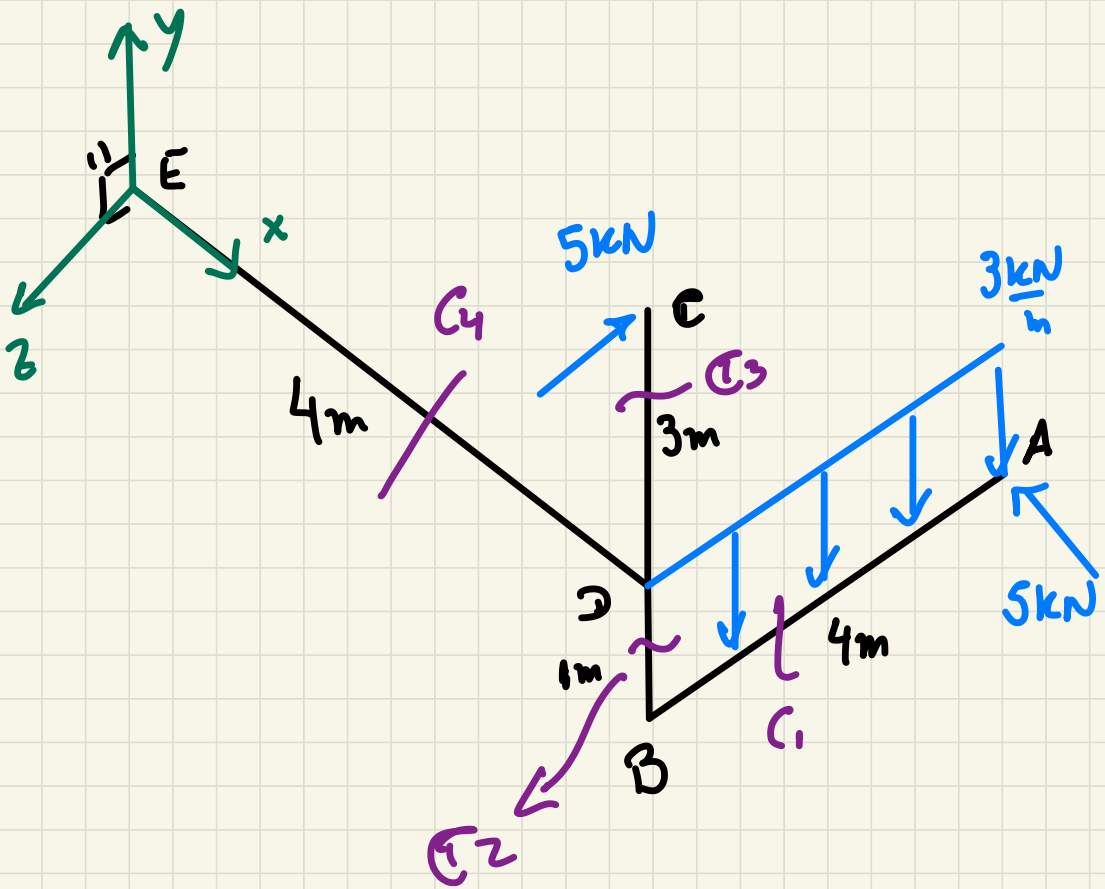
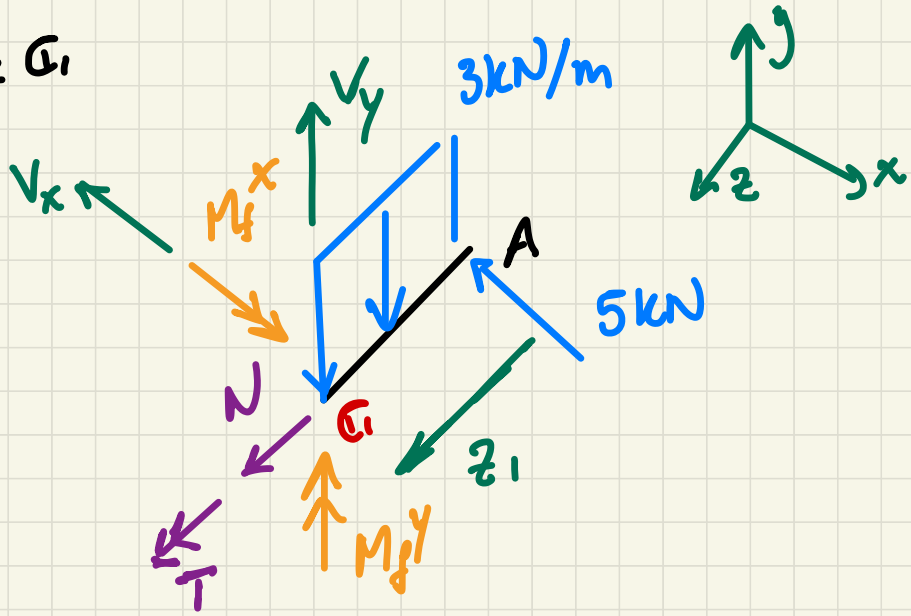
Ex: Traçar os diagramas de esforços solicitantes



