ZÁKLADY STAVEBNÍ MECHANIKY

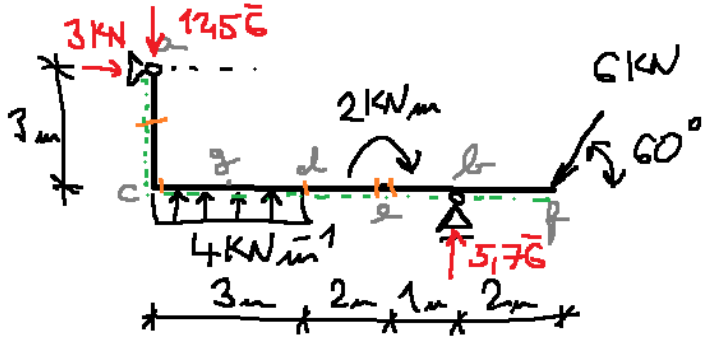
BDA001

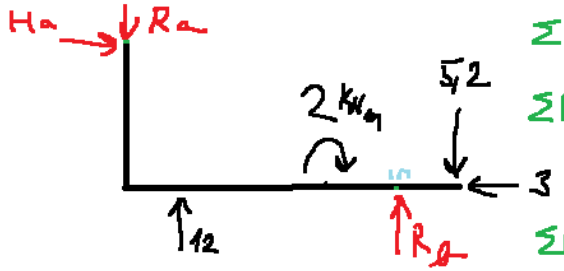
Rovinné pravoúhle lomené nosníky a konzoly zatížené libovolným zatížením včetně rovnoměrně spojitých a lineárních, reakce a diagramy vnitřních sil a momentů.

Zdeněk Kala

Rovinný rám


Jednoduchý rovinný lomený nosník pravoúhlý
nosník do úsečky





$\Sigma F_x = 0 \quad H_a - 3 = 0 \quad H_a = 3\ kN$

$\Sigma M_a = 0 \quad 12 \cdot 1{,}5 - 2 + R_b \cdot 6 - 5{,}2 \cdot 8 - 3 \cdot 3 = 0$

$R_b = 5{,}76\ kN$

$\Sigma M_b = 0 \quad -5{,}2 \cdot 2 - 2 - 12 \cdot 4{,}5 - 3 \cdot 3 + R_a \cdot 6 = 0$

$R_a = 12{,}56\ kN$

$\Sigma F_y = 0 \quad -12{,}56 + 12 + 5{,}76 - 5{,}2 = 0$ ✓

$M_a = 3 \cdot 3 - 12{,}56 \cdot 3 + 4 \cdot 3 \cdot 1{,}5 = -10{,}68\ kNm$

[kN] [m]

$M_g = 3 \cdot 3 - 12{,}56 \cdot 1{,}5 + 4 \cdot 1{,}5 \cdot 0{,}75$

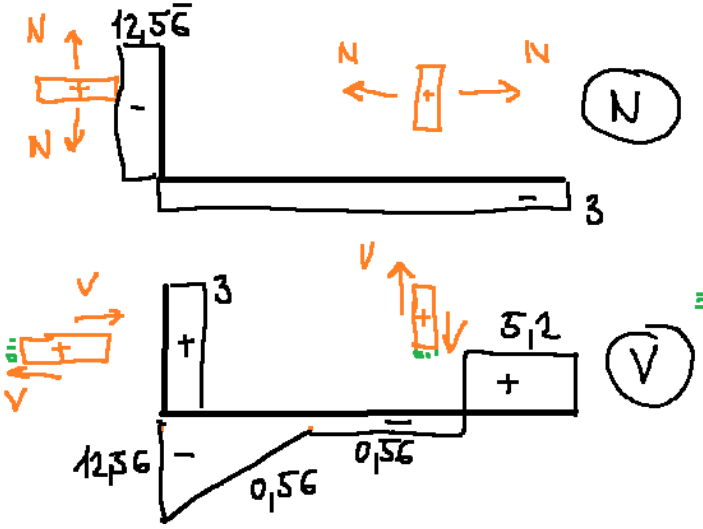
$= -5{,}74\ kNm$

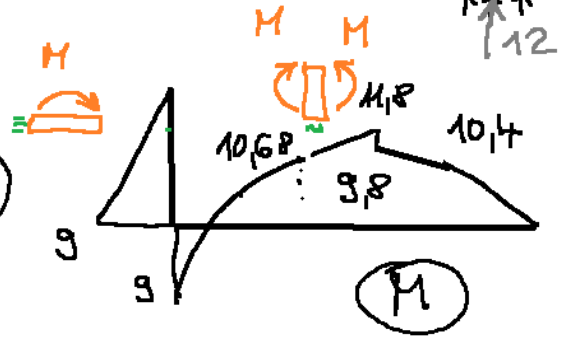
kN m

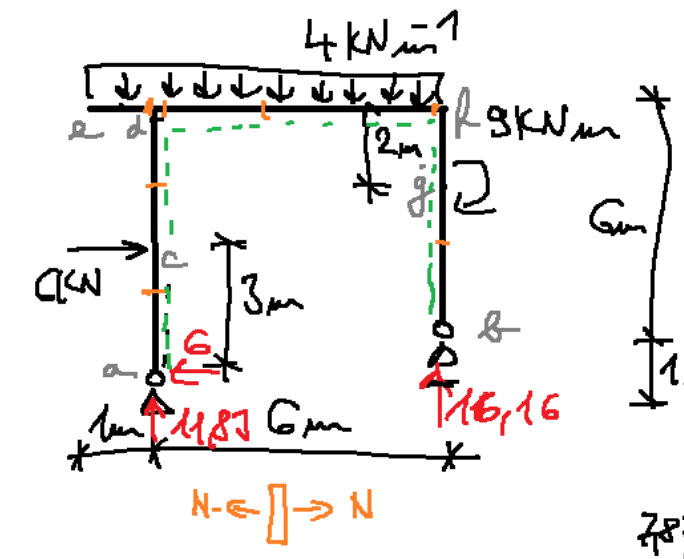
$^{L}M_e = 3 \cdot 3 - 12{,}56 \cdot 5 + 4 \cdot 3 \cdot 3{,}5 = -11{,}8\ kNm$

