

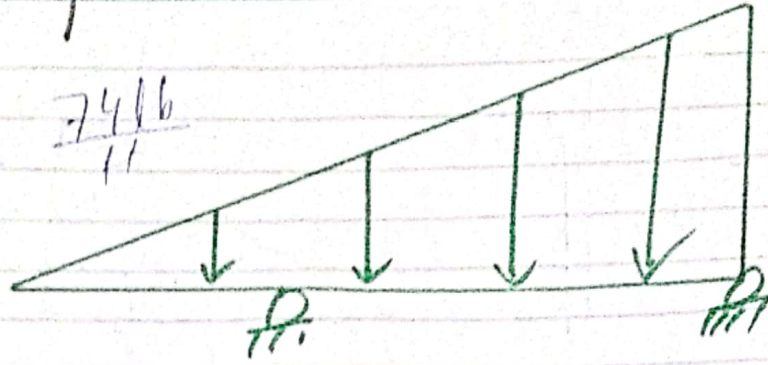
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Sub: Structure

(2:1)

$$\frac{Plb}{\delta t} = \frac{7416}{11}$$



$$\begin{aligned} \text{Total load} &= \frac{1}{2} (L \times w) \\ &= \frac{1}{2} (74 \times 24) \end{aligned}$$

$$\boxed{T.L = 888 \text{ lb}}$$

$$\sum M_B = 0$$

$$\frac{1}{2} \times 74 \times 24 \times \frac{1}{3} (24) = R_A \times 24$$

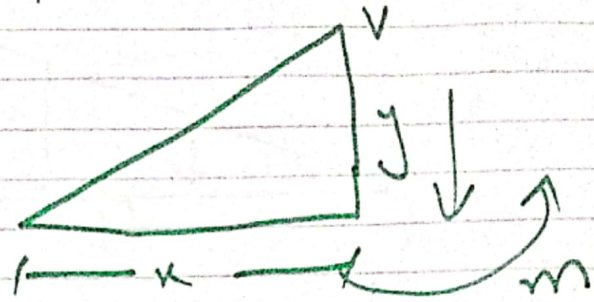
$$\boxed{R_A = 473.6}$$

$$\sum \Sigma y = 0 \uparrow$$

$$R_A + R_B = \frac{1}{2} \times 74 \times 24$$

$$\boxed{R_B = 888 \text{ lb}}$$

Now taking Section:



for y

$$y/x = \frac{74}{24}$$

$$y = \left[\frac{74}{24} \right] x$$

$$\text{So } \Sigma fy = 0 \quad \uparrow +$$

$$-\frac{1}{2} \times x \left[\frac{74}{24} \right] x - V_c = 0$$

$$V_c = -\frac{1}{2} x (2.58) x$$

$$V_c = -\frac{2.58 x^2}{2}$$

at $x=0$

$$V_c = 0$$

and at $x=9$

$$V_c = -163.688$$

$$M = -\frac{1}{2} \times x \times \left(\frac{74}{24} \right) x \times \frac{1}{x^3} x$$

