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Date: __/__/__

NAME :- Muneer Khan

ID NO # :- 7752

Subject :- Structure 1

Subject Teacher. Engr. Saqib

Dated. 26/9/2020.

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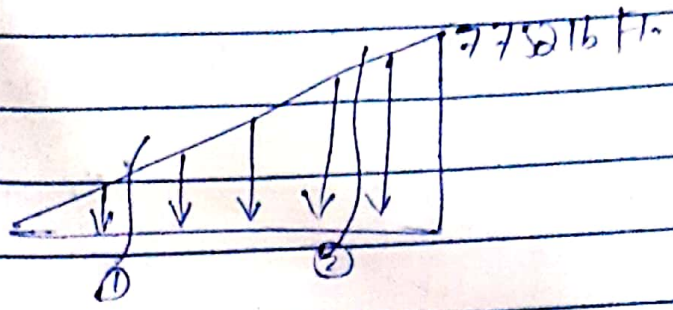
Q1a-



$\sum M_B = 0$ ↺+

$\Rightarrow \frac{1}{2} \times 52 \times 24 \times \frac{1}{3} \times 24 = R_A \times 15$

$R_A = 332.8 lb$

$\sum F_y \uparrow = 0$

$R_A + R_B = \frac{1}{2} \times 52 \times 24$

$R_B = \left(\frac{1}{2} \times 52 \times 24\right) - 332.8$

$R_B = 624 - 332.8$

$R_B = 291.2 lb$

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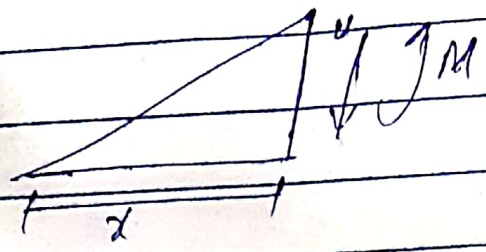
Section @ ①



For y

$$\frac{y}{x} = \frac{52}{24}$$

$$y = \left(\frac{52}{24}\right)x$$

So $F_y = 0 \uparrow +$

$$= -\frac{1}{2} \times x \times \left(\frac{52}{24}\right) - V_c = 0$$

$$V_c = -\frac{52}{48} x^2$$

$$9 = x = 0$$

$$V_c = 0$$

at $x = 9$.

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$V_c = 87.75$ lb.

$M = -\frac{1}{2} \times x \times \left(\frac{52x}{24}\right) \times \frac{1}{3} x.$

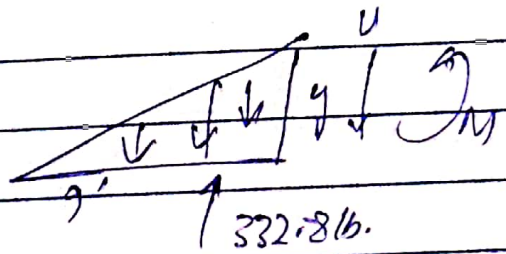
$M = \frac{-52x^3}{144}$

at $x = 0$, $M = 0$

at $x = 9$.

$M = -296.25$ lb/Ft.

Section (2-2)



For "y"

$\frac{y}{(x+9)} = \frac{52}{24}$.

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$$Y = \frac{52}{24}(x+9)$$

So $\Sigma F_y = 0 \uparrow$

$$332.8 - \frac{1}{2} \times (x+9)\left(\frac{52}{24}(x+9)\right) - V_c = 0$$

$$V_c = 332.8 - \frac{52(x+9)^2}{48}$$

at $x = 0$

$V_c = 245.05$ lb.

at $x = 15$

$V_c = -291.2$ lb.

$$M = \frac{1}{2}(x+9)\left(\frac{52}{24}(x+9)\right) + \frac{1}{3} \times (x+9)$$