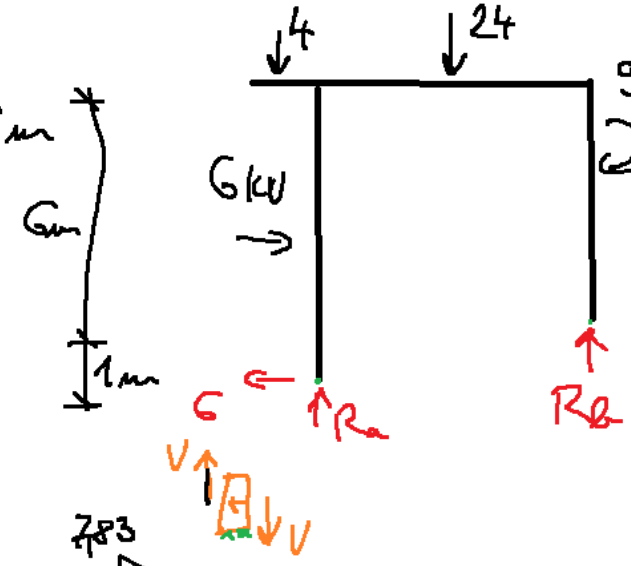
$^{R}M_e = -5{,}23 + 5{,}76 \cdot 1 = -9{,}8\ kNm$

$= M_e + 2 = -9{,}8\ kNm$









$\Sigma M_a = 0 \quad -6 \cdot 3 + 4 \cdot 0{,}5 - 24 \cdot 3 - 9 + R_b \cdot 6 = 0$

$R_b = 16{,}16\ kN$

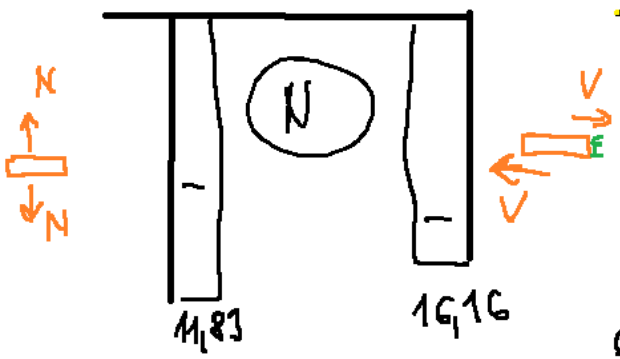
$\Sigma M_b = 0 \quad -R_a \cdot 6 - 6 \cdot 1 - 6 \cdot 2 + 4 \cdot 6{,}5 + 24 \cdot 3 - 9 = 0 \Rightarrow R_a = 11{,}83\ kN$

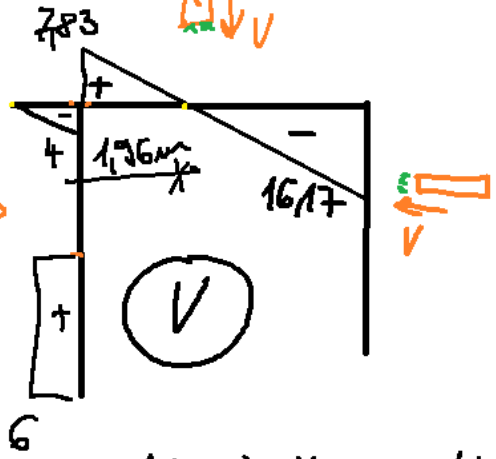
$\Sigma F_y = 0 \quad 11{,}83 - 4 - 24 + 16{,}16 = 0$ ✓

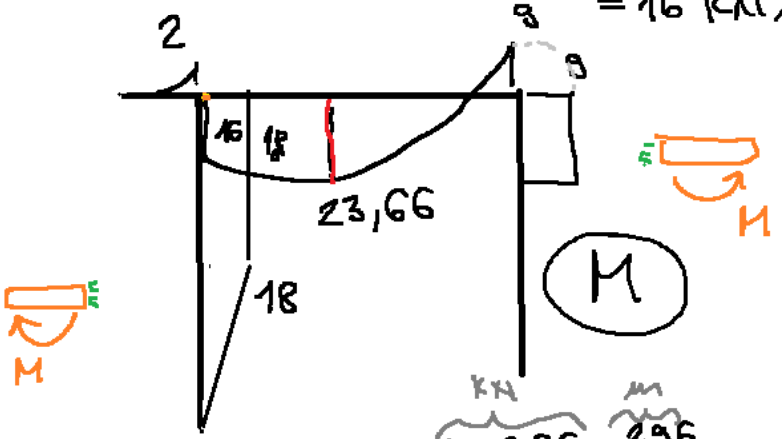
$M_d = 6 \cdot 7 - 6 \cdot 4 = 18\ kNm$

$M_d = -4 \cdot 1 \cdot 0{,}5 = -2\ kNm$

$M_d = +6 \cdot 7 - 6 \cdot 4 - 4 \cdot 1 \cdot 0{,}5 = 16\ kNm$







$M(1{,}96) = M_{max} = 11{,}83 \cdot 1{,}96 + 6 \cdot 7 - 6 \cdot 4 - 4 \cdot 2{,}96 \cdot \frac{2{,}96}{2} = 23{,}66\ kNm$