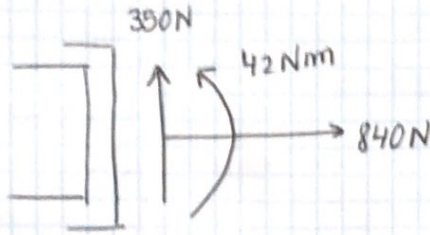
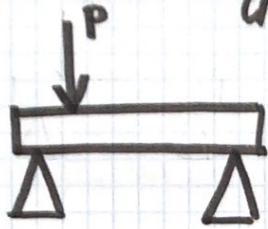


Emaitza:

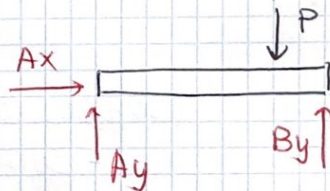
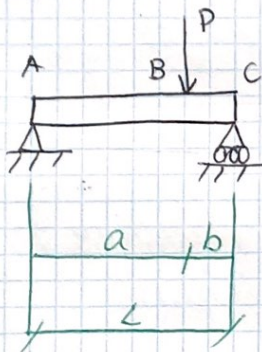


**HABEAK:** Zeharkako kargak jasaten dituzten elementu luzeak



## V-M DIAGRAMAK

1) Pausua: Egitura askatu eta erreakzioak aurkitu



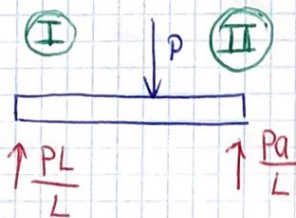
$$\sum F_x = 0 \quad A_x = 0$$

$$\sum F_y = 0 \quad A_y - P + B_y = 0$$

$$M_A = 0 \quad -P \cdot a + B_y \cdot L = 0$$

$$B_y = \frac{Pa}{L} \quad A_y = P - \frac{Pa}{L} = \frac{P(L-a)}{L} = \frac{Pb}{L}$$

SOLIDO ASKEAREN DIAGRAMA



I eta II eremuak dira

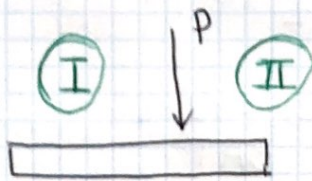
2) Barne-indarrak eremuka aztertuko ditugunez EREMUA identifikatu.

EREMUA

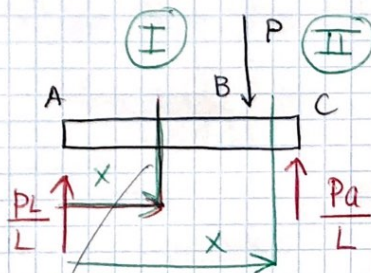
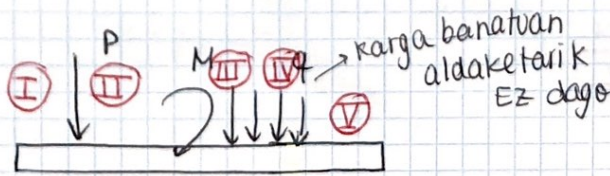
EREMUA: karga aldaketa gabeko zona

2) EREMUA identifikatu

I eta II eremuak

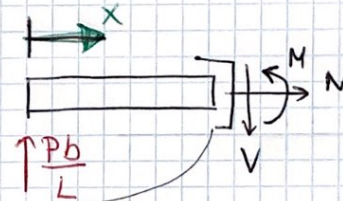


Adibide bat



berdin du non mazu, V kte izango da eta

1. EREMUA:  $AC \quad x \in (0, a)$



$$\sum F_x = 0 \rightarrow N = 0$$

$$\sum F_y = 0 \rightarrow \frac{Pb}{L} - V = 0$$

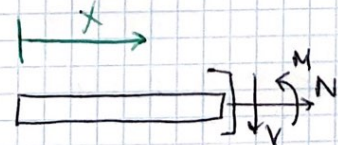
$$V = \frac{Pb}{L}$$

KTEA

BETI SEKZIOAN !!