Corte C_1



Equilíbrio $\quad \Sigma F_x = 0 \Rightarrow -5 - V_x = 0$

$$V_x = -5\,kN$$

$$\Sigma F_y = 0 \Rightarrow V_y - 3z_1 = 0 \Rightarrow \boxed{V_y = 3z_1}$$

$$\Sigma F_z = 0 \Rightarrow \boxed{N = 0}$$

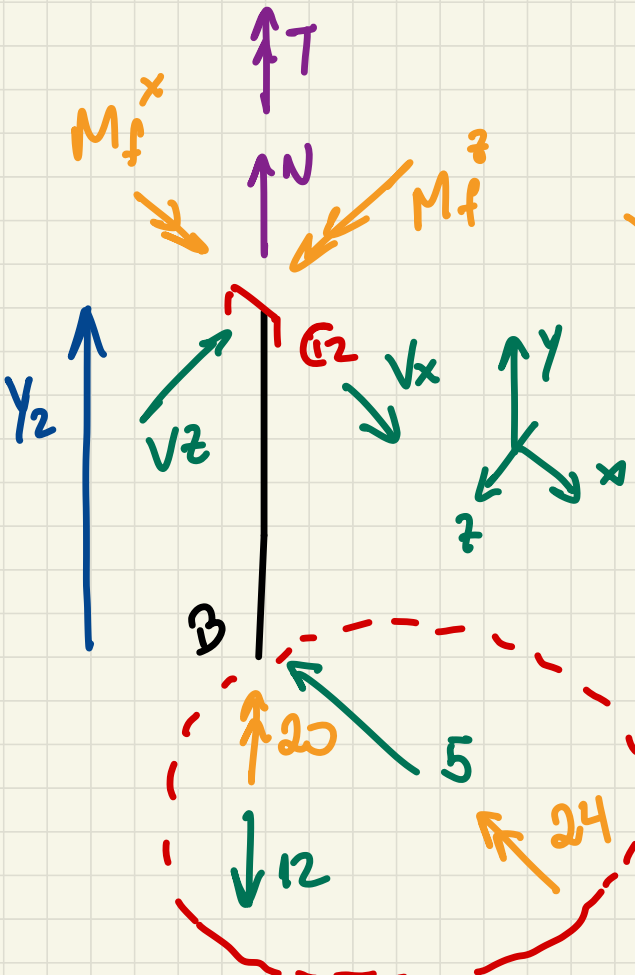
$$\Sigma M_{C_1}^x = 0 \Rightarrow M_f^x - 3z_1 \cdot \frac{z_1}{2} = 0$$

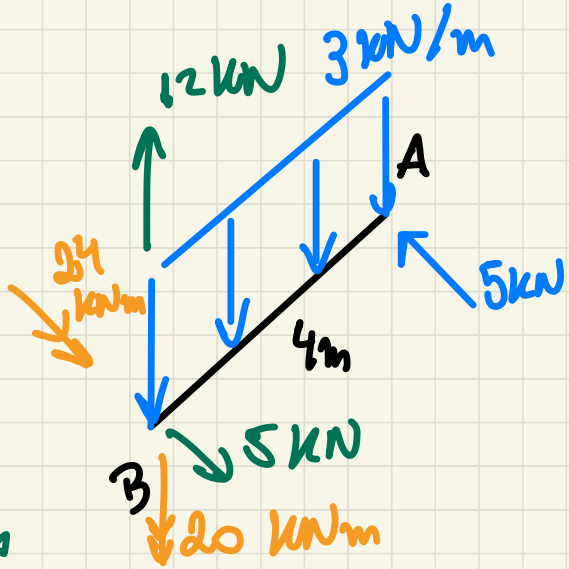
$$\boxed{M_f^x = 3/2\, z_1^2}$$

$$\Sigma M_{C_1}^y = 0 \Rightarrow M_f^y + 5z_1 = 0 \Rightarrow \boxed{M_f^y = -5z_1}$$