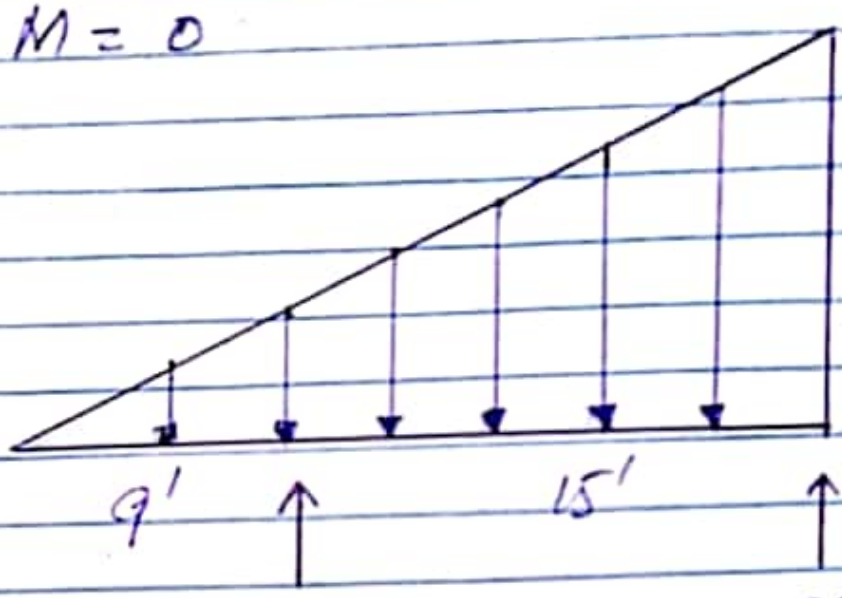
$$-263.2x^3 = 0.$$

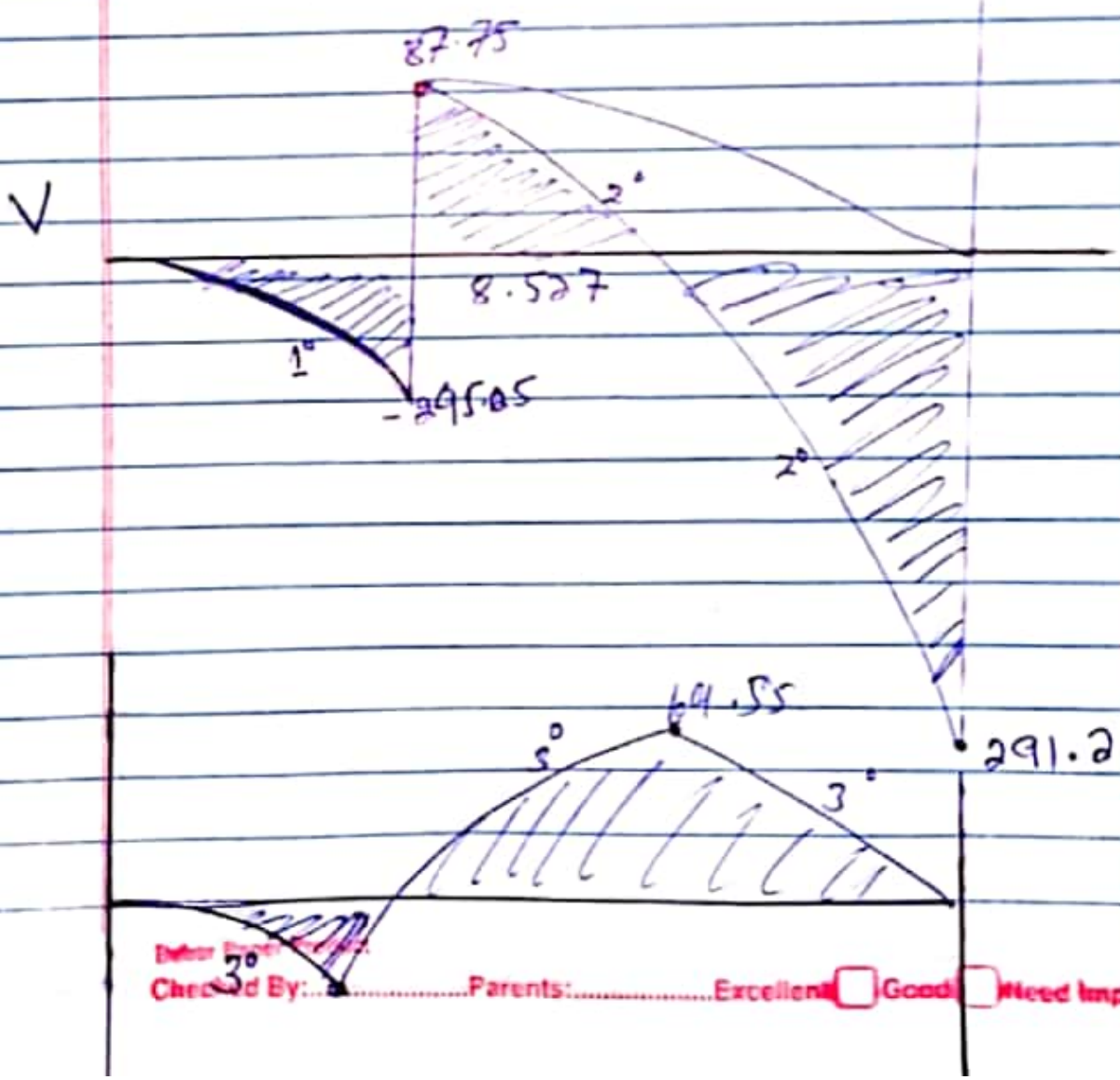
$$M = 332.8x - \frac{52(x+9)^3}{144}$$

at $x = 0$, $M = 69.55$ lb ft.

