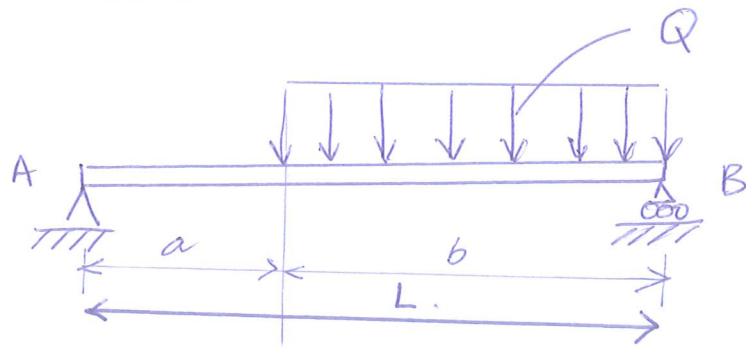


2.4.29

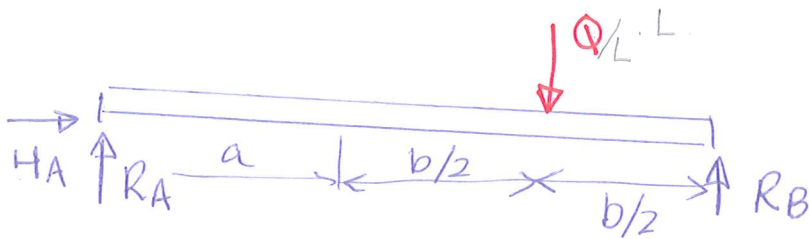
GIVET:



SÖKT: T och M-diagram.

LÖSNING:  $\begin{cases} 1.- \text{Global jmv} \Rightarrow \text{Reaktionskrafter} \\ 2.- \text{Snitta och jmv} \Rightarrow \text{Innekrafter / moment.} \end{cases}$

1.- Reaktionskrafter



$$\rightarrow : H_A = 0 \quad (1)$$

$$\sum M_A: (a + b/2)Q - L R_B = 0$$

$$R_B = \frac{(a + b/2)Q}{L} \quad (2)$$

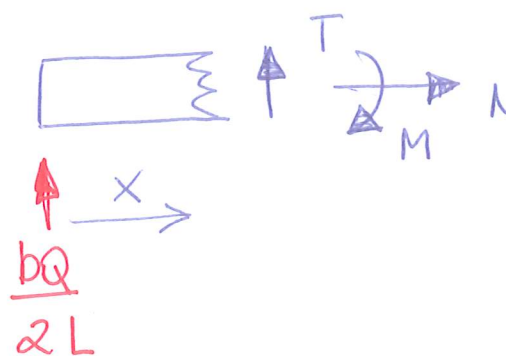
$$\uparrow : R_A + R_B - Q = 0 \rightarrow R_A = \frac{(a+b)}{L}Q - \frac{(a+b/2)}{L}Q$$

$$R_A = \frac{b/2}{L}Q \quad (3)$$

STATISKT BESTÄMT

## 2. Inrekræfter / Moment.

Del 1:  $0 \leq x \leq a$ .

