NAME = Junaid Khan

ID No = 7766

Section = C

instructor = Eng-Saqib Khan

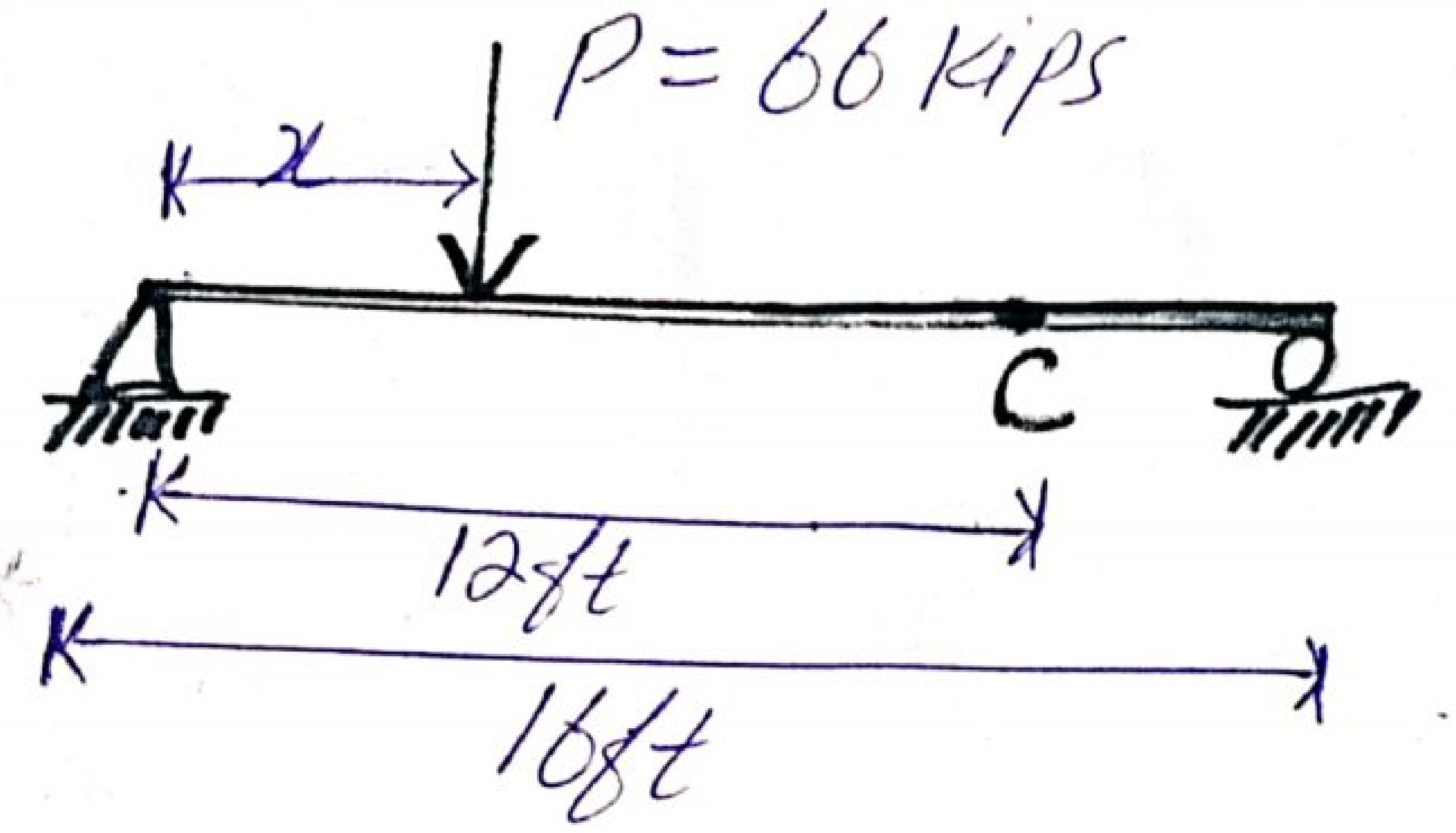
Department = BE civil

Date = 26/9/2020

Scanned with CamScanner

"Ans#03:.

: influence line :

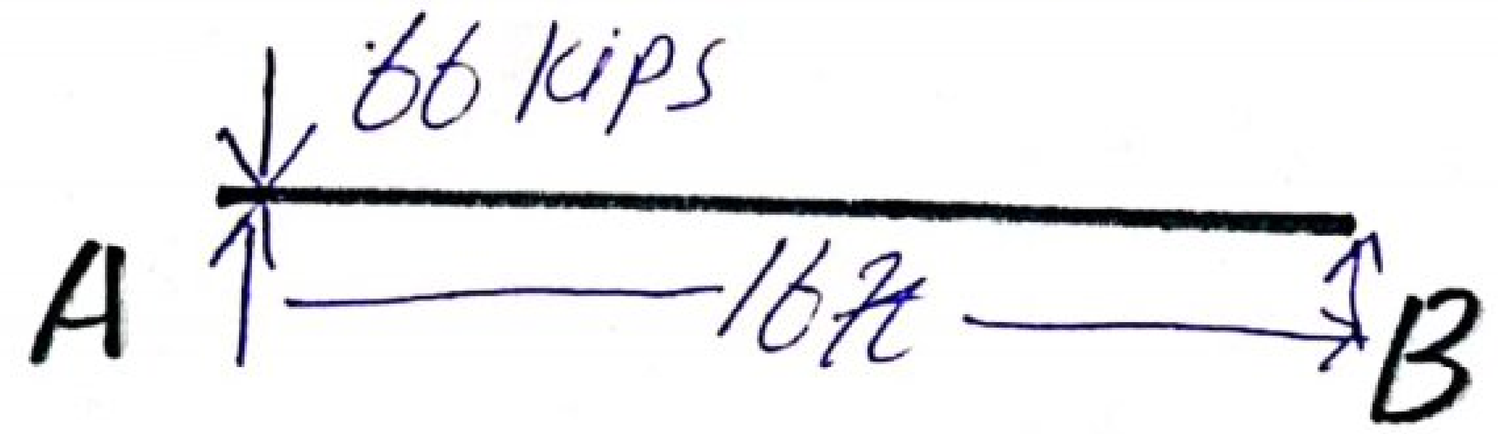


* Shear influence line at point "C" = ?
* influence line for reaction "A" = ?

Sol:-

influence line for Reaction "A":

For $x = 0$, $RA = ?$



$\circlearrowleft + \Sigma M_B = 0$

$(66)(16) - RA(16) = 0$

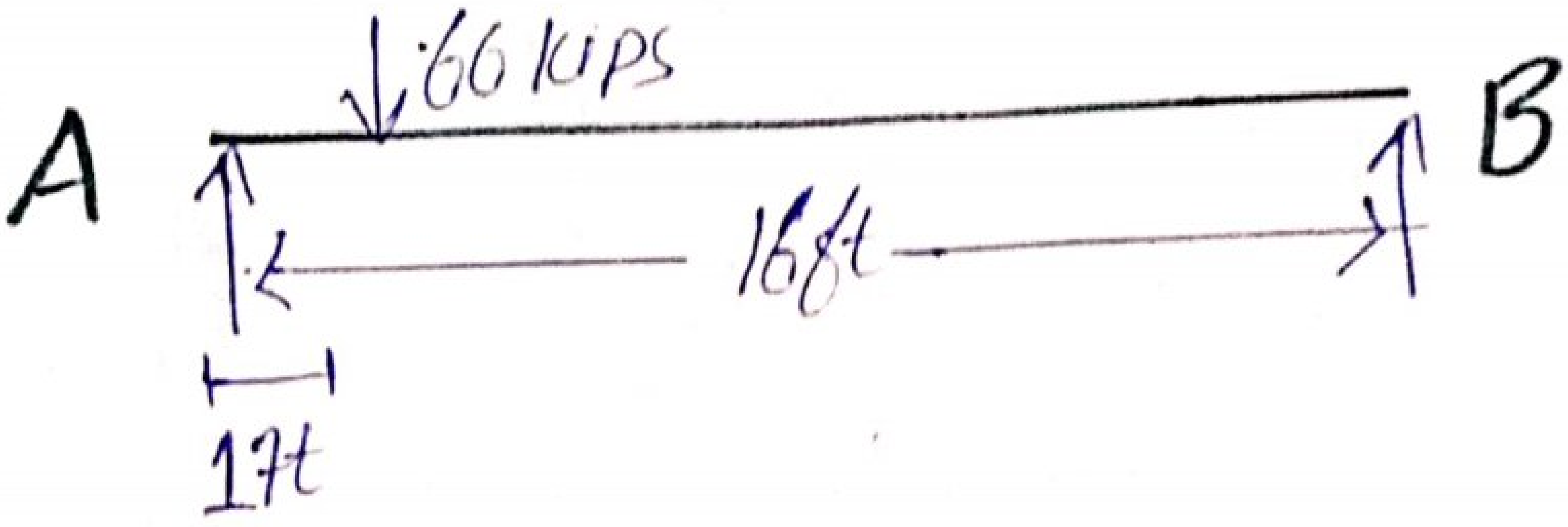
$16RA = 1056$

$\boxed{RA = 66 \text{ kips}}$

For x = 1ft

(2)

RA = ?