at $x = 15$

$M = 0$





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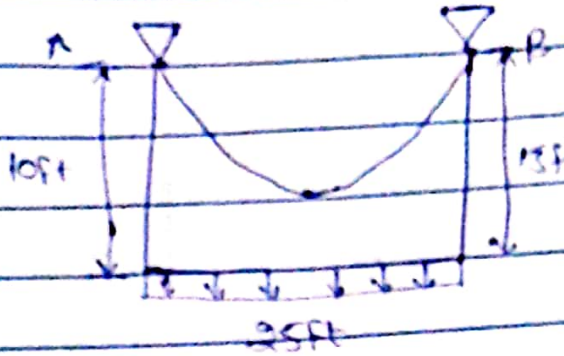
Ans 02:-



- Cable Support Uniform load = 752 lb/ft

Determine The tension in the Cable at : Support A = ?

Support B = ?

Solution:

$$Y = \frac{W_o}{2F_n} x^2$$

By Putting Values

$$15 = \frac{752}{2F_n} x^2 \quad \text{---(i)}$$

$$10 = \frac{752}{2F_H} (25-x)^2 \quad \text{---(ii)}$$

By Solving Both equations

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$F_H = \frac{752}{2(15)} x^2$, $F_H = \frac{752}{2(10)}(25-x)^2$

Now $F_H = F_H$

$\frac{752}{2(15)} x^2 = \frac{752}{2(10)}(25-x)^2$

$25.06x^2 = 37.6(625 - 50x + x^2)$

$x^2 = \frac{37.6}{25.06}(625 - 50x + x^2)$

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

$0.5x^2 - 75x + 937.50 = 0$ —(i)

Now choose Root (25ft.

By solving eqn (i)

$x = 13.76$ ft

Now

$25 - 13.76 = 11.25$ ft

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As

$$F_H = \frac{752}{2(15)} x^2 = \frac{752}{2(15)} (13.76)^2$$

$$= 4746.066 \text{ lb} \quad \text{—(A)}$$

$$F_H = \frac{752}{2(10)} (25.x)^2 = \frac{752}{20} (11.25^2)$$

$$= 4758.75 \text{ lb} \quad \text{—(B)}$$

Support B

$$Y = \frac{wo}{2F_H} x^2 = \frac{752}{2(4746.06)} (13.76)^2$$

$$= 15.00$$

Now:

$$\frac{dy}{dx} = \tan \theta_B = 15.00$$

$$\theta_B = \tan^{-1}(15.00)$$

$$\theta_B = 86.185$$

Tan at B

$$T_B = \frac{F_H}{\cos \theta B} = \frac{4746.06}{\cos(86.185)} = 23.3016$$

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Support A

$$Y = \frac{w_0}{2F_H}(x)^2 = \frac{752}{2(4758.75)}(25.x)^2$$

$$Y = \frac{752}{2(4758.75)}(11.25)^2$$

$$Y = 10$$

$$\frac{dy}{dx} = \tan\theta_A = 10$$

$$\theta_A = \tan^{-1}(10) = 84.302$$

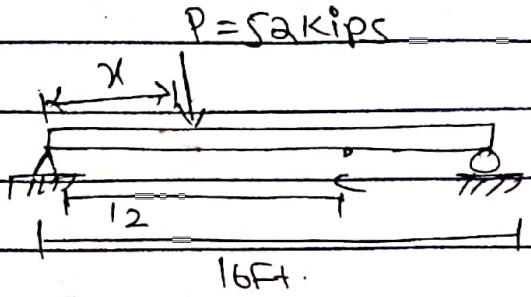
Now

$$T_A = \frac{F_H}{\cos\theta_A} = \frac{4758.75}{\cos(84.302)} = 59481\text{lb}$$

59.48kips

Ans ; 03

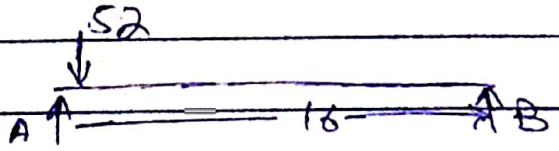
Influence Line:



Shear Influence line at point 'C' = ?
Influence line for reaction 'A' = ?

Solution.