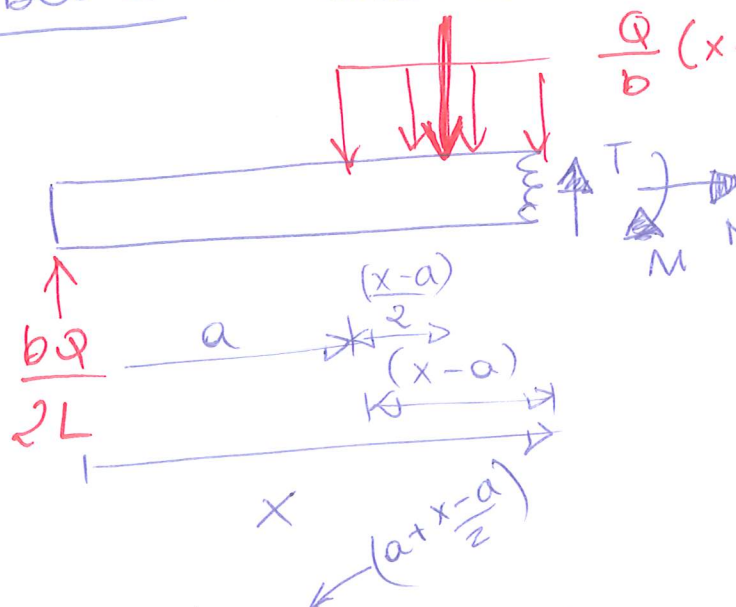


$$\rightarrow : \underline{N = 0}$$

$$\uparrow : T + \frac{bQ}{2L} = 0 ; \underline{T = -\frac{bQ}{2L}}$$

$$\sum A : -Tx + M = 0 \quad \underline{M = -\frac{bQ}{2L}x}$$

Del 2 :  $a \leq x \leq L$



$$\rightarrow : \underline{N = 0}$$

$$\uparrow \frac{bQ}{2L} - \frac{Q}{b}(x-a) + T$$

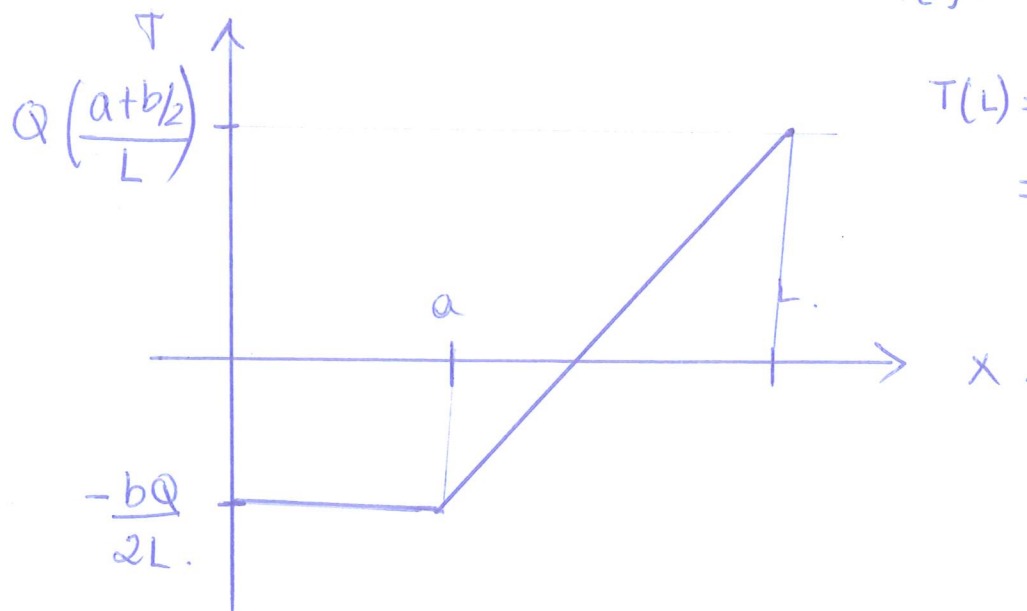
$$\underline{T = \frac{Q}{b}(x-a) - \frac{bQ}{2L}}$$

$\sum A : \left(\frac{x+a}{2}\right) \frac{Q}{b}(x-a) - Tx + M = 0$

$$M = \left( \frac{Q}{b}(x^2 - ax) - \frac{bQ}{2L}x \right) \overset{T \cdot x}{\leftarrow} - \frac{Q}{2b}(x^2 - a^2)$$