$$\Sigma M_{C_1}^z = 0 \Rightarrow \boxed{T = 0}$$

Trecho DB, trazendo esforços solicitantes de AB p/ ponto B.





— e —

esforços solicitantes em B "sentidos já corretos"

↳ trouxe p/ o elemento vertical os esforços internos no elemento horizontal AB

Equilíbrio BC_2

$\sum F_x = 0 \Rightarrow \boxed{V_x = 5\ kN}$

$\sum F_y = 0 \Rightarrow \boxed{N = 12\ kN}$

$\sum F_z = 0 \Rightarrow \boxed{V_z = 0\ kN}$

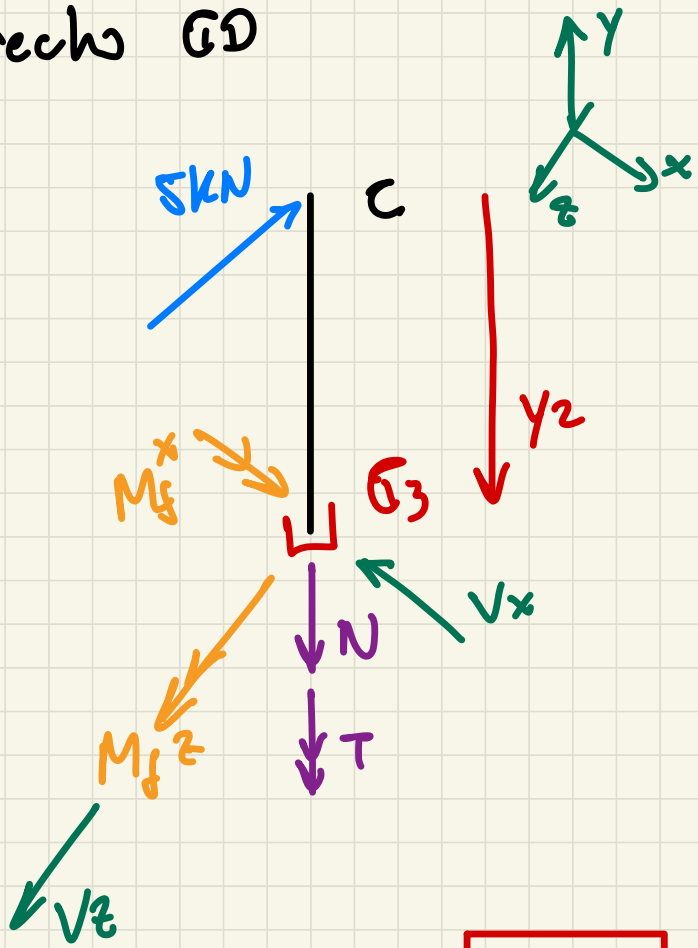
$\sum M^x_{C_2} = 0 \Rightarrow \boxed{M_f^x = 24\ kN m}$