$\circlearrowleft^{+} \sum M_B = 0$

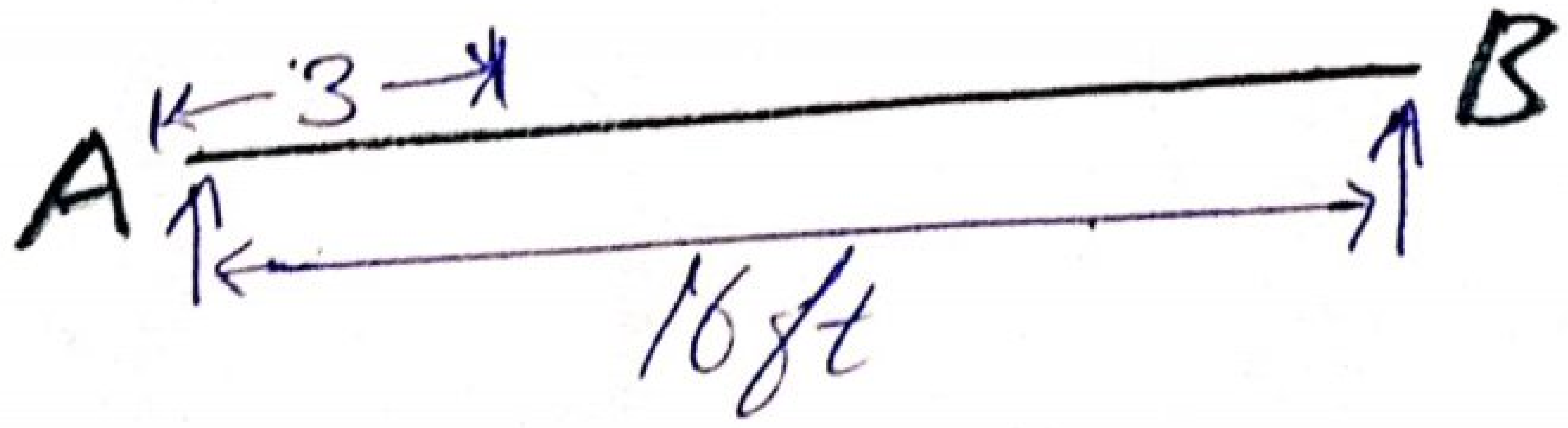
$(66)(15) - RA(16) = 0$

$990 - 16RA = 0$

$16RA = 990$

$RA = 61.87$ kips

For x = 3ft:



$\circlearrowleft^{+} \sum MB = 0$

$(66 \times 13) - RA(16) = 0$

$858 - 16RA = 0$

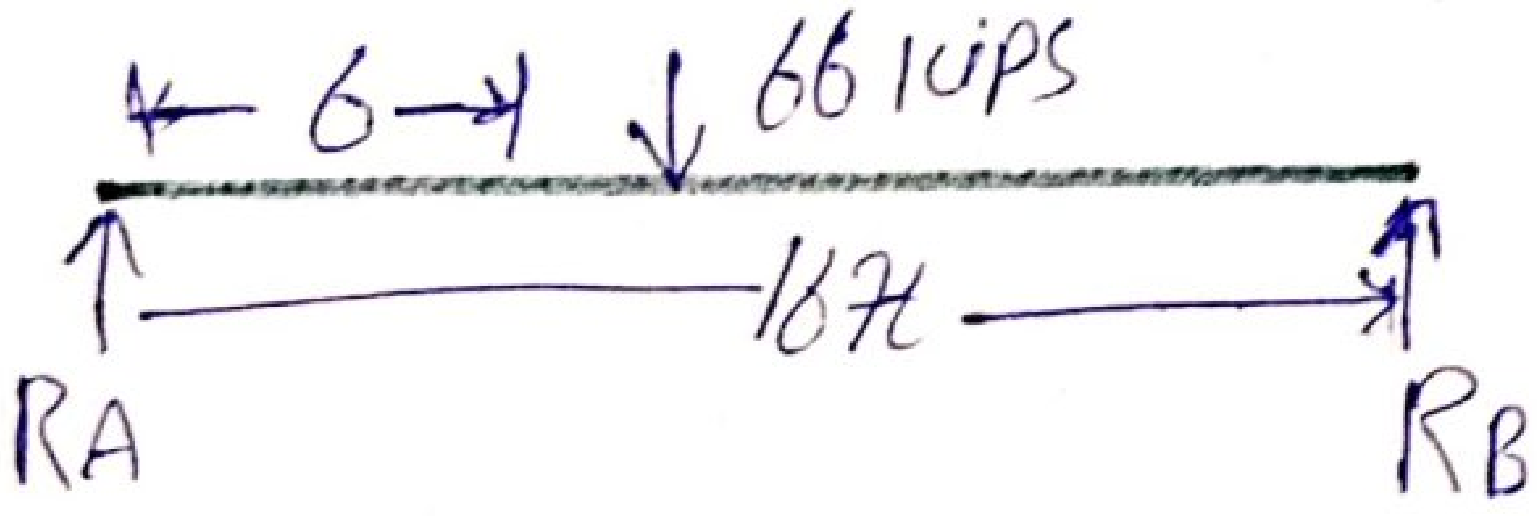
P.T.O

$16 R_A = 858$ **(3)**

$$R_A = 53.62 \text{ kips}$$

For $x = 6 ft$:

$R_A = ?$



$\circlearrowright^{+} \sum M_B = 0$

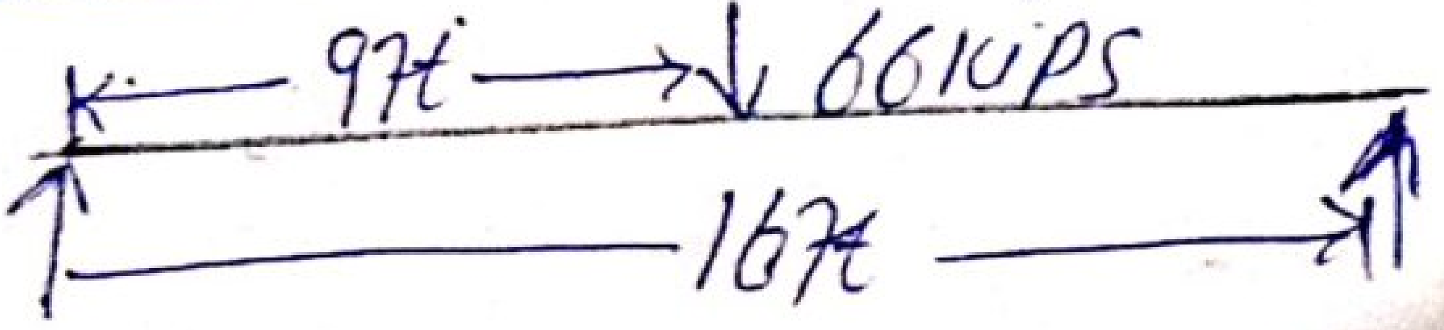
$$(66 \times 10) - R_A(16) = 0$$

$$660 - 16 R_A = 0$$

$$16 R_A = 660$$

$$R_A = 41 \text{ kips}$$

For $x = 9 ft$: $R_A = ?$



$\circlearrowright^{+} \sum M_B = 0$

$$(66 \times 7) - R_A(16) = 0$$

$$462 - 16 R_A = 0$$

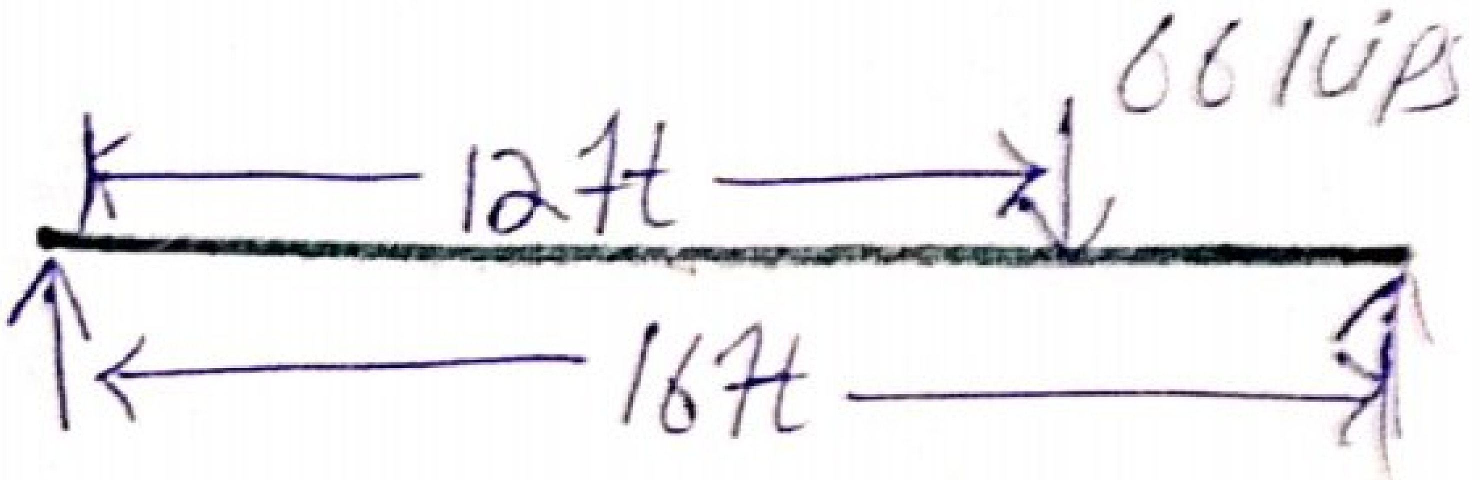
$$16 R_A = 462$$

$$R_A = 28.87$$

(4)

For $x = 12\,ft$

$R_A = ?$



$\circlearrowleft^{+} \sum M_B = 0$

$(66 \times 4) - R_A(16) = 0$

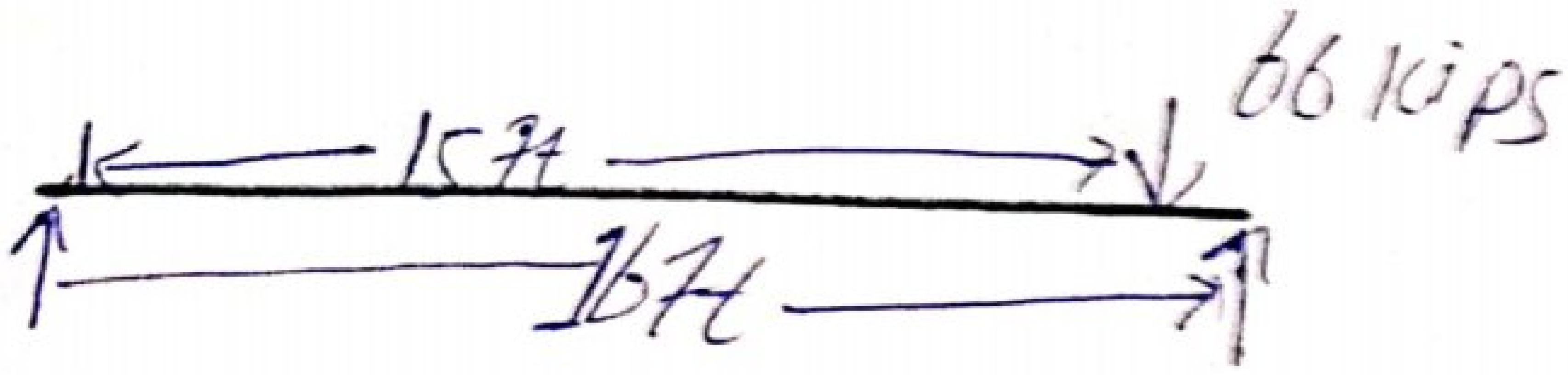
$264 - 16R_A = 0$

$16R_A = 264$

$\boxed{R_A = 16.5\ kips}$

For $x = 15\,ft$

$R_A = ?$

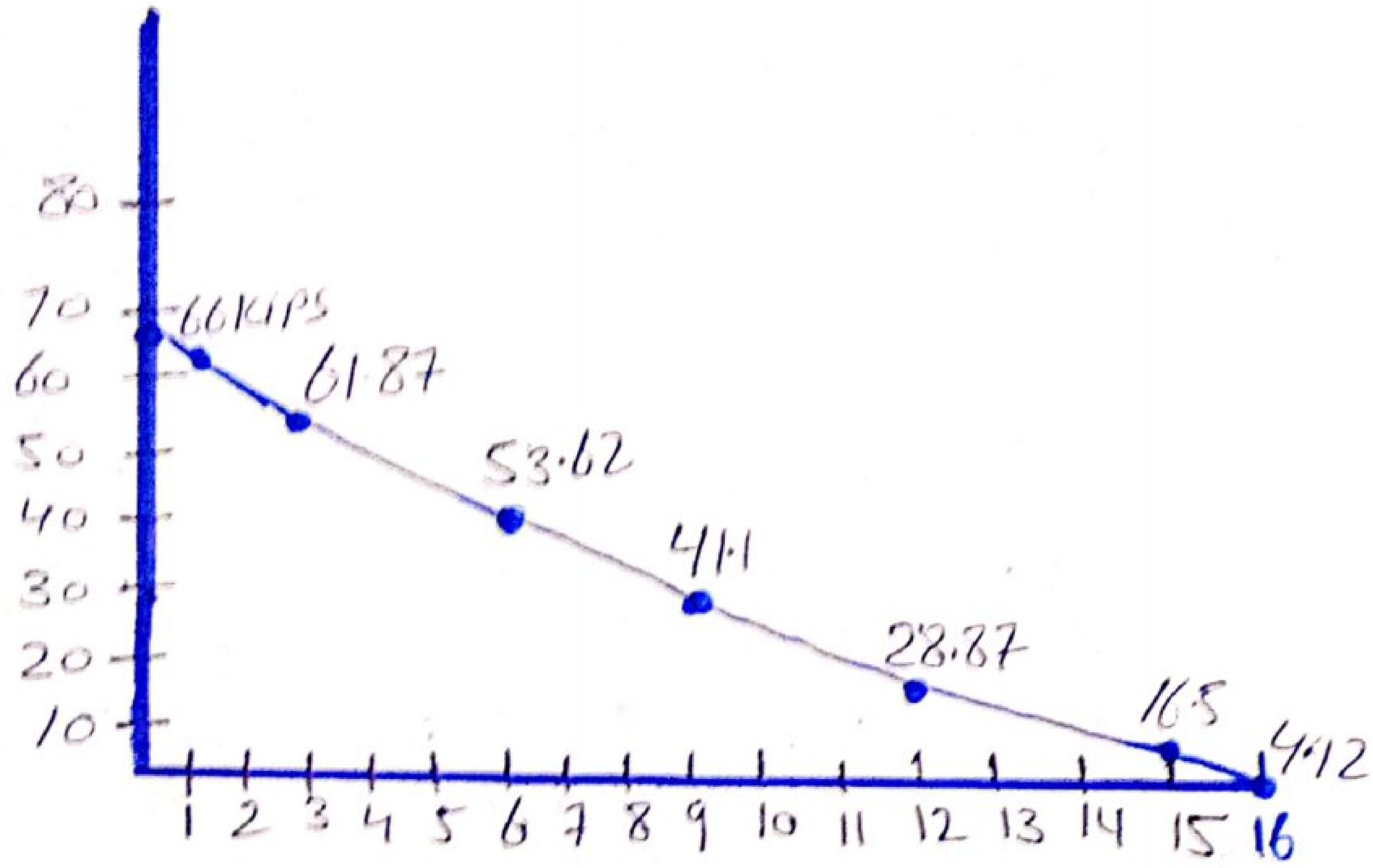


$(66 \times 1) - R_A(16) = 0$

$66 - 16R_A = 0$

$16R_A = 66$

$\boxed{R_A = 4.12\ kips}$

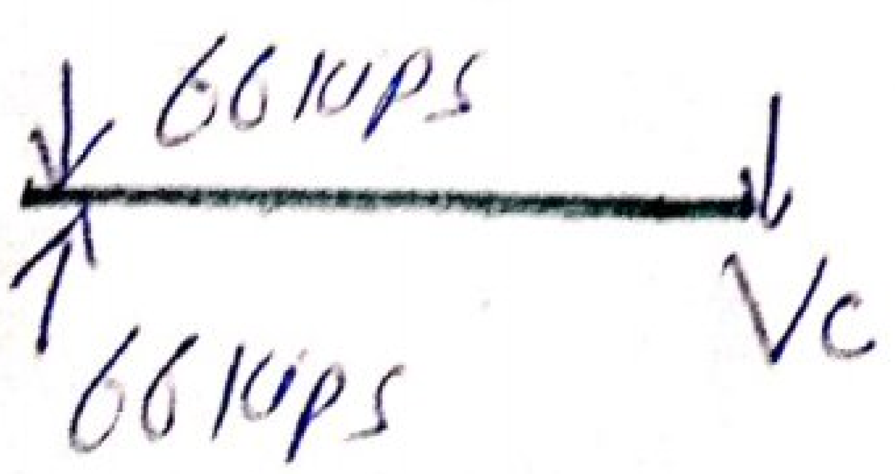


∴ influence line of RA:

Now:

Shear influence line at point "C"

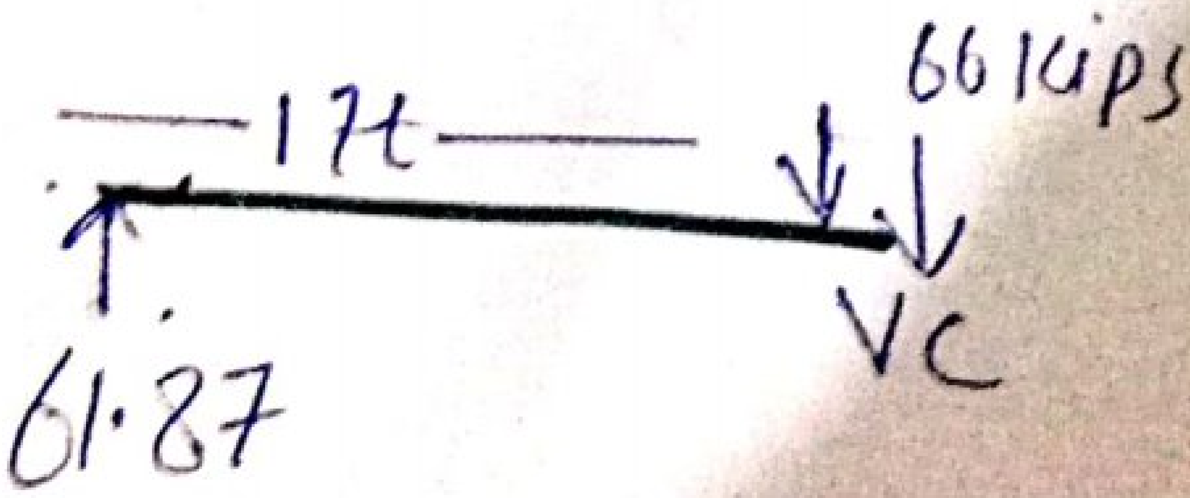
⇒ **For x=0** $V_C = ?$



$+\uparrow \Sigma F_Y = 0$

$RA - 66 - V_C = 0$

⇒ **For x = 1ft** $V_C = ?$



$+\uparrow \Sigma F_Y = 0$

$RA - P - V_C = 0$

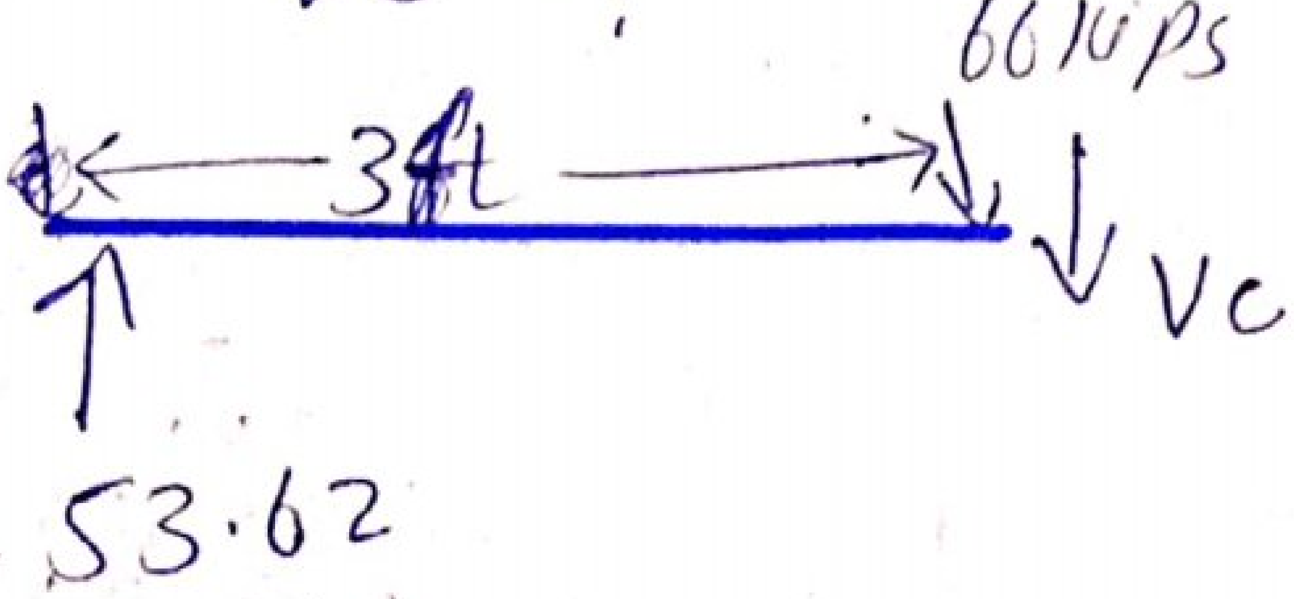
Scanned with CamScanner

$66 - 66 - V_C = 0$

$V_C = 0$

⇒ For x = 3ft

$V_C = ?$



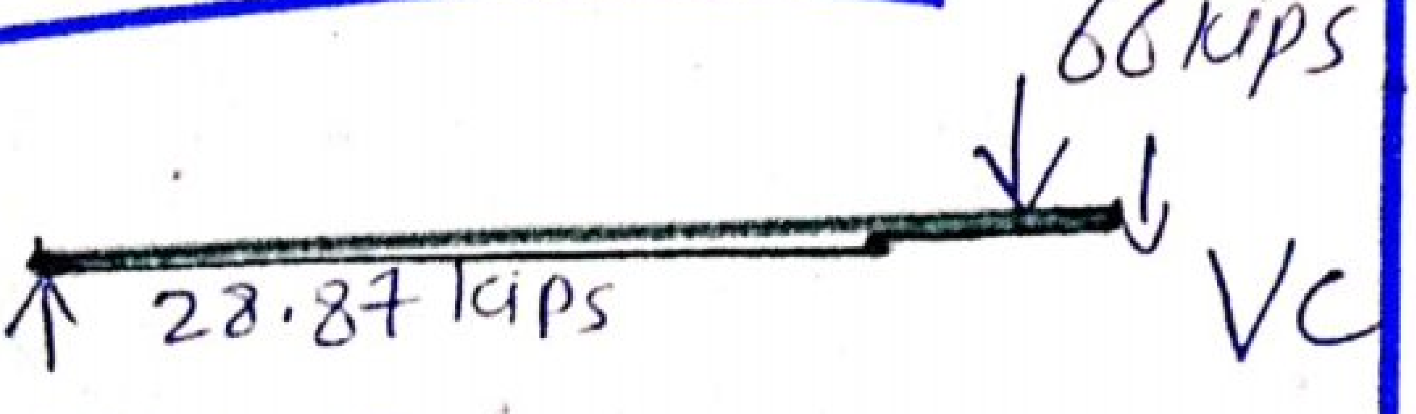
$\uparrow \Sigma F_Y = 0$

$R_A - P - V_C = 0$

$53.62 - 66 - V_C = 0$

