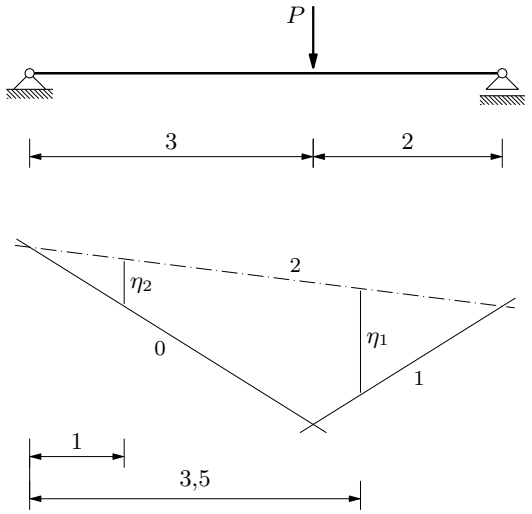
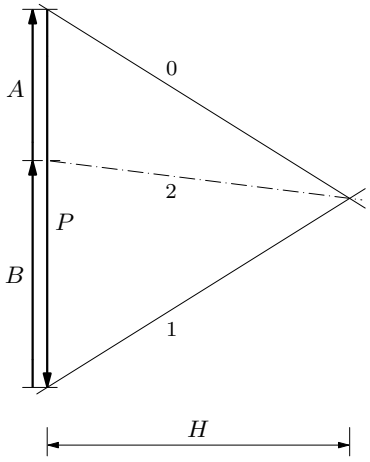
Verižni poligoni — teme s varijacijama

1.





mjerilo duljina: 1 cm :: 0,8 m mjerilo sila: 1 cm :: 10 kN

zadano: $P = 50\,\text{kN}$ $\Rightarrow$ na crtežu: $\widetilde{P} = 5\,\text{cm}$

odabrano: $H = 40\,\text{kN}$ $\Rightarrow$ $\widetilde{H} = 4\,\text{cm}$

očitano: $\widetilde{B} = 3{,}0\,\text{cm}$ $\Rightarrow$ $B = 30\,\text{kN}$

$\widetilde{A} = 2{,}0\,\text{cm}$ $\Rightarrow$ $A = 20\,\text{kN}$

(analitički: $\sum M_{/A} = 0 : -3 \cdot P + 5 \cdot B = 0 \quad \Rightarrow \quad B = \frac{3}{5} \cdot 50 = 30\,\text{kN}$)

očitano: $\tilde{\eta}_2 = 14\,\text{mm} = 1{,}4\,\text{cm}$ $\Rightarrow$ $\eta_2 = 1{,}4 \cdot 0{,}8 = 1{,}12\,\text{m}$

(verižni poligon je u mjerilu duljina)

$M(x = 3{,}5) = H\,\eta_2 = 40 \cdot 1{,}12 = 44{,}8\,\text{kNm}$

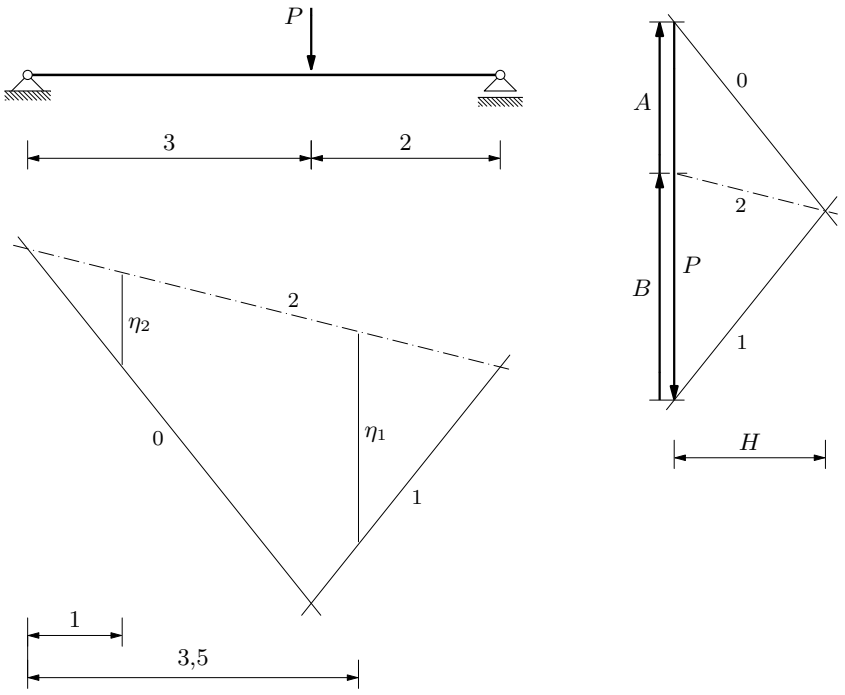
(analitički: $M(x = 3{,}5) = 1{,}5 \cdot B = 1{,}5 \cdot 30 = 45\,\text{kNm}$)

očitano: $\tilde{\eta}_1 = 6$ i četvrt mm $= 0{,}625\,\text{cm}$ $\Rightarrow$ $\eta_1 = 0{,}625 \cdot 0{,}8 = 0{,}5\,\text{m}$

$T(0^+) = H\,\dfrac{\eta_1}{1} = 40 \cdot 0{,}5 = 20\,\text{kN}$ (analitički: DZ!)