$$M = -\frac{74x^2}{144}$$

at $x=0$

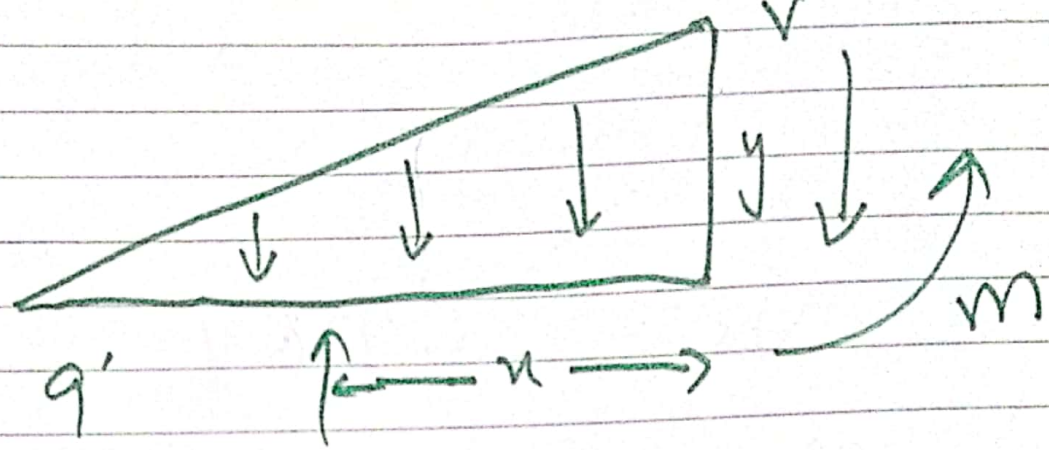
$$M = 0$$

at $x=9$

$$M = \frac{-74(9)^2}{144}$$

$$M = -41.625$$

Now for Section 2



for y

$$\frac{y}{(x+9)} = \frac{97}{24}$$

$$y = \frac{97(x+9)}{24}$$

So $\sum fy = 0 \uparrow$

$$396.8 - \frac{1}{2} (x+9) \left[\frac{97}{24} (x+9) \right] - V_c = 0$$

$$V_c = \frac{97(x+9)^2}{48} + 396.8$$

at $x = 0$

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$$V_c = 396.8$$

$$\text{at } u = 15$$

$$V_c = -4438.11$$

$$M + \frac{1}{2} \times (u+9) \left(\frac{74}{24} \right) (u+9) \times \frac{1}{3} (u+9)$$

