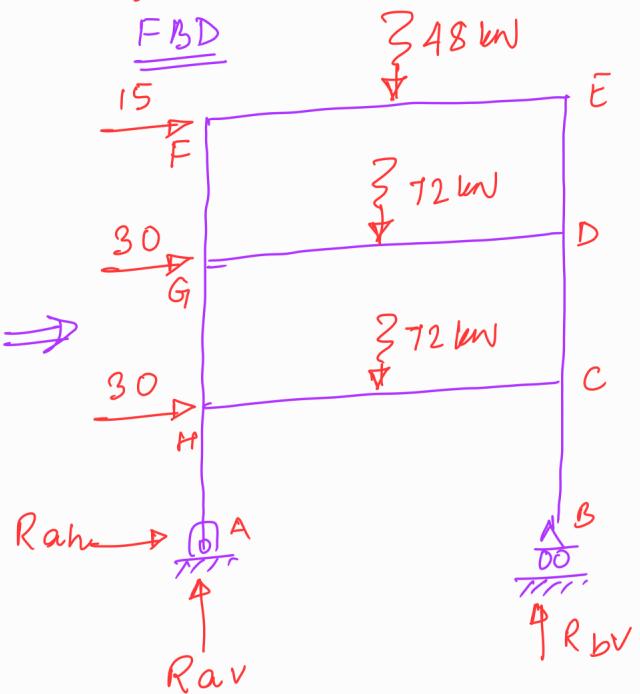
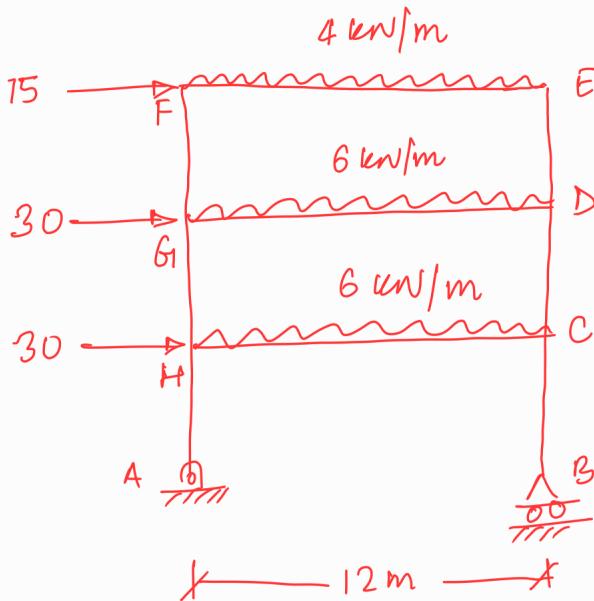
$$\therefore Radv = 33.75 \text{ kN} \quad \text{Ans.}$$

$$\sum F_x = 0 \quad \text{Ans.}$$

$$+ 40 - Reh = 0$$

$$\therefore Reh = 40 \text{ kN} \quad \text{Ans.}$$

Q.3 Determine the support reaction for the frame shown:



Solution:

$$\sum F_x = 0 \rightarrow +ve$$

$$+ R_{AH} + 15 + 30 + 30 = 0$$

$$\therefore R_{AH} = -75 \text{ kN} \quad \text{--- (1)}$$

$$\sum F_y = 0 \uparrow +ve$$

$$+ R_{AV} - 48 - 72 - 72 + R_{BV} = 0$$

$$\therefore R_{AV} + R_{BV} = 192 \quad \text{--- (2)}$$

$$\sum M_A = 0 \rightarrow +ve$$

$$- R_{BV} \times 12 + \underline{30 \times 6} + \underline{30 \times 10} + \underline{15 \times 13} + \underline{48 \times 6} + \underline{72 \times 6} + \underline{72 \times 6} = 0$$

$$\therefore R_{BV} = 152.25 \text{ kN} \quad \text{--- (3)}$$

$$\therefore R_{AV} = 192 - 152.25 = 39.75 \text{ kN} \quad \underline{\underline{\text{Ans.}}}$$