$T(5^-) = -H\,\dfrac{\eta_2}{1{,}5} = -40 \cdot \dfrac{1{,}12}{1{,}5} = -29{,}9\,\text{kN}$ (funkcija M je padajuća)

(analitički: $T(5^-) = -B = -30\,\text{kN}$)



mjerilo duljina: $1\,\text{cm} :: 0{,}8\,\text{m}$ mjerilo sila: $1\,\text{cm} :: 10\,\text{kN}$

zadano: $P = 50\,\text{kN}$

odabrano: $H = 20\,\text{kN}$

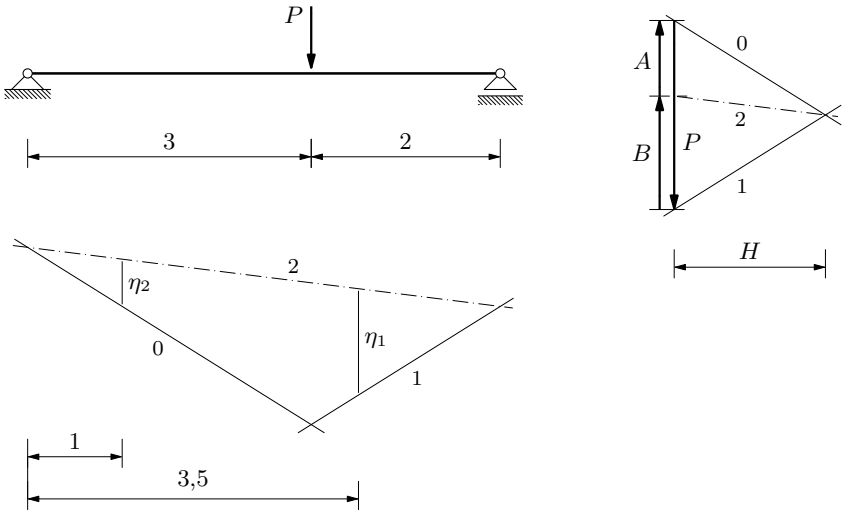
očitano: $\tilde{\eta}_2 = 28\,\text{mm} = 2{,}8\,\text{cm} \quad \Rightarrow \quad \eta_2 = 2{,}8 \cdot 0{,}8 = 2{,}24\,\text{m}$

$$M(x = 3{,}5) = H\,\eta_2 = 20 \cdot 2{,}24 = 44{,}8\,\text{kNm}$$

očitano: $\tilde{\eta}_1 = 12 \text{ i pola mm} = 1{,}25\,\text{cm} \quad \Rightarrow \quad \eta_1 = 1{,}25 \cdot 0{,}8 = 1{,}0\,\text{m}$

$$T(0^+) = H\,\frac{\eta_1}{1} = 20 \cdot 1 = 20\,\text{kN}$$

$$T(5^-) = -H\,\frac{\eta_2}{1{,}5} = -20 \cdot \frac{2{,}24}{1{,}5} = -29{,}9\,\text{kN}$$



mjerilo duljina: $1\,\text{cm} :: 0{,}8\,\text{m}$ mjerilo sila: $1\,\text{cm} :: 20\,\text{kN}$

zadano: $P = 50\,\text{kN} \quad \Rightarrow \quad$ na crtežu: $\widetilde{P} = 2{,}5\,\text{cm}$

odabrano: $H = 40\,\text{kN} \quad \Rightarrow \quad \widetilde{H} = 2\,\text{cm}$

očitano: $\widetilde{B} = 1{,}5\,\text{cm} \quad \Rightarrow \quad B = 30\,\text{kN}$

$\widetilde{A} = 1{,}0\,\text{cm} \quad \Rightarrow \quad A = 20\,\text{kN}$

očitano: $\tilde{\eta}_2 = 14\,\text{mm} = 1{,}4\,\text{cm} \quad \Rightarrow \quad \eta_2 = 1{,}4 \cdot 0{,}8 = 1{,}12\,\text{m}$