$V_C = -12.38$

For x = 9ft



$\uparrow \Sigma F_Y = 0$

$R_A - P - V_C = 0$

$28.87 - 66 - V_C = 0$

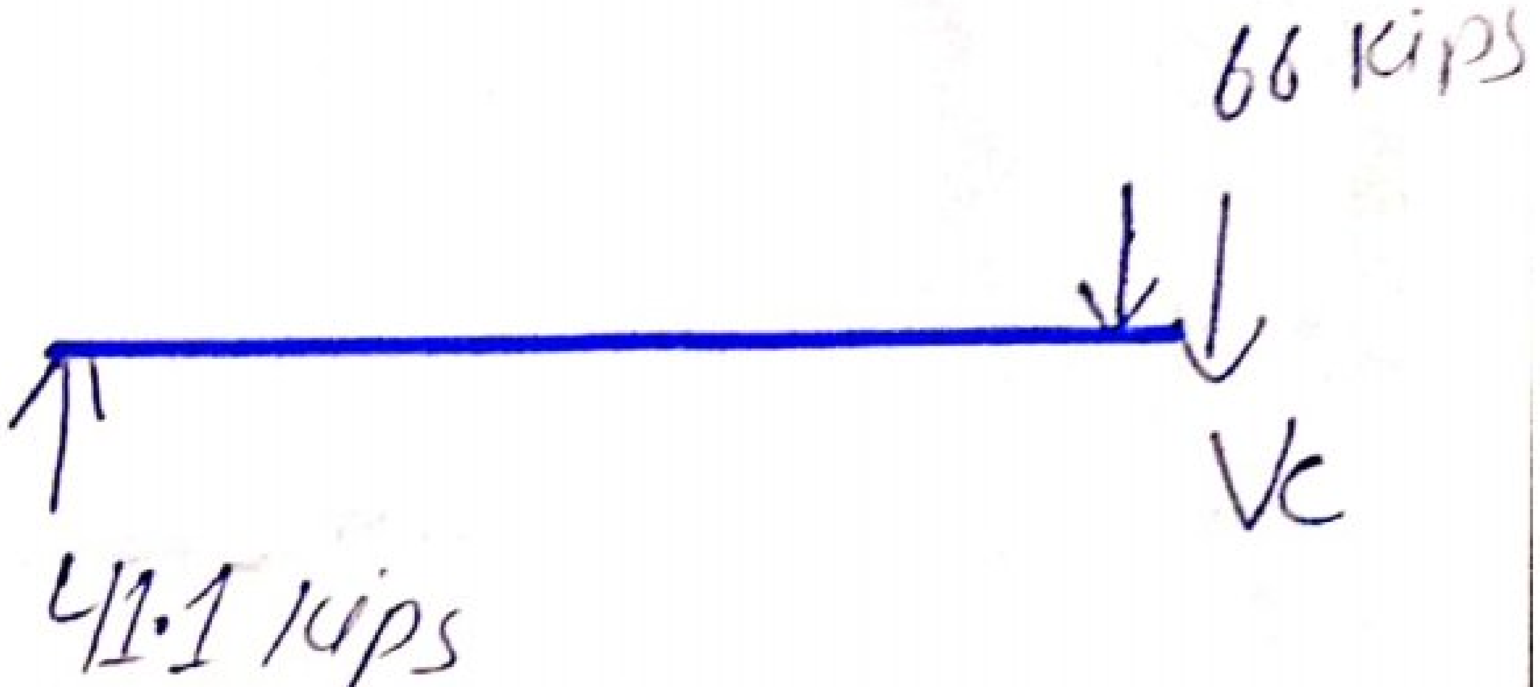
$V_C = -37.13$

(6)

$61.87 - 66 - V_C = 0$

$V_C = -4.13$

⇒ For x = 6ft



$\uparrow \Sigma F_Y = 0$

$R_A - P - V_C = 0$

$41.1 - 66 - V_C = 0$

$V_C = -24.9$

⇒ For x = 12ft

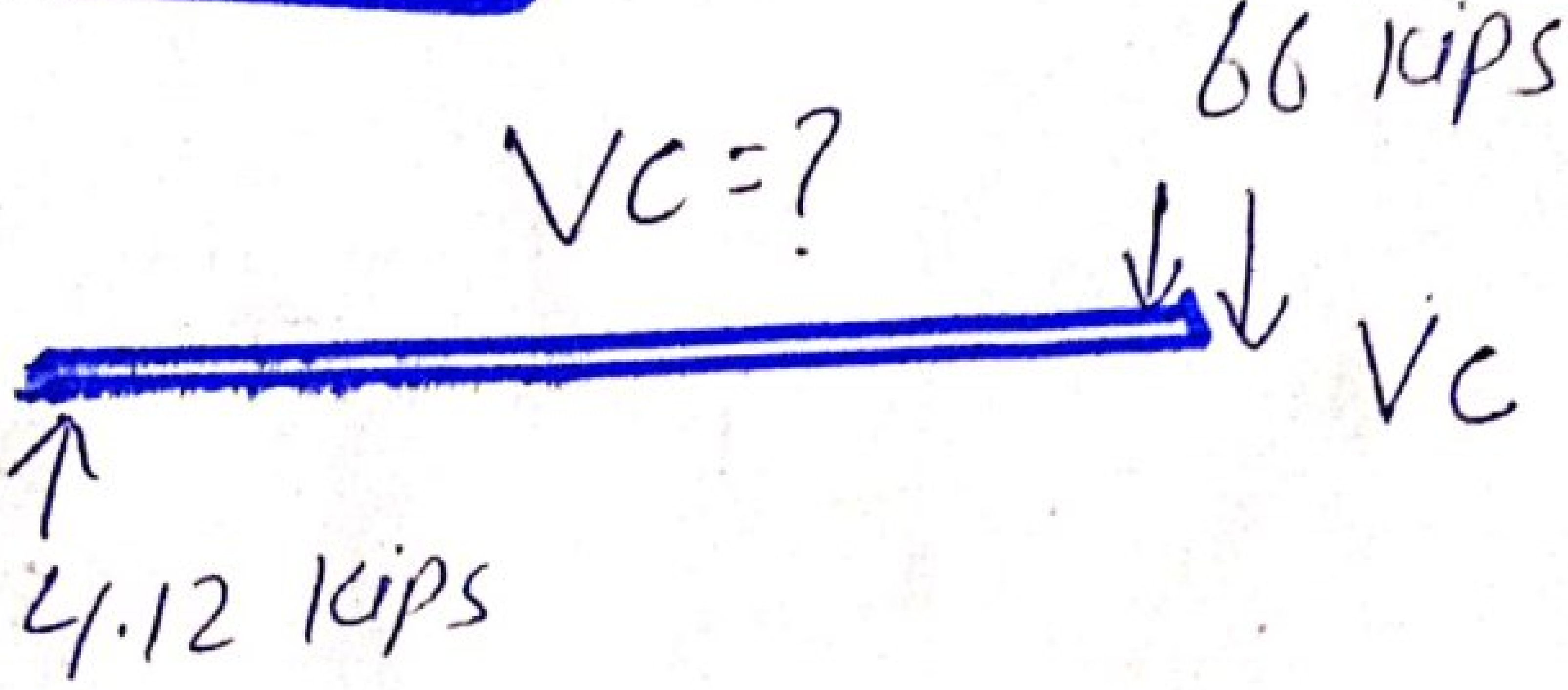
$\uparrow \Sigma F_Y = 0$

$R_A - P - V_C = 0$

$16.5 - 66 - V = 0$

$V_C = -49.5$

For x = 15ft (7)