2. EREMUA:

$CB \quad x \in (a, L)$



$$\uparrow \frac{Pb}{L}$$

$$\sum F_x = 0 \quad N = 0$$

$$\sum F_y = 0 \quad \frac{Pb}{L} - P - V = 0$$

$$V = \frac{P}{L} \cdot (b-L) = -\frac{Pa}{L} \text{ kte}$$

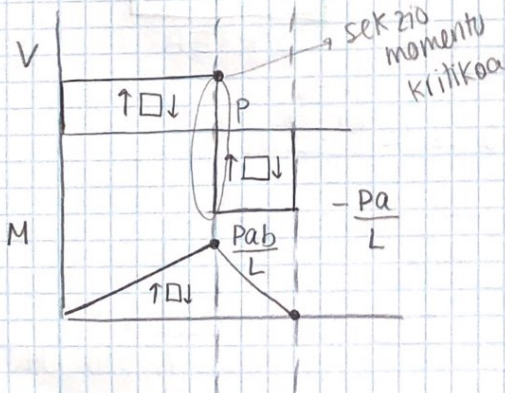
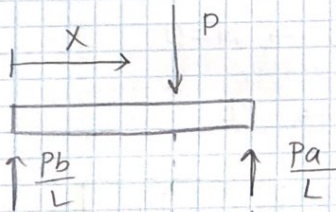
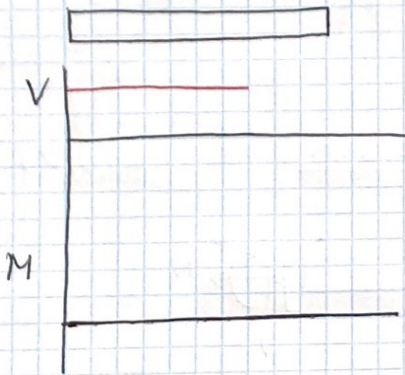
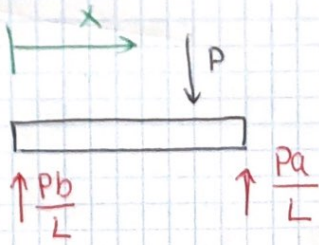
$$M = \frac{Pbx}{L} \text{ ZUZENK BAT}$$

geroz eta urrutiago A titik, M handiagoa izango da.

$$\sum M = 0 \quad -\frac{Pb}{L}x + P(x-a) + M = 0$$

$$M = \frac{Pb}{L}x - Px + Pa = \frac{Px(b-L)}{L} + Pa =$$

$$= \boxed{-\frac{Pax}{L} + Pa} \quad \text{ZUZEN BAT}$$



momentuaren  
puntzioan ordezkatu

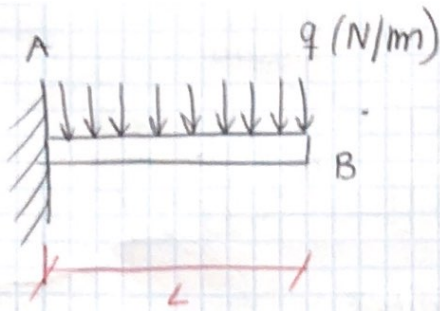
$$M(x=a) = Pa - \frac{Paa}{L} = \frac{Pa}{L} (L-a) =$$

$$= \boxed{\frac{Pab}{L}}$$

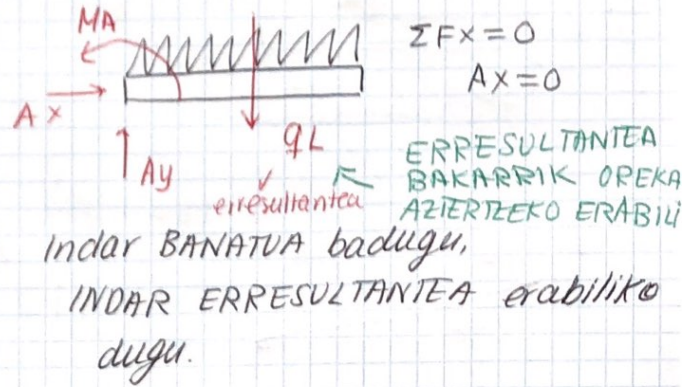
$$M(x=L) = Pa - \frac{Pa}{L} \cdot L = 0$$

$$M(x=b) = -\frac{Pab}{L} + Pa =$$

$$\frac{-Pab + LPa}{L} = \frac{Pa(-b+L)}{L} = -\frac{Pa}{L}$$



1) Egitura askatu  $\rightarrow$  erreakzioak

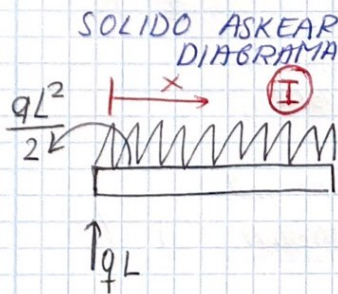


$$\sum F_y = 0$$

$$A_y - qL = 0$$

$$A_y = qL$$

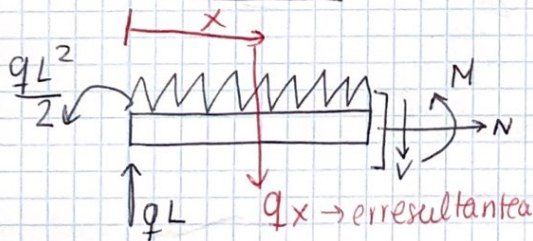
$$\sum M_A = 0 \quad M_A - qL \cdot \frac{L}{2} = 0 \quad M_A = \frac{qL^2}{2}$$



$\vec{R}$  EZ JARRI!!!