$M(x = 3{,}5) = H\,\eta_2 = 40 \cdot 1{,}12 = 44{,}8\,\text{kNm}$

očitano: $\tilde{\eta}_1 = 6 \text{ i četvrt mm} = 0{,}625\,\text{cm} \quad \Rightarrow \quad \eta_1 = 0{,}625 \cdot 0{,}8 = 0{,}5\,\text{m}$

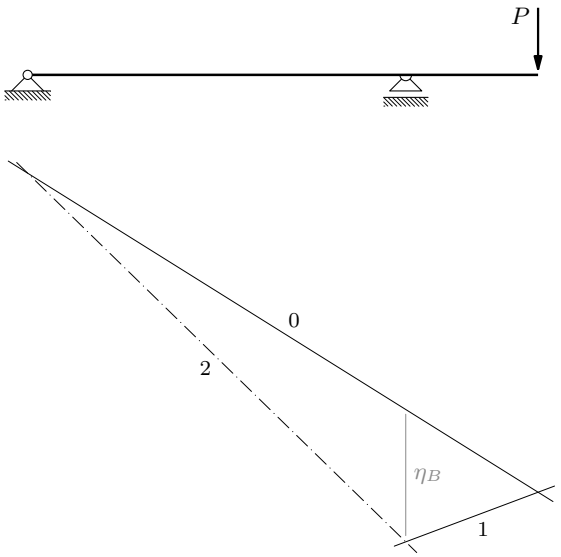
$$T(0^+) = H\,\frac{\eta_1}{1} = 40 \cdot 0{,}5 = 20\,\text{kN}$$

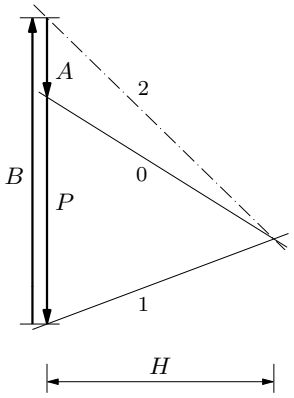
$$T(5^-) = -H\,\frac{\eta_2}{1{,}5} = -40 \cdot \frac{1{,}12}{1{,}5} = -29{,}9\,\text{kN}$$

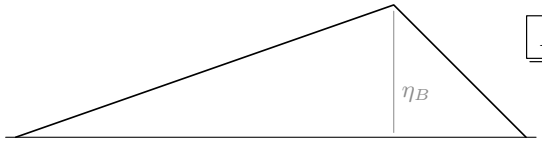
ukratko:

ako je mjerilo duljina $1\,\text{cm} :: d\,\text{m}$, onda je mjerilo momenata $1\,\text{cm} :: d\,H\,\text{kNm}$

2.