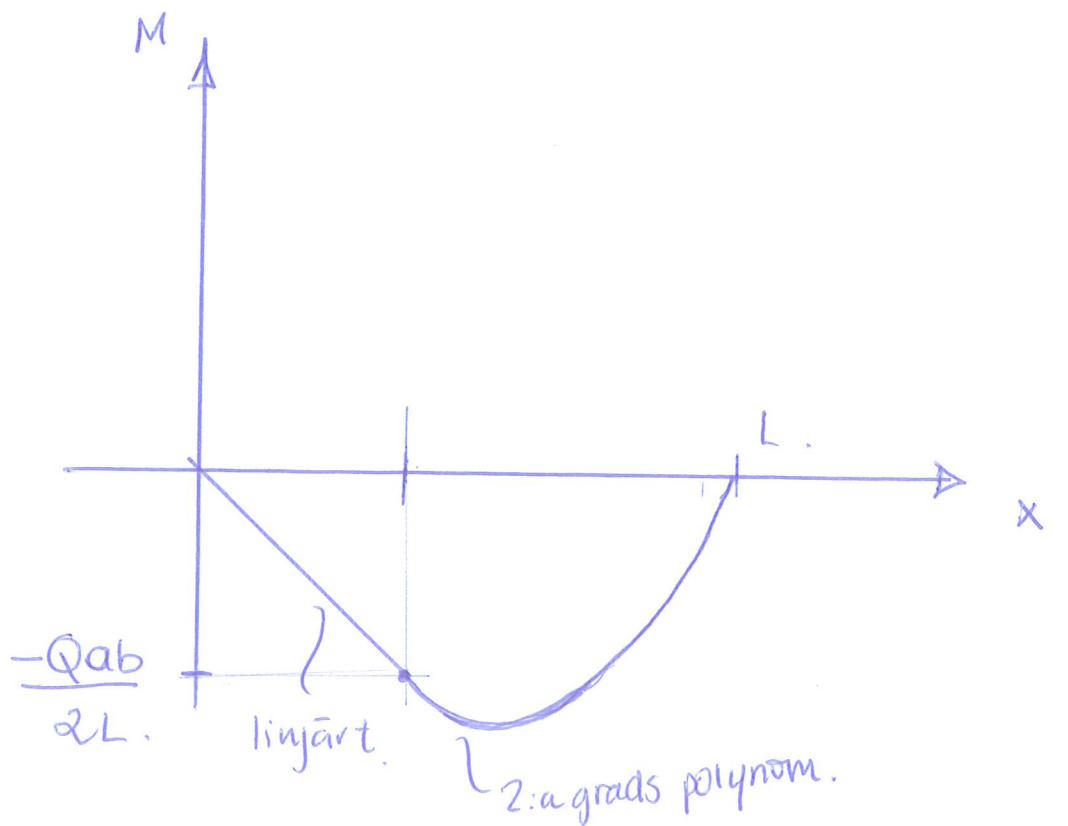
$$M = \frac{Q}{2b}(x^2 - 2ax + a^2) - \frac{bQ}{2L}x$$

$$\underline{M = \frac{Q}{2b}(x-a)^2 - \frac{bQ}{2L}x}$$



$$T(L) = \frac{Q}{b}(L-a) - \frac{bQ}{2L}$$

$$\begin{aligned} T(L) &= Q - \frac{bQ}{2L} \\ &= \frac{(2a+2b)Q - bQ}{2L} \\ &= \frac{(2a+b)Q}{2L} \end{aligned}$$



$$M_{min} \Rightarrow \frac{dM}{dx} = 0 \rightarrow \frac{Q}{b}(x-a) - \frac{bQ}{2L} = 0$$

$$x = a + \frac{b^2}{2L}$$

$$M\left(x = a + \frac{b^2}{2L}\right) = \frac{Q}{2b} \left(\frac{b^2}{2L}\right)^2 - \frac{abQ}{2L} - \frac{b^3Q}{4L^2} =$$

$$= \frac{Qb^3}{8L^2} - \frac{Qb^3}{4L^2} - \frac{abQ}{2L} = -\frac{Qb^3}{8L^2} - \frac{abQ}{2L} =$$

$$= -\frac{Qb^3}{8L^2} \left(1 + \frac{4aL}{b^2}\right) = -\frac{Qb}{8} \left(\frac{L+a}{L}\right)^2$$

$\uparrow$   
 $b = L - a$