$\sum M^y_{C_2} = 0 \Rightarrow T + 20 = 0 \Rightarrow \boxed{T = -25\ kN m}$

$\sum M^z_{C_2} = 0 \Rightarrow M_f^z - 5y_2 = 0$

$\Rightarrow \boxed{M_f^z = 5y_2}$

Trecho CD



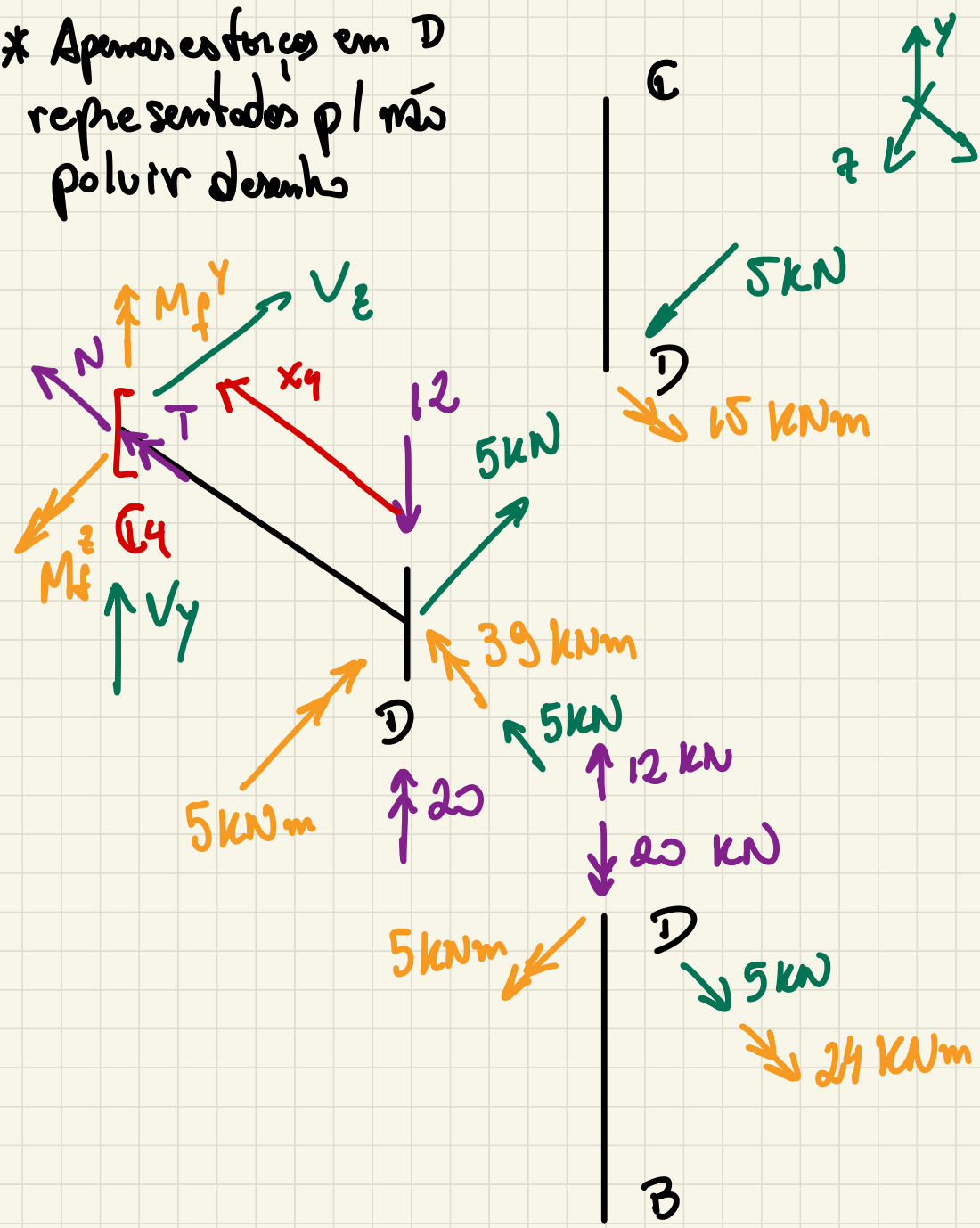
Equilíbrio: $\Sigma F_x = 0 \Rightarrow \boxed{V_x = 0}$ $\quad \Sigma F_z = 0$

$\Sigma F_y = 0 \Rightarrow \boxed{N = 0}$ $\quad \Rightarrow \boxed{V_z = 5kN}$

$\Sigma M_{C_2}^x = 0 \Rightarrow M_f^x - 5y_2 = 0 \Rightarrow \boxed{M_f^x = 5y_2}$

$\Sigma M_{C_2}^y = 0 \Rightarrow \boxed{T = 0}$ $\quad \Sigma M_{C_2}^z \Rightarrow \boxed{M_f^z = 0}$