$$= 396.8 = 0$$

$$M = 396.8 - \frac{74}{144} (u+9)(u+9)^2$$

$$\text{at } u = 0$$

$$M = \cancel{403.8} 398.0625 \text{ b-ft}$$

$$\text{at } u = 15$$

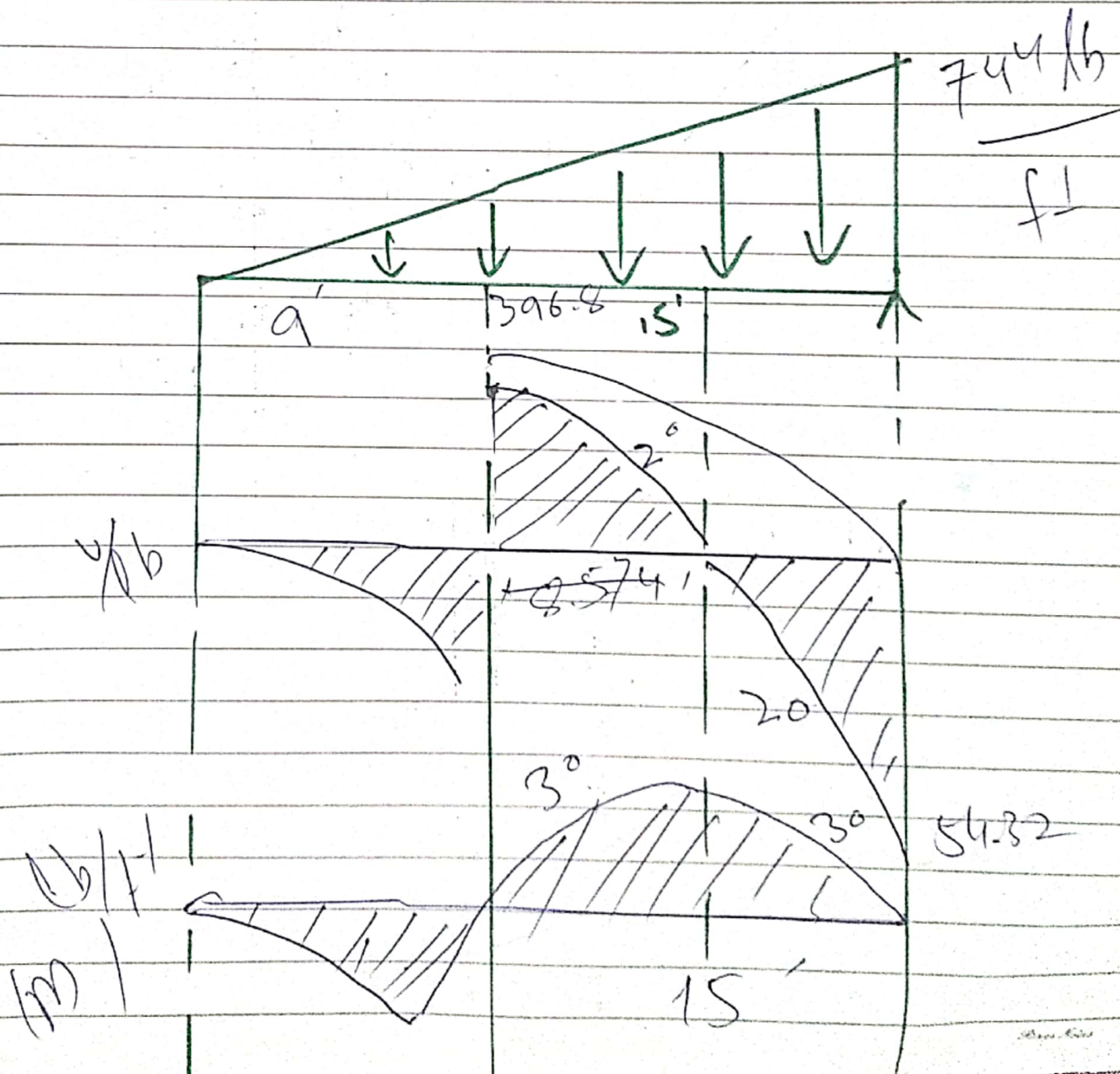
$$M = 396.8 - \frac{74(u+9)^3}{144}$$

$$\text{at } u = 0$$

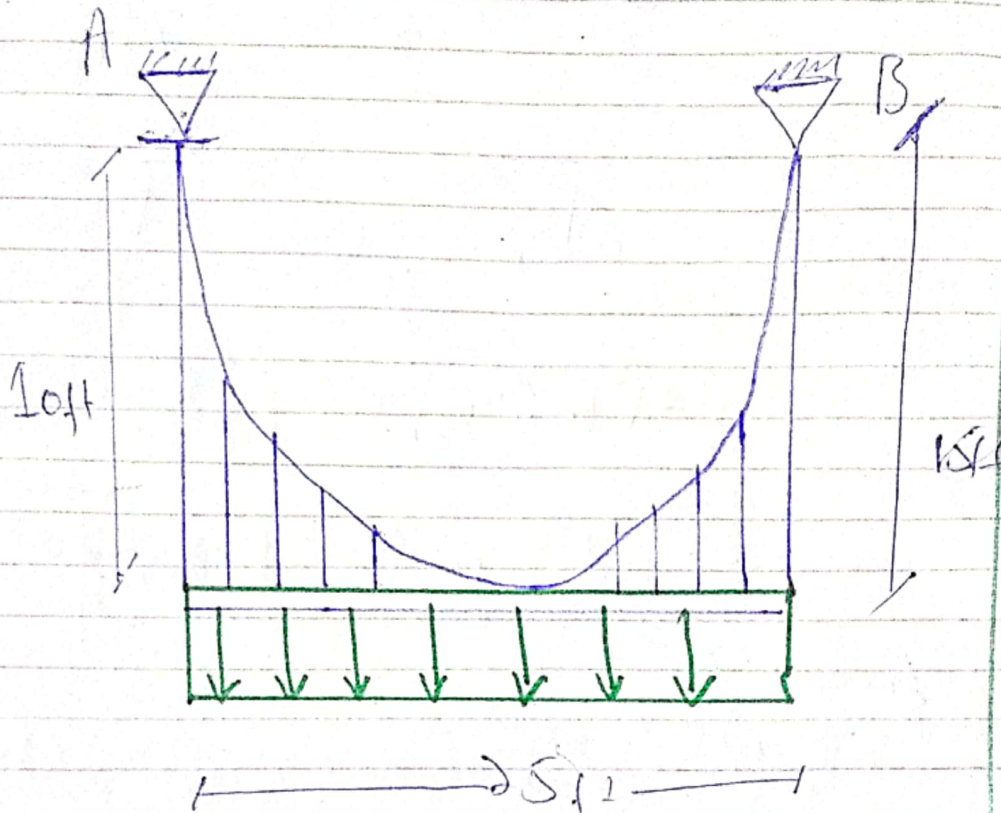
$$M = 398.062 \text{ ft}$$

at $x = 15$

$$M = 0$$



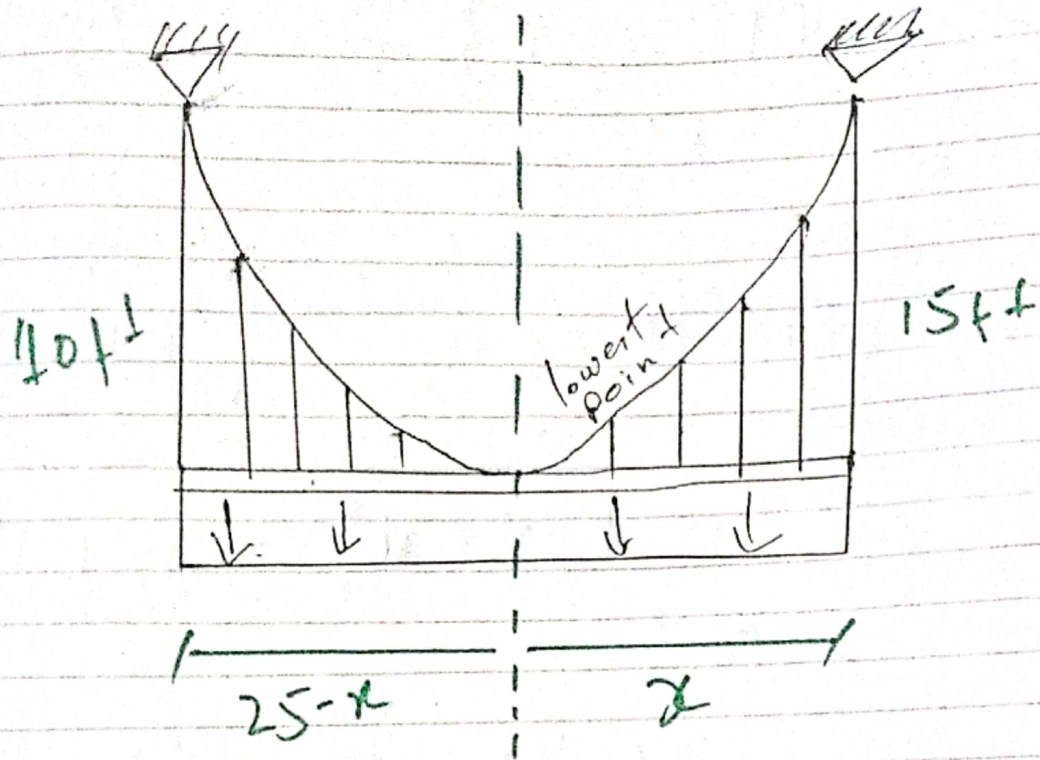
Q: 2



$$\frac{P \text{ lb}}{\text{ft}} = \frac{874 \text{ lb}}{\text{ft}}$$

Solution:

As the given cable have different heights, we will divide into two for better illustration.



$$FH_1 = \frac{WL_1^2}{2h} \quad , \quad FH_2 = \frac{WL_2^2}{2h}$$

$$FH_1 = \frac{874(25-x)^2}{2(10)}$$

$$FH_2 = \frac{874(x)^2}{2(15)}$$

As we know

$$FH_1 = FH_2$$

$$\frac{437}{874} (25-x)^2 = \frac{437}{874} (x)^2$$

$$\sqrt{43.7(25-x)^2} = \sqrt{29.13(x)^2}$$

$$43.7(25-x) = 29.13(x)$$

$$x = L_1 = 13.758'$$

As x has been determined So,

$$\Rightarrow 25-x = 25-13.758'$$

$$L_1 = 11.242$$

S

$$F_H = \frac{874(11.24)^2}{2 \times 10}$$

$$F_H = 379016$$

Now find T_{max} (TA)