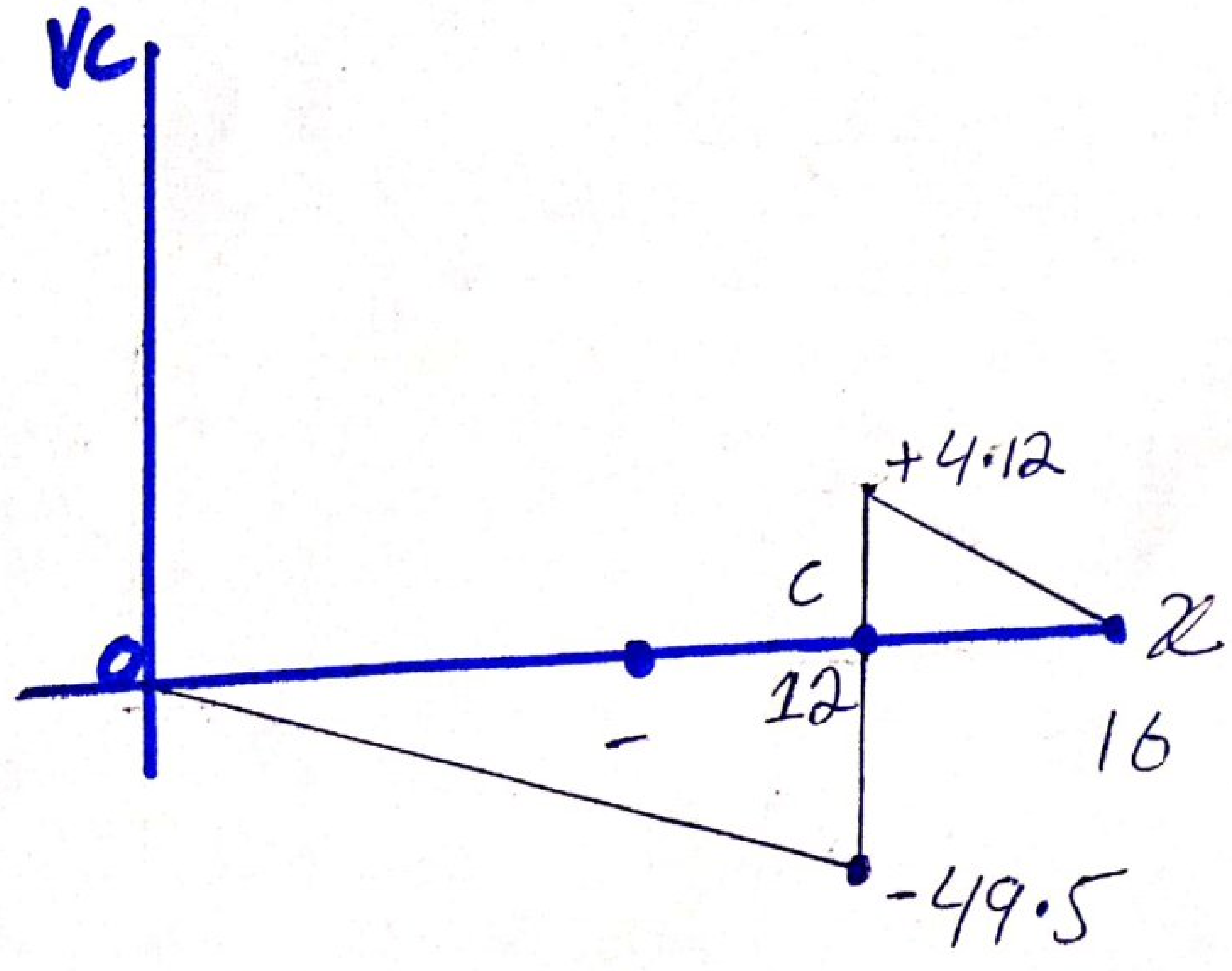


$+\uparrow \Sigma F_Y = 0$

$R_A - V_C = 0$

$4.12 - V_C = 0$

$V_C = 4.12$



Shear influence line at point "C".

Scanned with CamScanner

2

(1)

ANS# 02 =

Cable:

*Cable supports uniform load = 872 lb/ft

Determine the tension in the cable at;

Support A = ?

support B = ?

Sol:

$$y = \frac{W_o}{2F_H} x^2$$

By putting values;

$$15 = \frac{766}{2F_H} x^2 \quad \text{—(i)}$$

Scanned with CamScanner

$$10 = \frac{766}{2FH}(25-x)^2 \quad -(ii)$$

By solving Both equations:

$$FH = \frac{766}{2(15)}x^2 \quad , \quad FH = \frac{766}{2(10)}(25-x)^2$$

Now:

$$FH = FH$$

$$\frac{766}{2(15)}x^2 = \frac{766}{2(10)}(25-x)^2$$

$$25.533x^2 = 38.3(25-x)^2$$

$$x^2 = \frac{38.3}{25.533}(25-x)^2$$

$$x^2 = 1.5001(625-50x+x^2)$$

$$x^2 = 1.50(625-50x+x^2)$$

$$0.5-75x+937.50 = 0 \quad -(i)$$

(3)

Now choose root < 25ft

By solving equation (i)

$x = 13.76\,ft$

Now:,

$25 - 13.76 = 11.25\,ft$

As;

$F_H = \frac{766}{2(15)} x^2 = \frac{766}{2(15)} (13.76)^2 = 4834\,lb.$ **(A)**

$F_H = \frac{766}{2(10)} (25-x)^2 = \frac{766}{20} (11.25)^2 = 4847\,lb.$ **(B)**

Support # B

$Y = \frac{W_o}{2F_H} x^2 = \frac{766}{2(4834)} (13.76)^2$

$= 15.001$

Now,

$dy/dx = \tan\theta_B = 15.001$

$\theta_B = \tan^{-1}(15.001)$

$= \boxed{\theta B = 86.18^\circ}$ (4)

we have:,

Tension at B;

$$T_B = \frac{F_H}{\cos\theta B} = \frac{4834)}{\cos(86.18)} = 72558.40 \text{ lb}$$

$$= \boxed{72.558 \text{ kips}}$$

Support: A

$$Y = \frac{w_0}{2F_H} x^2 = \frac{766}{2(4834)} (25 - x)^2 = \frac{766}{2(4834)} (11.25)^2$$

$$\boxed{Y = 9.902}$$

$$\frac{dY}{dx} = \tan\theta_A = 9.902$$

$$\theta_A = \tan^{-1}(9.902) = \theta A = \boxed{84.23}$$

Now:

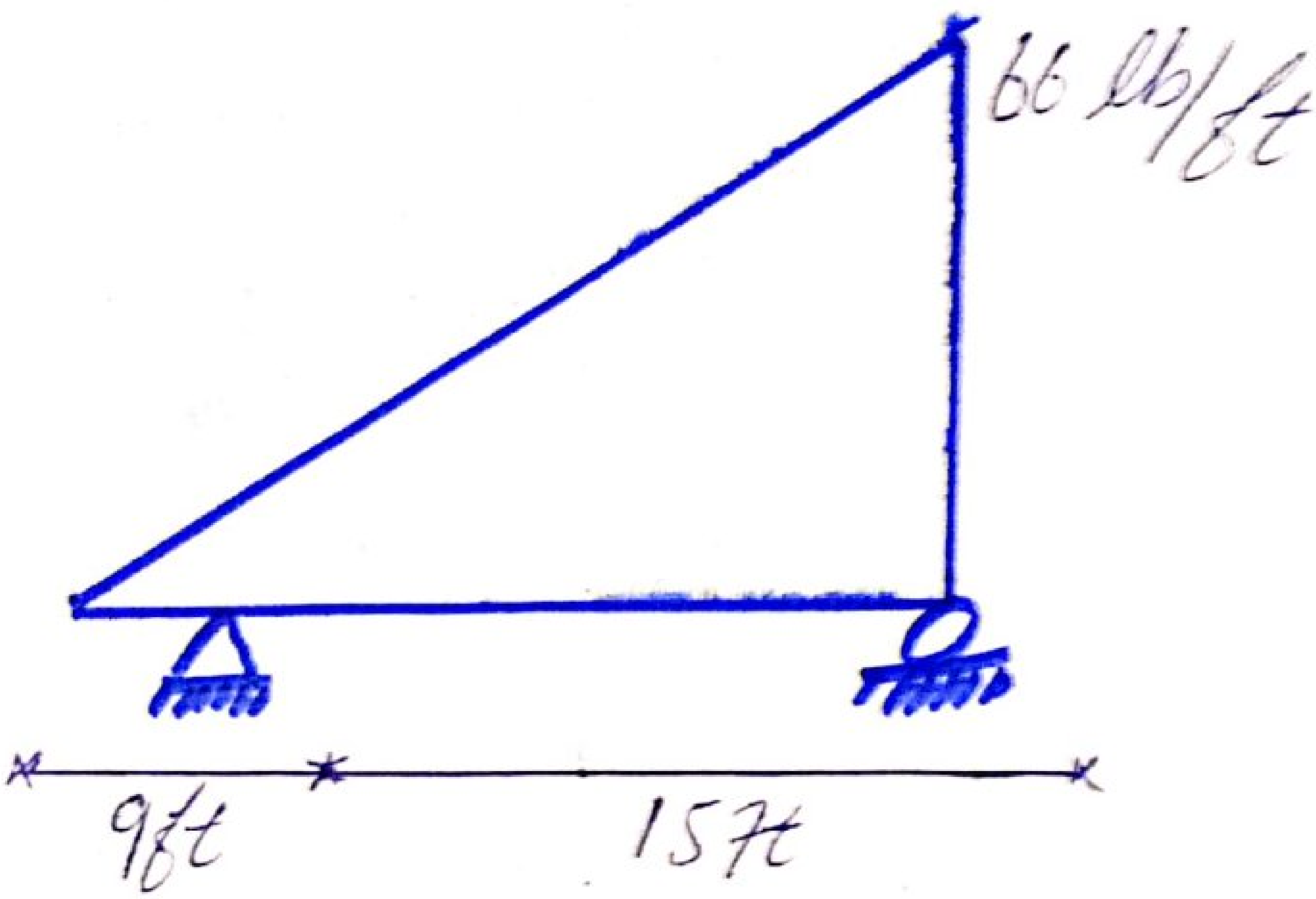
$$T_A = \frac{F_H}{\cos\theta A} = \frac{4834)}{\cos(84.23)} = 48082.5 \text{ lb}$$

$$= \boxed{48.0825} \text{ Ans}$$

(1)

"Ans#01:

"Shear and Bending Moment"