* Apenas esforços em D representados p/ não poluir desenho



Equilíbrio

$$\Sigma F_x = 0 \Rightarrow -N - 5 = 0$$

$$N = -5\ kN$$

$$\Sigma F_y = 0 \Rightarrow V_y = 12\ kN$$

$$\Sigma F_z = 0 \Rightarrow V_z = -5\ kN$$

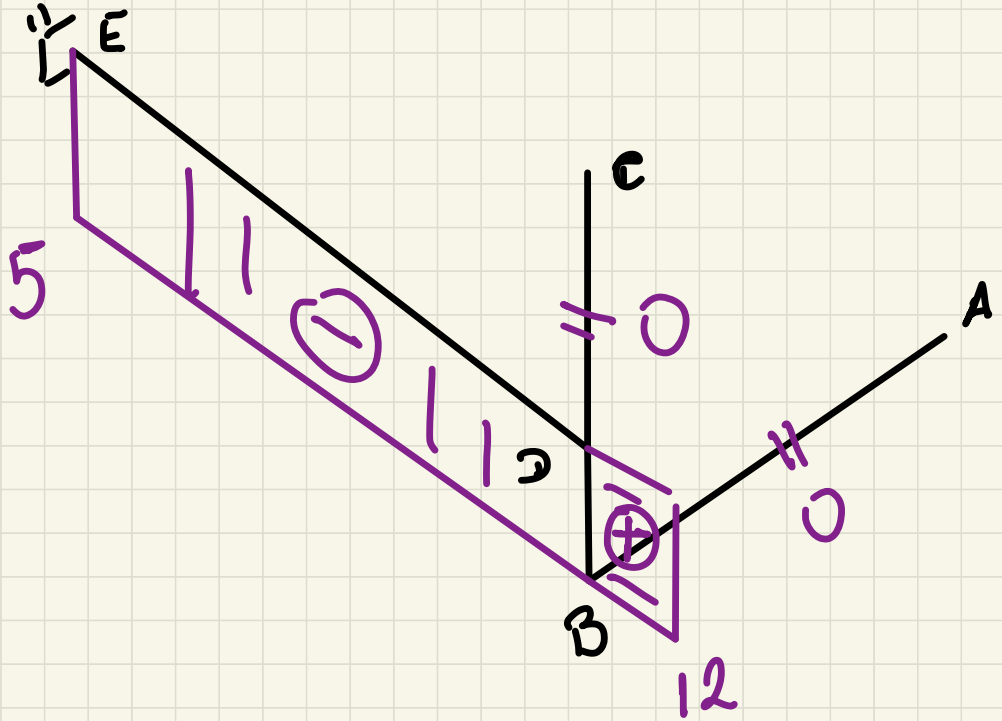
$$\Sigma M_x^{C_4} = 0 \Rightarrow T = -39\ kN\,m$$