$$T_{max} = \sqrt{(F_H)^2 + (W_oL)^2}$$

$$T_{max} = \sqrt{(379016)^2 + (982376)^2}$$

$$T = 1052916$$

$$\uparrow A_y = 98237616$$

$$F_H = A_x \quad T_{ension} = TA$$

$$379016$$

$$11.24'$$

$$874(11.24) = 98237616$$

Now for T_B

$$\sum F_y = 0$$

$$B_y + A_y - 874(25) = 0$$

$$B_y + 9823 - 21850 = 0$$

$$B_y - 12161.12 = 0$$

$$B_y = 12161.12$$

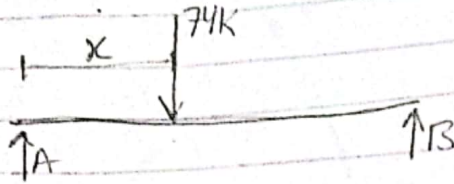
$$T_B = \sqrt{B_x^2 + B_y^2}$$

$$T_B = \sqrt{(39701)^2 + (12161.12)^2}$$

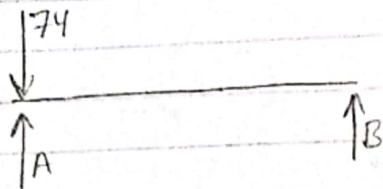
$$T_B = 12738.08 \text{ lb}$$

Q:3

first to find influence line



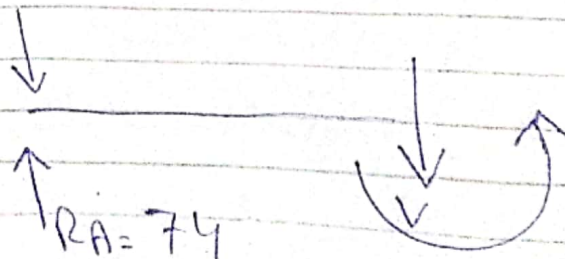
$$x=0 \quad V_c = ?$$



$$\sum M_B = 0$$

$$-R_A(16) + 74(16) = 0$$