1. eremua AB  $x \in (0, L)$



$$\sum F_x = 0 \rightarrow N = 0$$

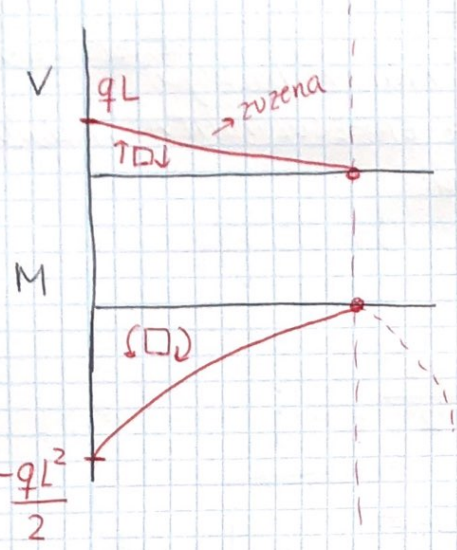
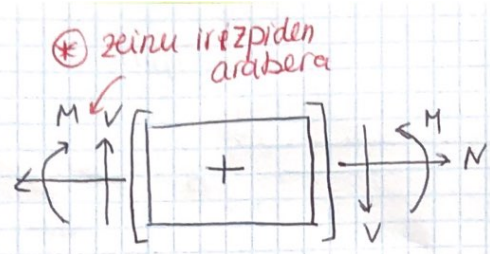
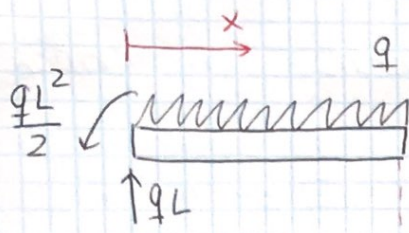
$$\sum F_y = 0 \rightarrow qL - qx - V = 0$$

$$V = qL - qx \text{ ZUZEN BAT}$$

$$\sum M = 0 \rightarrow \frac{qL^2}{2} - qLx + qx \left(\frac{x}{2}\right) + M = 0$$

$$M = -\frac{qx^2}{2} + qLx - \frac{qL^2}{2} \text{ PARABOLA}$$

V-M  
grafikoa  
 $\Downarrow$



ordezkatoz

$x=0$  denean;

$$M = -\frac{qL^2}{2}$$

$x=L$  denean;

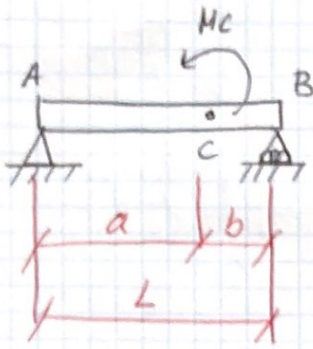
$$M(x=L) = -\frac{qL^2}{2} + qL^2 - \frac{qL^2}{2} = 0$$

