Date:

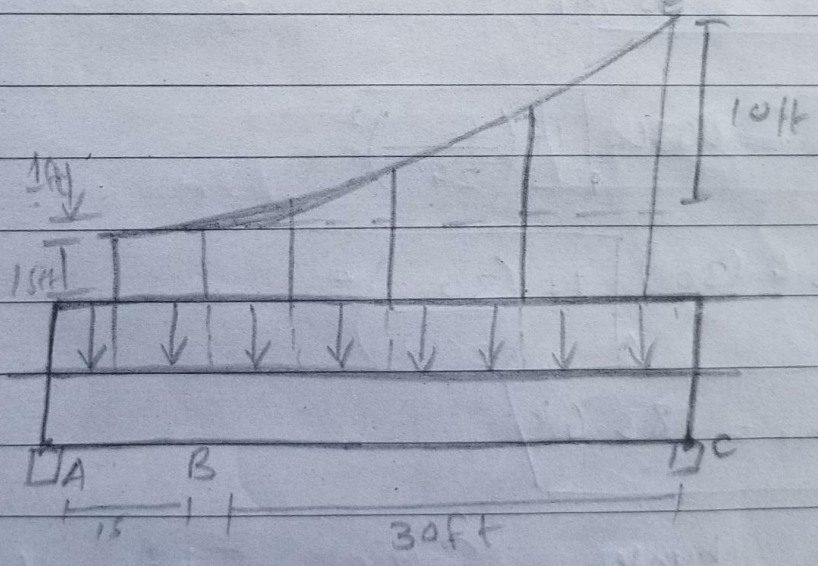
Day: M T W T F S S

Assigment # 4.

Cables and Arches

Ques 1

Determine the maximum & minimum tension in the parabolic cable and the force in each of the hangers The ginder is subjected to the uniform load and is pin connected out at B.



Member BC

$\rightarrow \Sigma F_x = 0$

$B_x = 0$

Member AB

$\xrightarrow{+}\ \Sigma F_x = 0$ $\quad A_x = 0$

moment At A

$\left(\overset{+}{\circlearrowleft}\ \Sigma M_A = 0\right.$ $\quad F_H(1) - B_y(15) - 45(7.5) = 0$ —①

FBD

$\left(\overset{+}{\circlearrowleft}\ M_C = 0 - F_H(16) - B_y(30) + (45)30 = 0\right.$

$\boxed{F_H = 153.4}$ $\quad B_y = 0$

$$w_0 = \frac{2F_H h}{L^2} = \frac{2(153.4)(10)}{30^2}$$

$$\Rightarrow \frac{3068}{900} = 3.40$$

$\boxed{w_0 = 3.40\ k/ft}$

$$F_{max} = w_0 L \sqrt{1 + \left(\frac{L}{24}\right)^2}$$

$$3.4(30)\sqrt{1 + \left(\frac{30}{2(10)}\right)^2}$$

$\boxed{F_{max} = 183.6k}$

Each hunger Carrie 5ft of car

$T = (5ft)(3.4\ k/ft)$

$\boxed{T = 17\ k}$

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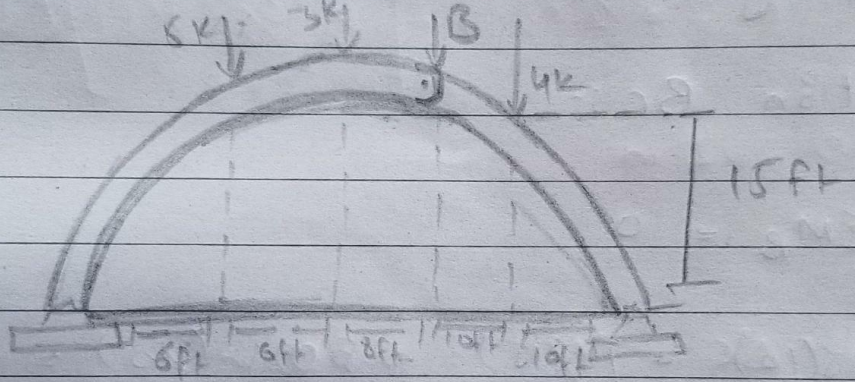
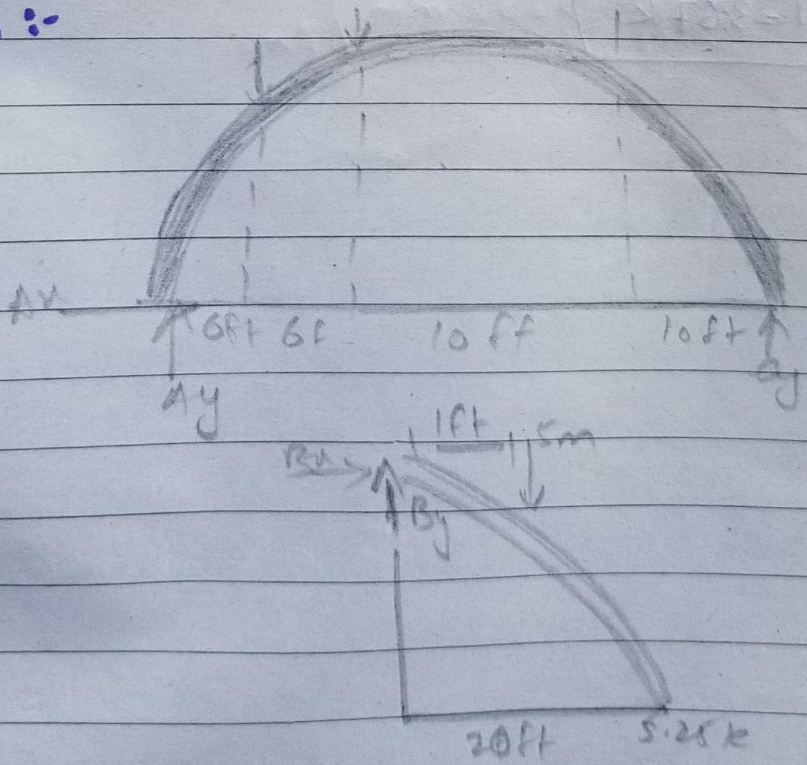
Ques 2:-

The tied three-hinged arch is subjected to the loading shown. Determine the Component of reaction at A and C and the tension in the road.



Sol:-



Entire arch:

$\circlearrowleft + \Sigma M_A = 0; \quad -4(6) - 3(12) - 5(30) + C_y(40) = 0$

$C_y = 5.25\ K$

$+\uparrow \Sigma F_y = 0$

$A_y + 5.25 - 4 - 3 - 5 = 0$

$A_y = 6.75\ K$

$\overset{+}{\rightarrow} \Sigma F_y = 0 \qquad A_x = 0$

Section BC :-

$\circlearrowleft + \Sigma M_B = 0$

$-5(10) - T(15) + 5.25(20) = 0$

$\boxed{T = 3.67\ K}$