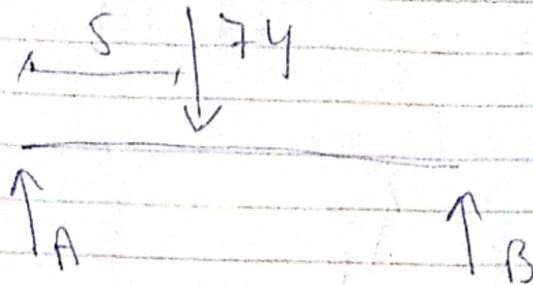
$$R_A = 74$$



$$74 - 74 - V_c = 0$$

$$V_c = 0$$

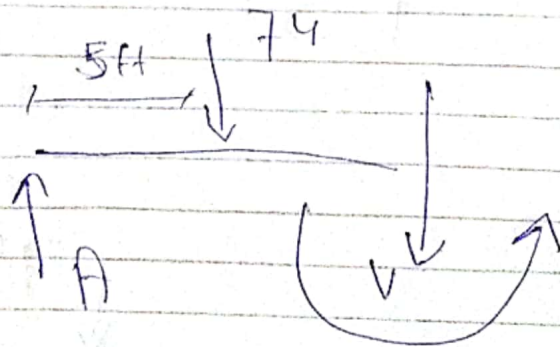
$$x_c = 5$$



$$\sum M_B = 0$$

$$-R_A(16) + 74(11) = 0$$

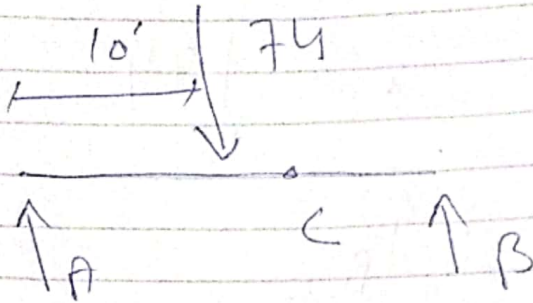
$$R_A = 50.875 \text{ K}$$



$$50.875 - 74 - V_c = 0$$

$$V_c = -23.125$$

$$x = 10$$

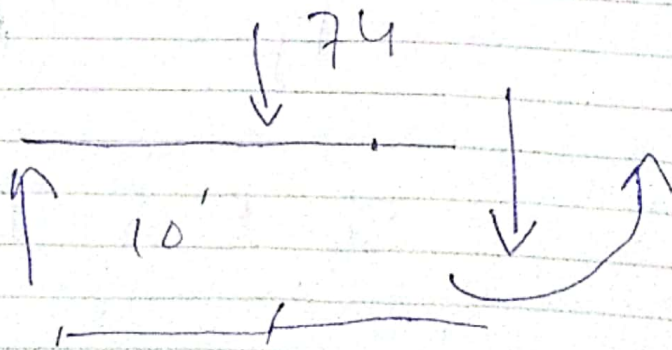


$$V_c = ?$$

$$\sum M_b = 0$$

$$-R_A(16) + 74(6) = 0$$

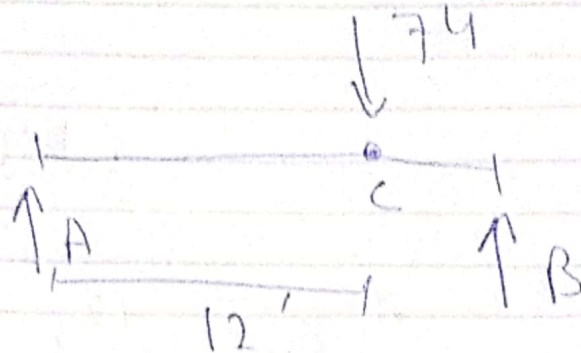
$$R_A = 27.75 \text{ K}$$



$$27.75 - 74 - V_c = 0$$

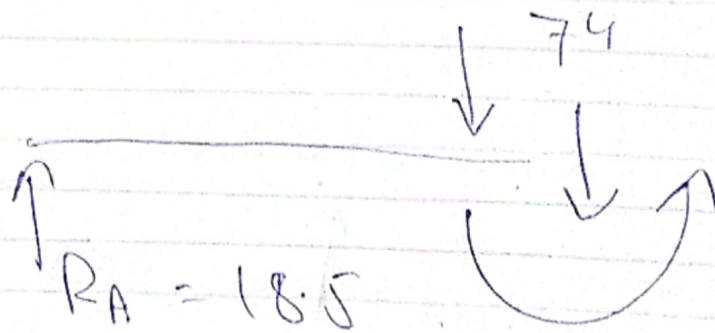
$$V_c = -46.25$$

$$x = 12$$



$$74(4) - R_A(16) = 0$$

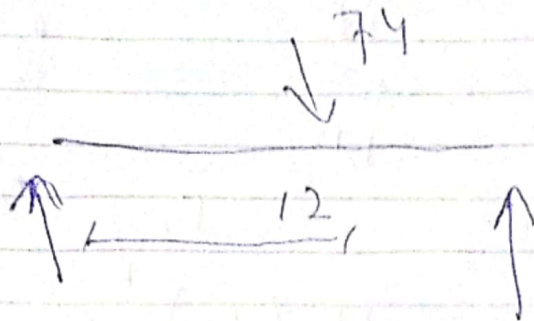
$$R_A = 18.5$$