Influence line for Reaction "A"
for $x = 0$ $R_A = ?$



$\circlearrowleft + \Sigma M_B = 0.$

$R_A = ?$

$(52)(16) - R_A(16) = 0.$

$16R_A = 832$

$R_A = \frac{832}{16}$

$R_A = 52 kips.$

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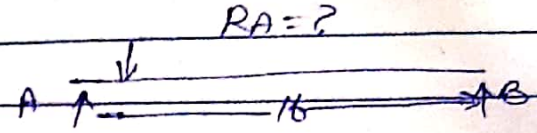
For $x = 1$ Ft.



$\zeta + \sum M_B = 0$.

$(52)(15) - R_A(16) = 0$

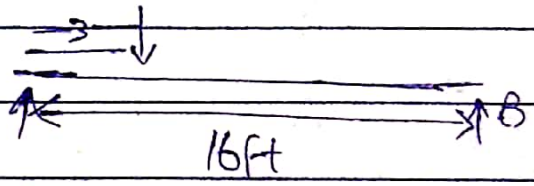
$780 - 16R_A = 0$

$16R_A = 780$

$R_A = \frac{780}{16}$

$R_A = 48.75$ kips.

For $x = 3$ Ft



$\zeta \sum M_B = 0$.

$(52 \times 13) - R_A(16) = 0$

$676 - R_A(16) = 0$

$R_A = \frac{676}{16}$

$R_A = 42.25$ kips.

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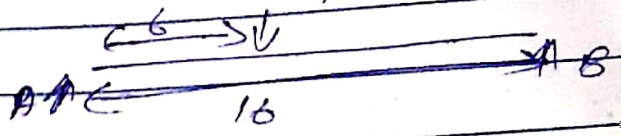
For $x = 6$.

$R_A = ?$



$\circlearrowleft + \sum M_B = 0$

$(52 \times 10) - R_A(16) = 0$

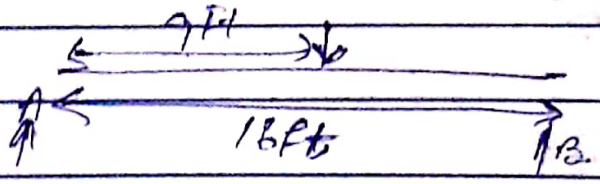
$16R_A = 520$

$R_A = \frac{520}{16}$

$R_A = 32.5$

For $x = 9$ Ft.

$R_A = ?$



$(52 \times 7) - R_A(16) = 0$

$364 - R_A(16) = 0$

$R_A = \frac{364}{16}$

$R_A = 22.75$

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→ for $x = 12$ ft.

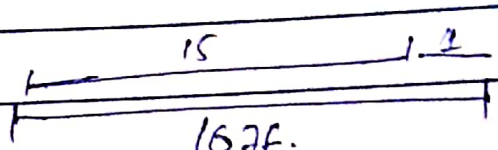
$(52 \times 4) - R_A(16) = 0$

$208 - R_A(16) = 0$.

$R_A = \frac{208}{16}$

$R_A = 13$

⇒ for $x = 15$ ft.

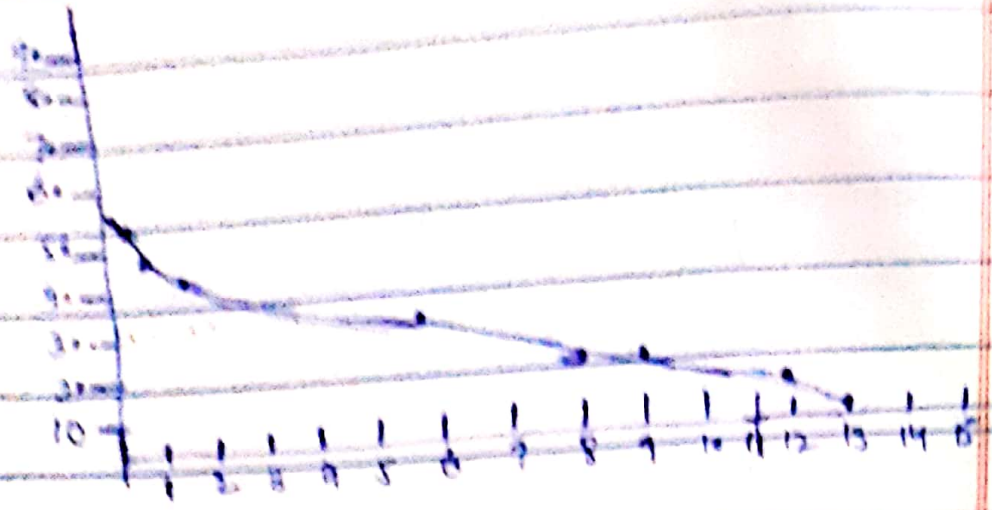


$(52 \times 1) - R_A(16) = 0$

$52 - R_A(16) = 0$.