$$\Sigma M_y^{C_4} = 0 \Rightarrow M_f^y + 5 \times 4 + 20 = 0$$

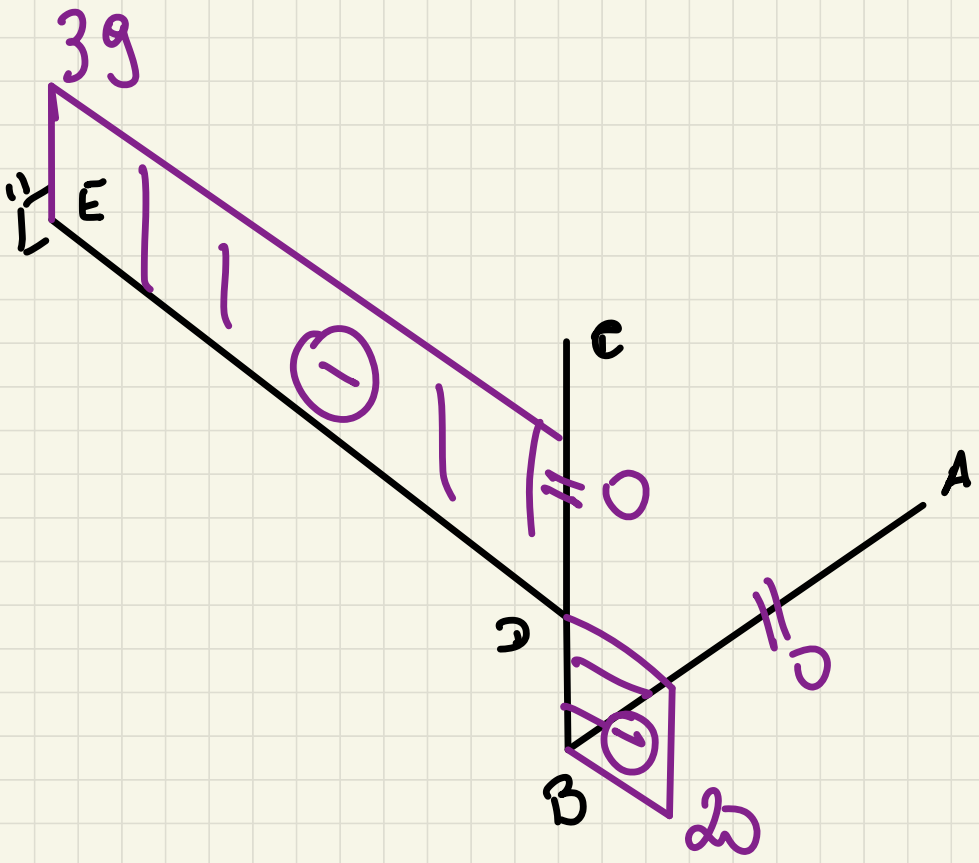
$$M_f^y = -5 \times 4 - 20$$

$$\Sigma M_z^{C_4} = 0 \Rightarrow M_f^z - 5 - 12 \times 4 = 0$$