$$18.5 - 74 - V_C = 0$$

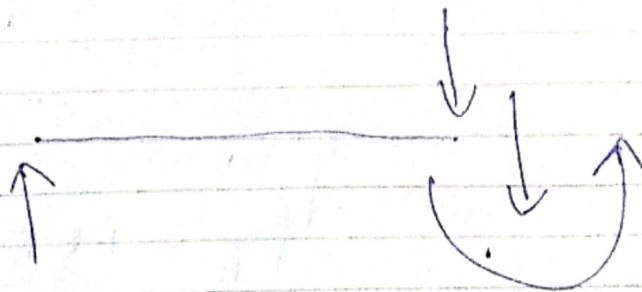
$$V_C = -55.5 \text{ k}$$

$$J_C = 12'$$



$$-R_A(16) + 74(4) = 0$$

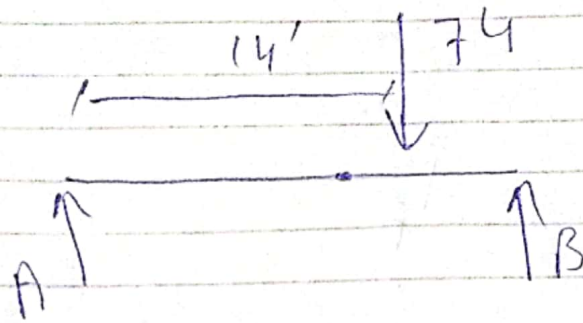
$$R_A = 18.5 \text{ K}$$



$$18.5 - V_C = 0$$

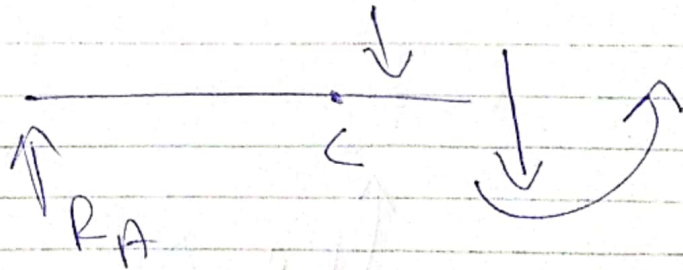
$$V_C = 18.5 \text{ K}$$

$$\sum C = 14$$



$$-R_A(16) + 74(2) = 0$$

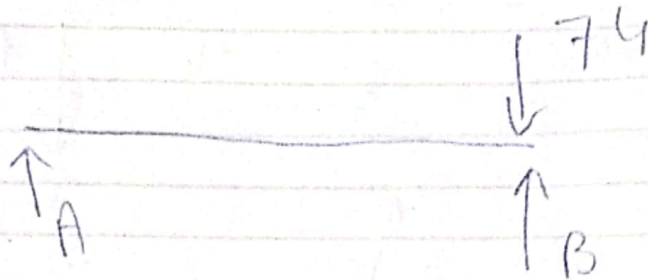
$$R_A = 9.25$$



$$9.25 - V_C = 0$$

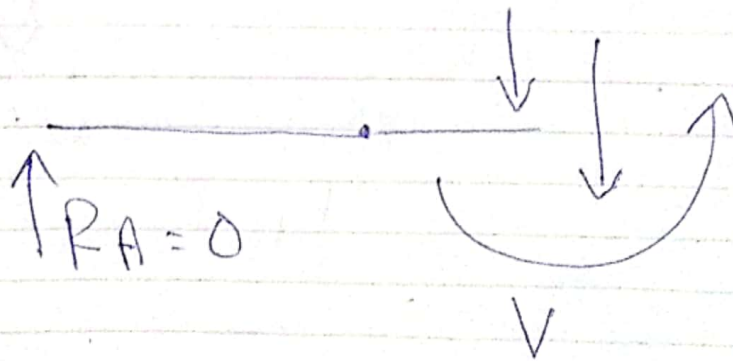
$$V_C = 9.25$$

$$x = 16$$



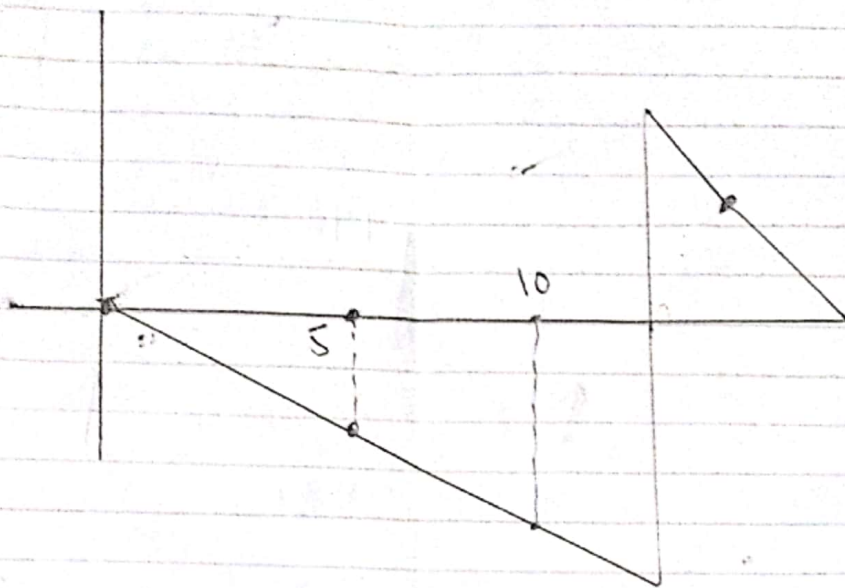
$$-R_A(16) + 74(0) = 0$$

$$R_A = 0$$



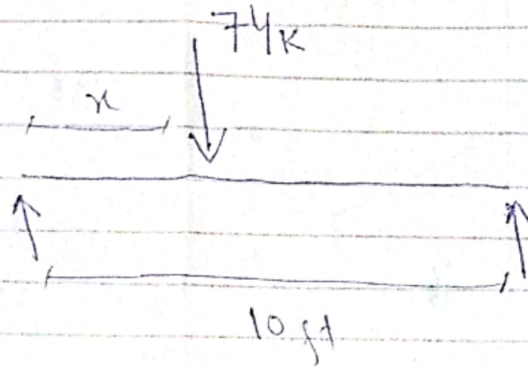
$$0 - V_c = 0$$

$$V_c = 0$$



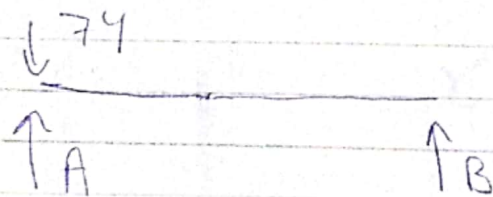
x	V_c
0	0