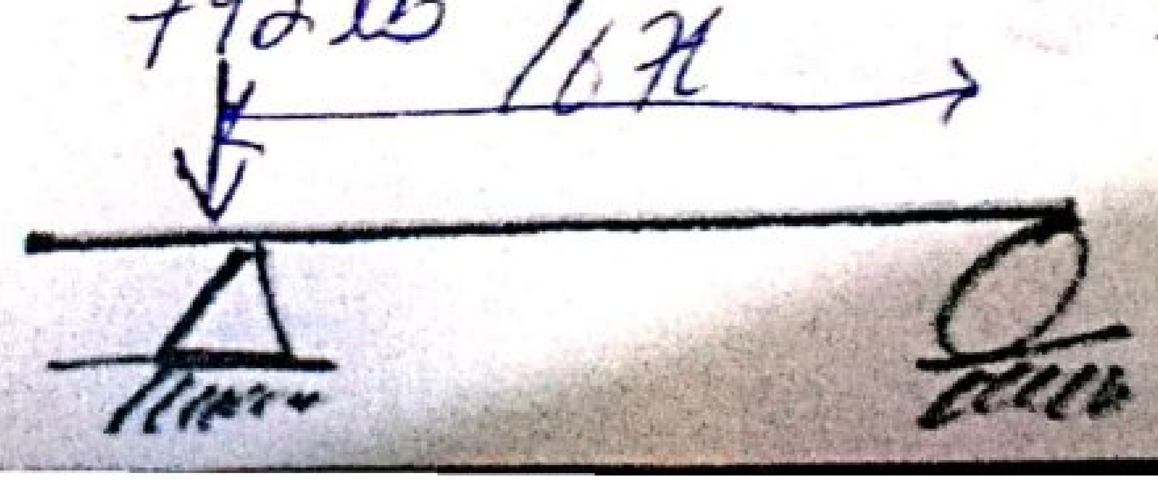
Sol:

Converting UVL To point load

We have;

$$X = \frac{2B}{3} = \frac{2(24)}{3} = \frac{48}{3}$$

$$\boxed{X = 16 ft}$$ From the large end of the load Triangle.



Scanned with CamScanner

(2)

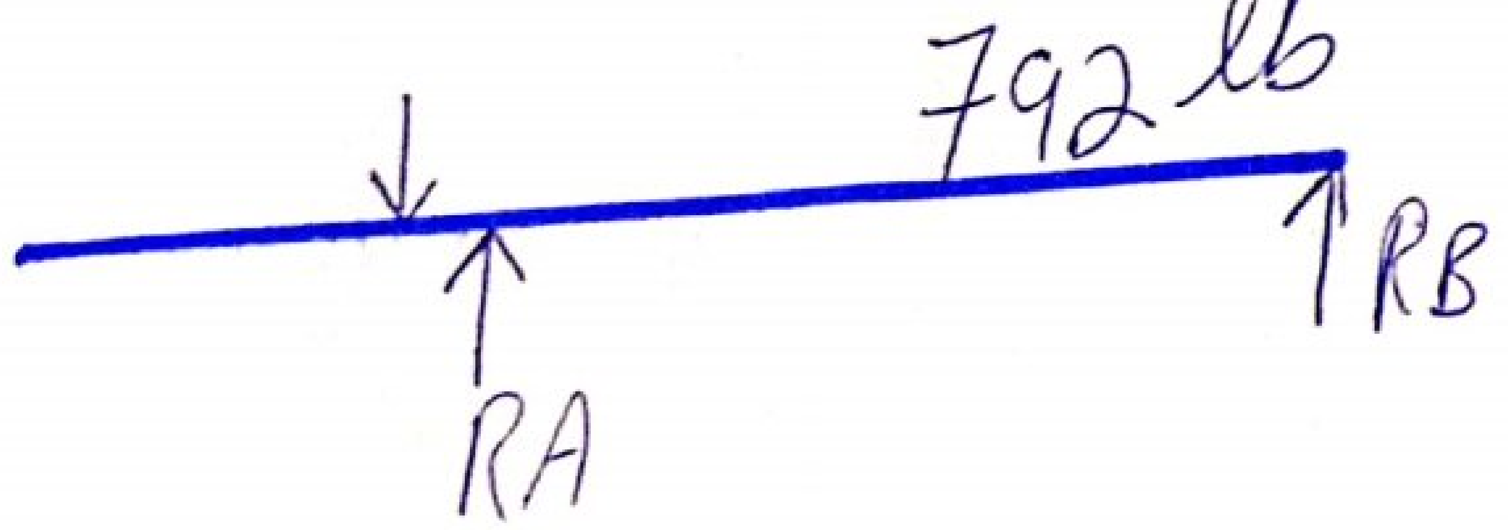
" Magnitude of Concentrated point load:-

$\frac{1}{2}bh$

$= \frac{1}{2}(24)(66)$

$= 792$

" **Support Reaction**::



$\circlearrowleft + \Sigma M_B = 0$

$-15RA + 792(16) = 0$

$15RA = 12657$

$RA = 843.8 \text{ lb}$

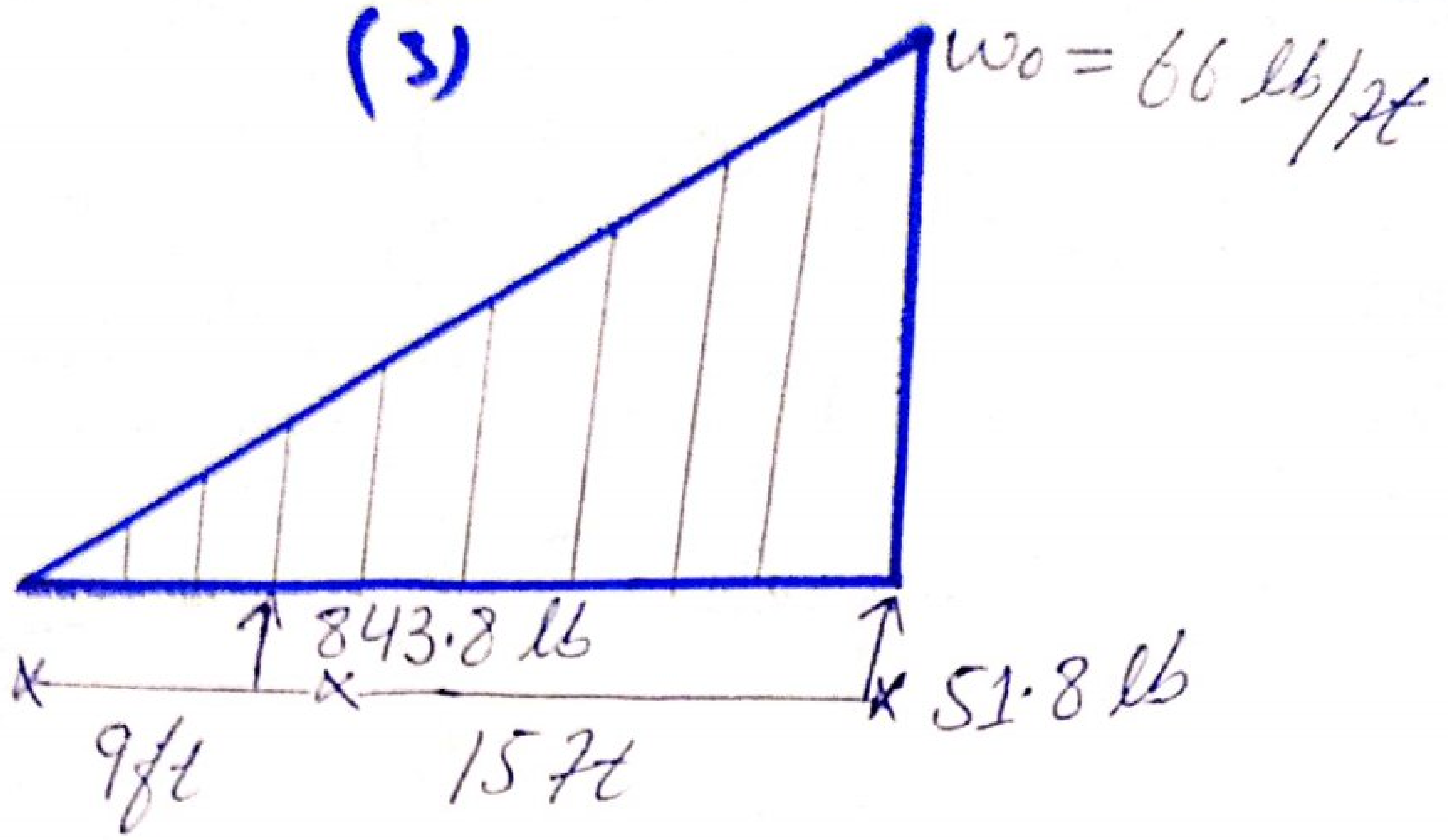
$\uparrow + \Sigma FY = 0$

$-792 + RA + RB = 0$

$-792 + 843.8 + RB = 0$

$RB = 51.8 \text{ lb}$

(3)