PARABOLA  
BAT

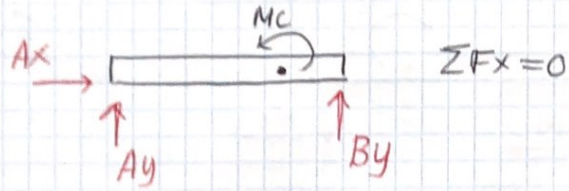
\* horren arabera  
⊖

INDAR BANATUA  
↓↓↓↓ bada ⇒ PARABOLA GANBILA

INDAR BANATUA ⇒ PARABOLA AHIRRA



1) Egitura askatu  $\rightarrow$  erreakzioak

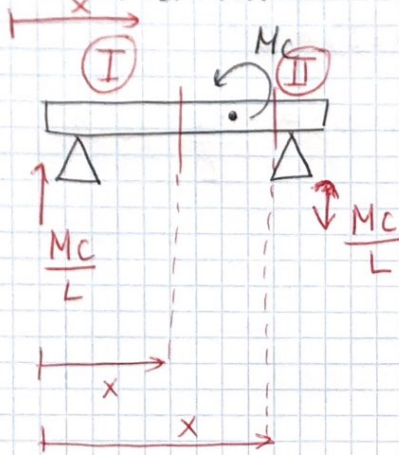


$$\Sigma F_y = A_y + B_y = 0 \rightarrow A_y = -B_y$$

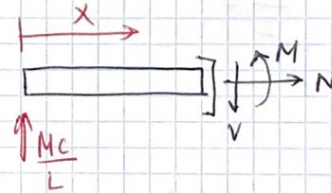
$$\Sigma M_A = 0 \rightarrow \widehat{M}_C + \widehat{B}_y \cdot L = 0$$

$$\left\{ \begin{array}{l} B_y = -\frac{M_c}{L} \\ A_y = \frac{M_c}{L} \end{array} \right\}$$

SOLIDO ASKEAREN  
DIAGRAMA



1. eremua:  $AC \ x \in (0, a)$



$$\Sigma M = -\frac{M_c}{L} \cdot x + M = 0$$

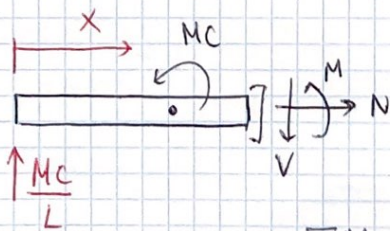
$$\Sigma F_x = 0 \rightarrow N = 0$$

$$\Sigma F_y = 0 \rightarrow \frac{M_c}{L} - V = 0$$

$$M = \frac{M_c x}{L} \quad \text{ZUZEN BAT}$$

$$V = \frac{M_c}{L} \quad \text{KTEA}$$

2. eremua:  $BC \ x \in (a, L)$



$$\Sigma F_x = 0 \rightarrow N = 0$$

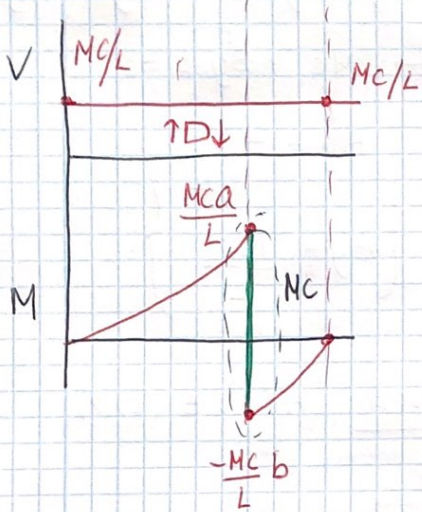
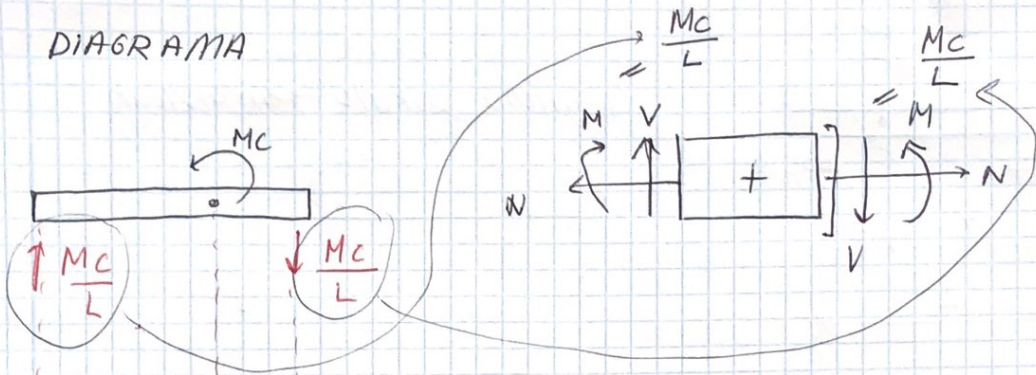
$$\Sigma F_y = 0 \rightarrow \frac{M_c}{L} - V = 0 \rightarrow V = \frac{+M_c}{L} \quad \text{KTEA}$$

$$\Sigma M = 0 \rightarrow -\frac{M_c}{L} \cdot x + M_c + M = 0$$

sezioan

$$M = \frac{M_c}{L} x - M_c \quad \text{ZUZENA BAT DA}$$

DIAGRAMA



$$\begin{cases} M_c(x=a) = \frac{M_c}{L}(a-L) = -\frac{M_c}{L}b \\ M_c(x=L) = 0 \\ M_c(x=b) = \frac{M_c}{L}(L-a) \end{cases}$$