5	-23.125
10	-46.25
12 ⁻	-55.5
12 ⁺	18.5
14	9.25
16	0

To find Influence
line Reaction R_A



$$x=0$$

$$V_c = ?$$

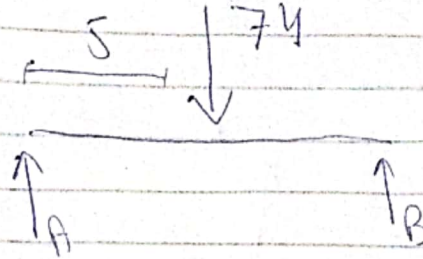


$$\sum M_B = 0$$

$$-R_A(16) + 74(16) = 0$$

$$R_A = 74$$

$$x = 5$$

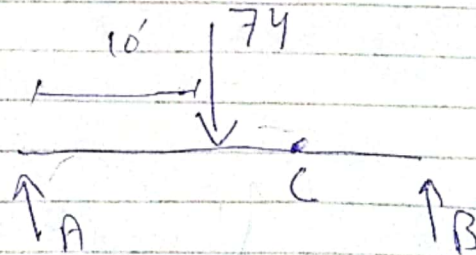


$$+\circlearrowleft \Sigma M_B = 0$$

$$-R_A(16) + 74(11) = 0$$

$$R_A = 50.875 \text{ k}$$

$$x = 10$$



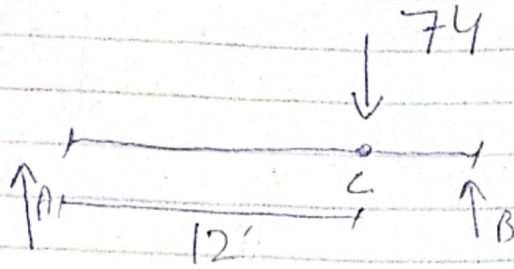
$$+\circlearrowleft \Sigma M_b = 0$$

$$V_c = ?$$

$$-R_A(16) + 74(6) = 0$$

$$R_A = 27.75 \text{ k}$$

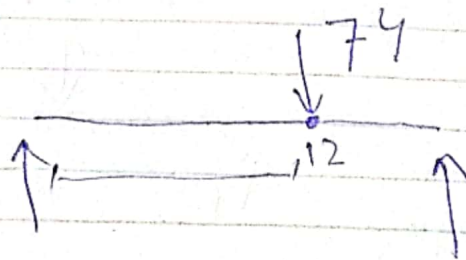
$$x = 12$$



$$74(4) - R_A(16) = 0$$

$$R_A = 18.5$$

$$x = 12'$$



$$-R_A(16) + 74(4) = 0$$

$$R_A = 18.5 \text{ K}$$