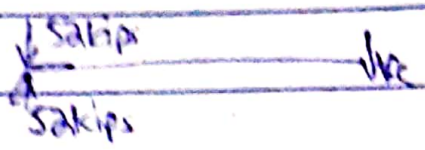
$R_A = \frac{52}{16}$

$= 3.25$



Now Shear Influence line at Point "C"

For $x = 0$ $V_c = ?$



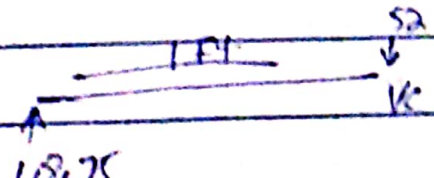
$\uparrow \Sigma F_y = 0$

$R_A - 72 - V_c = 0$

$52 - 72 - V_c = 0$

$V_c = 0$

For $x = 1$ ft $V_c = ?$



$+\uparrow \Sigma F_y = 0$

$R_A - P - V_c = 0$

$48.75 - 52 - V_c = 0$

$V_c = -3.25$

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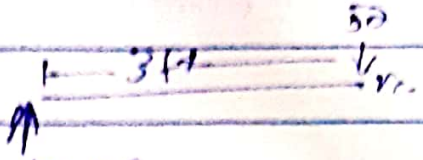
For x = 3 ft

V_c = ?



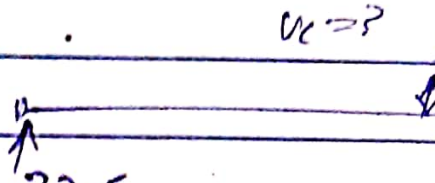
$+\uparrow \sum F_y = 0$

$R_A - P - V_c = 0$

$42.25 - 52 - V_c = 0$

$V_c = -9.75$

For x = 6 ft



$\sum F_y = 0$

$R_A - P - V_c = 0$

$32.5 - 52 - V_c = 0$

$V_c = -19.75$

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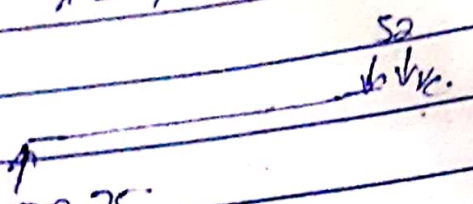
For $x = 9$.



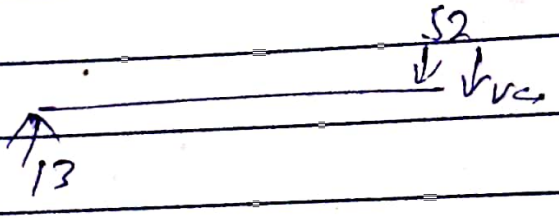
$\xi F_y = 0$.

$R_A - P - V_c = 0$.

$22.75 - 52 - V_c = 0$.

$V_c = -29.25$.

For $x = 12$



$\xi F_y = 0$.

$R_A - P - V_c = 0$.

$13 - 52 - V_c = 0$.

$V_c = -39$

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For $x = 15$

SD.

V_C

3.25

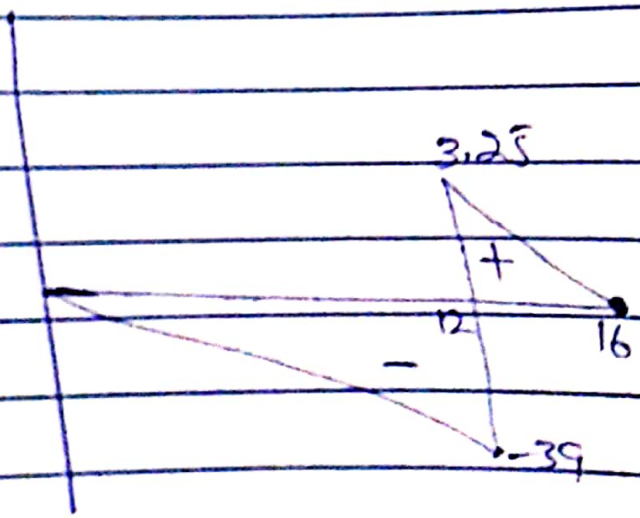
$\uparrow \Sigma F_y = 0$.

$R_A - 8 - V_C = 0$

$3.25 - 52 - V_C = 0$

$V_C = -48.75$

$V_C = 3.25$



Sketch influence line at Point C.