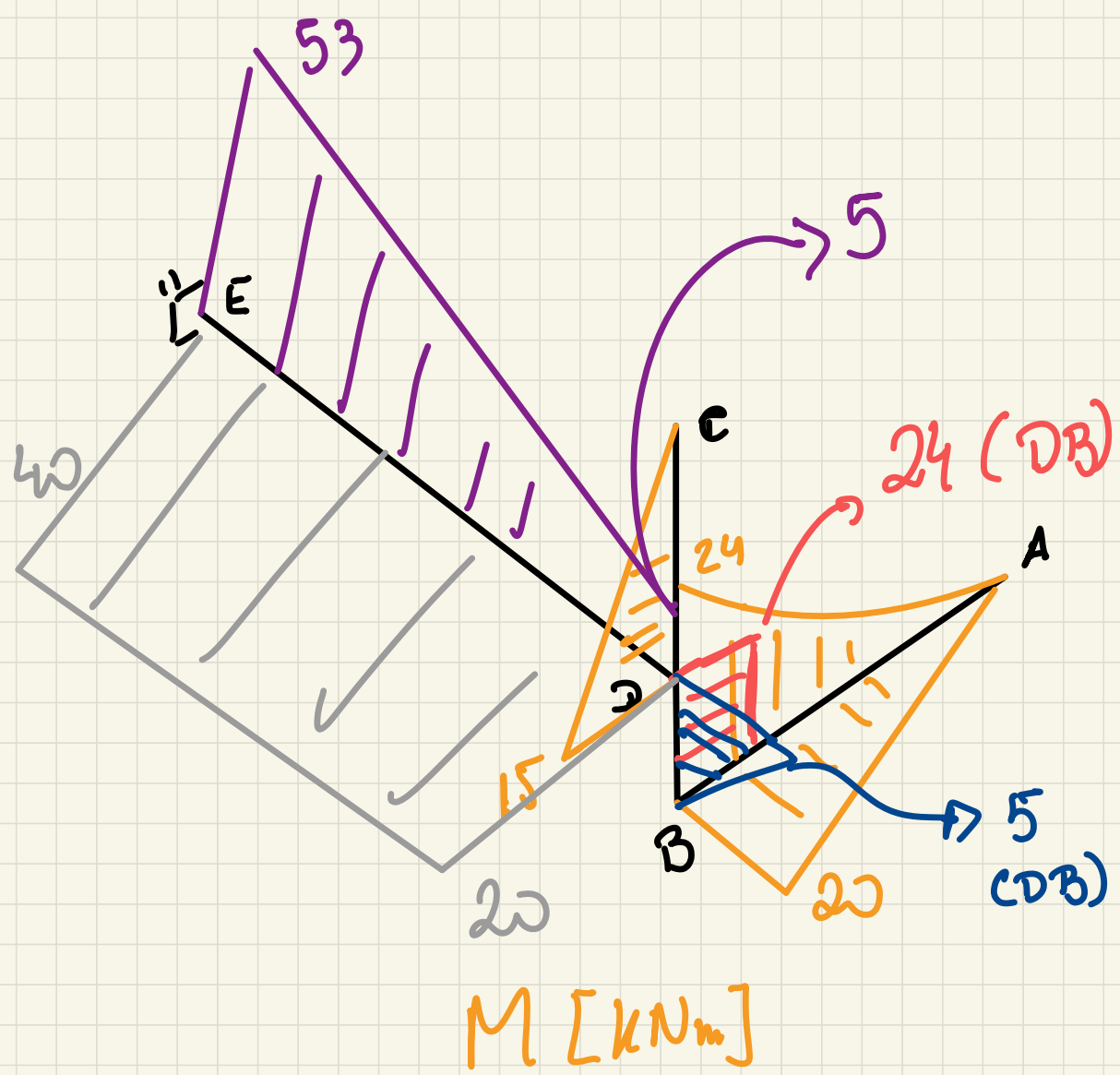
$$M_f^z = 5 + 12 \times 4$$

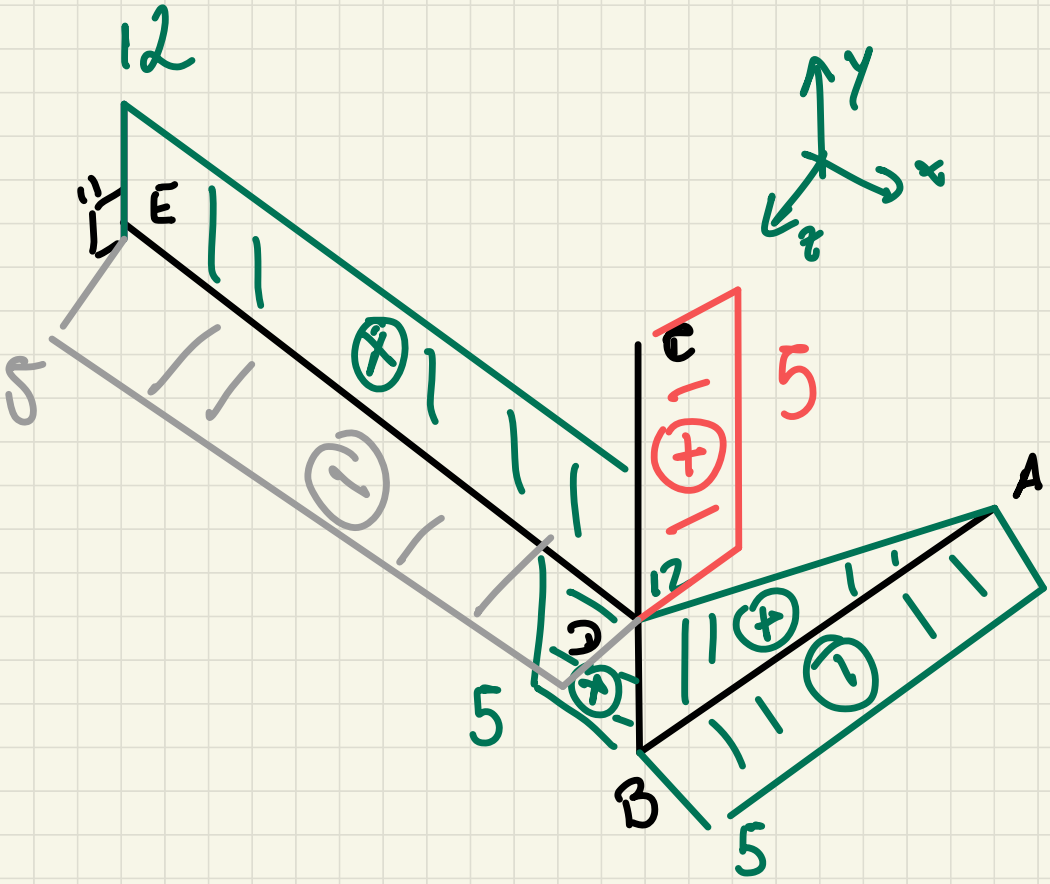


N [kN]



T [kNm]


53
E
5
C
24 (DB)
24
A
40
D
15
B
5
(DB)
20
20
M [kNm]



V[kN]

Entrega