Now:

$$\frac{W_o L}{4} - \frac{1}{2}\left(\frac{w_o x^2}{L}\right)(x) = 0$$

$$432 - \frac{1}{2}\left(\frac{66 x^2}{L}\right) = 0$$

$$1.5x^2 - 432 = 0$$

$$x^2 = 432/1.5$$

$$\sqrt{x^2} = \sqrt{288}$$

$$\boxed{x = 16.970}$$

Now: $\circlearrowleft + \Sigma M = 0$

$$M + \frac{1}{2}\left(\frac{w_o x}{l}\right)\left(\frac{x^2}{3}\right) - \left(\frac{W_o L}{4}\right)\left(x - \frac{1}{3}\right) = 0$$

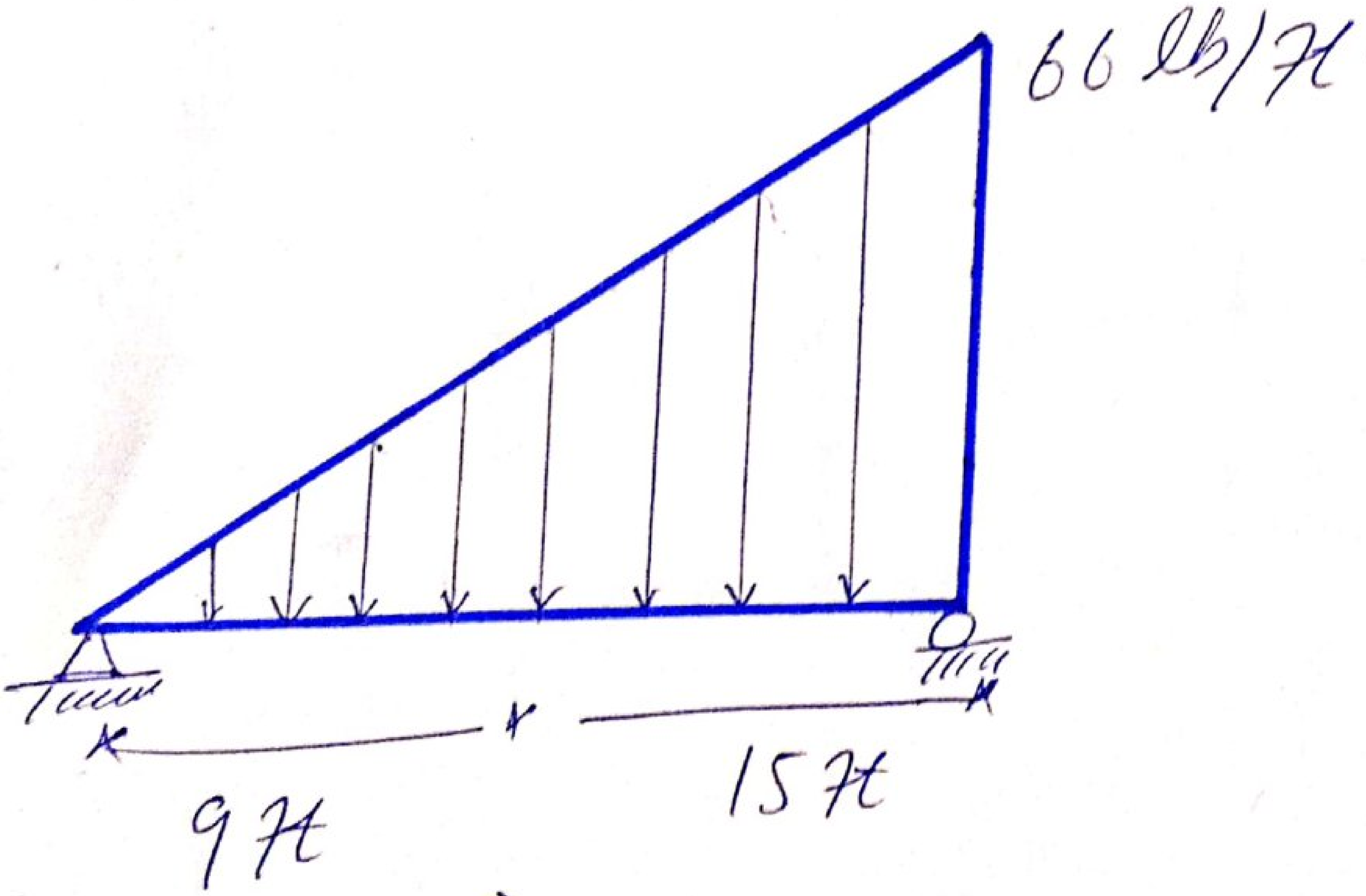
(4)

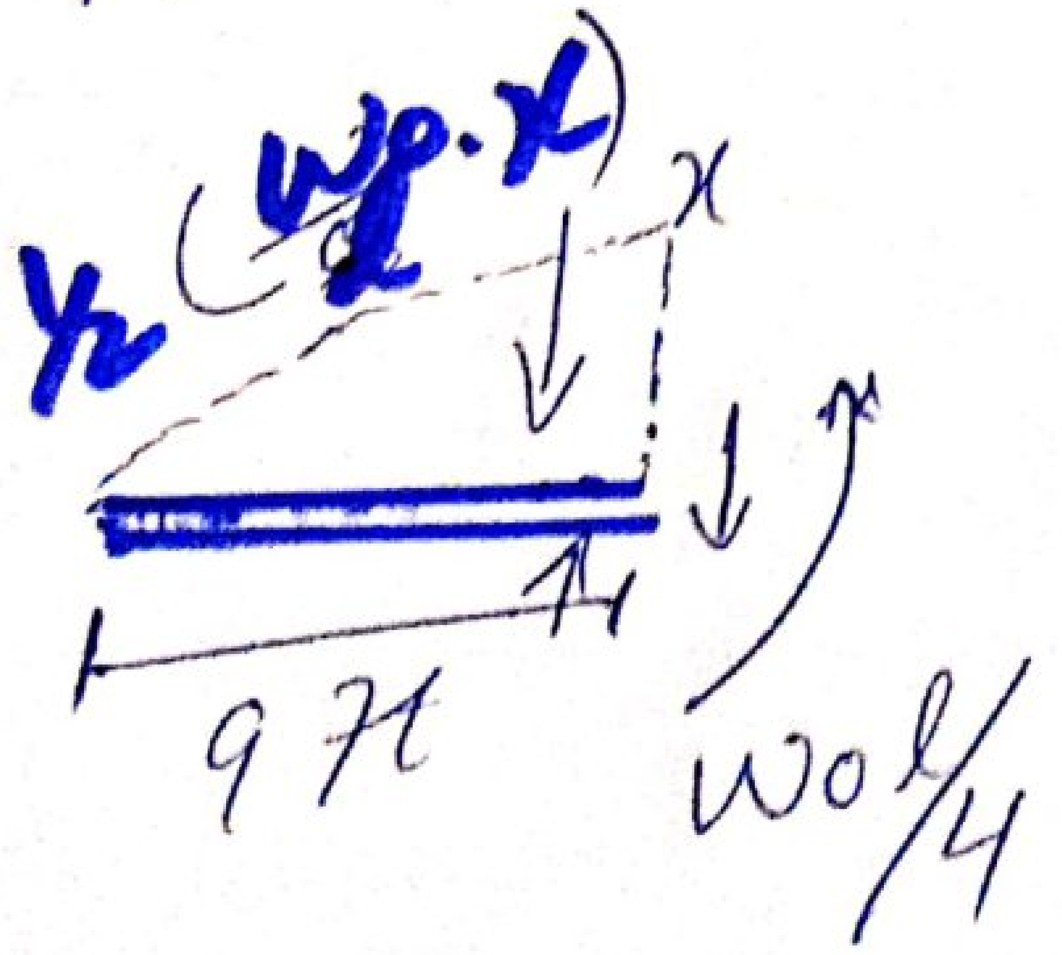
$$M = -\frac{1}{2}\left((66)(16.97)\right) \times \left(\frac{16.97}{3}\right)$$

$$+ \frac{66(24)}{4}\left(16.97 - \frac{1}{3}\right) = 0$$

$$M = -7698.30 + 4025.48$$

$$\boxed{M = -3672.82 \text{ lb/ft}}$$





(5)

$$\frac{1}{2}\left(\frac{66(16.97)}{24}\right)(16.97) = \boxed{431.97\ lb}$$

$$\frac{w_o}{l}x = \frac{66}{24}(16.97) = \boxed{50.91\ lb/ft}$$

Now Shear force and Bending Moment Diagram:-