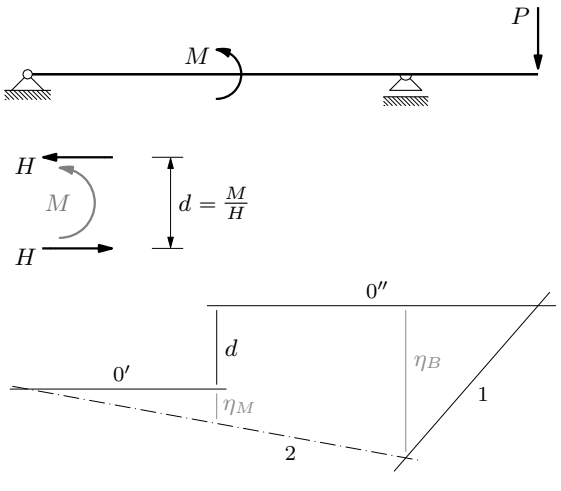


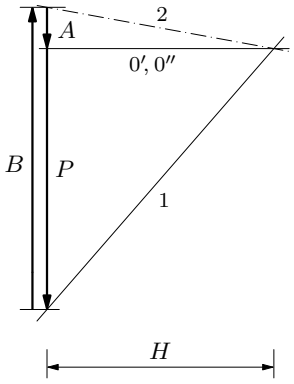


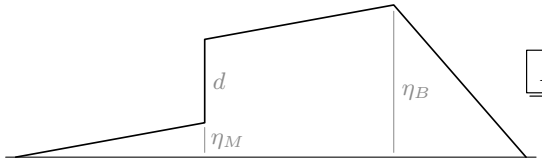


$\boxed{M}$

$$M(x) = H\,\eta(x)$$

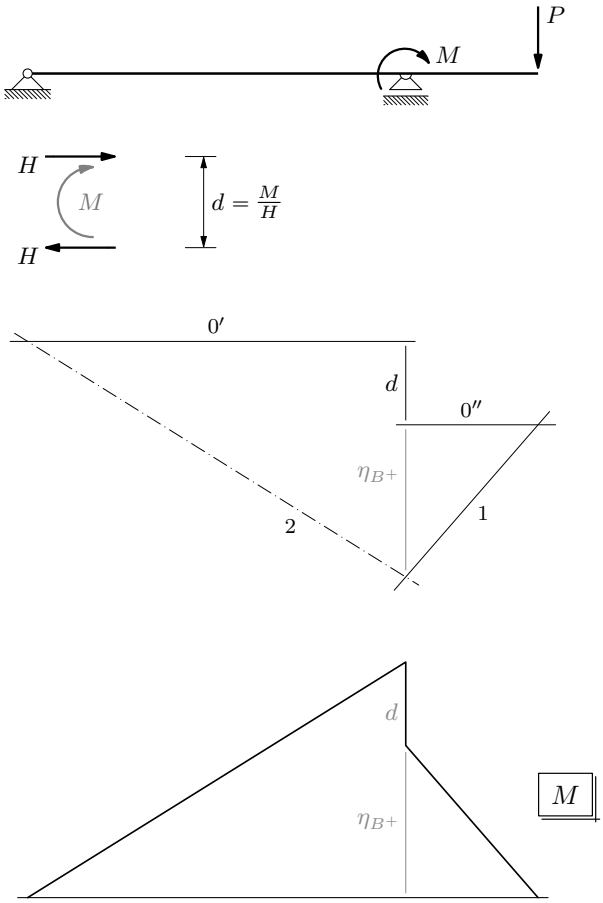


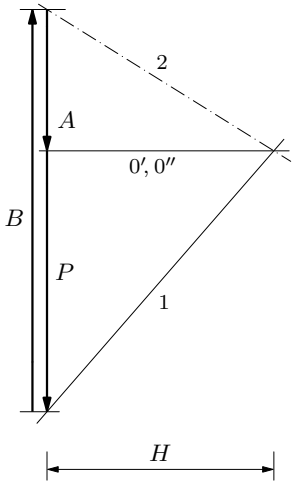




$\boxed{M}$

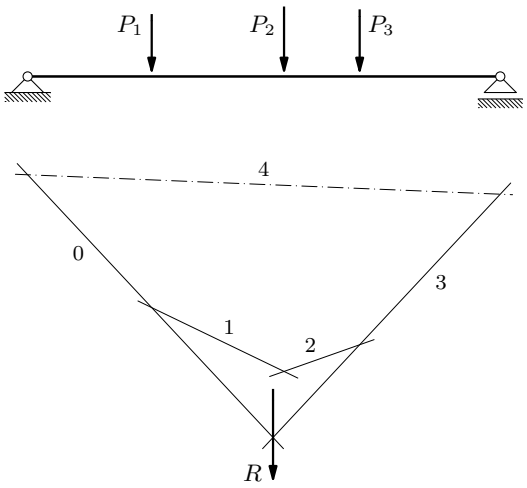
$$M(x) = H\,\eta(x)$$

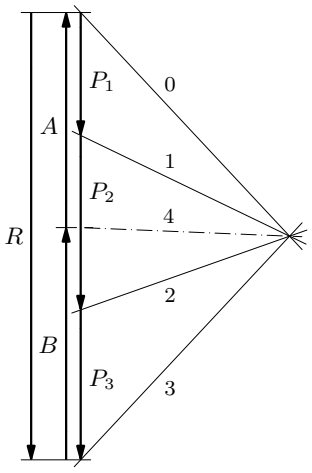

P
M
H
M
H
$d = \frac{M}{H}$
0′
d
0″
η_{B^+}
2
1

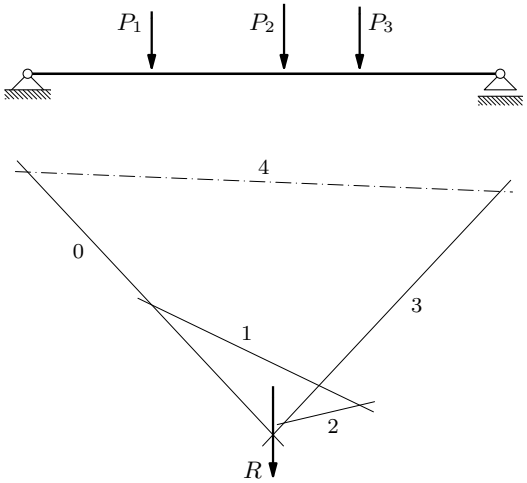

2
A
0′, 0″
B
P
1
H

d
η_{B^+}
M

3.


P_1
P_2
P_3
4
0
3
1
2
R


P_1
0
A
1
P_2
R
4
2
B
P_3
3


P_1
P_2
P_3
4
0
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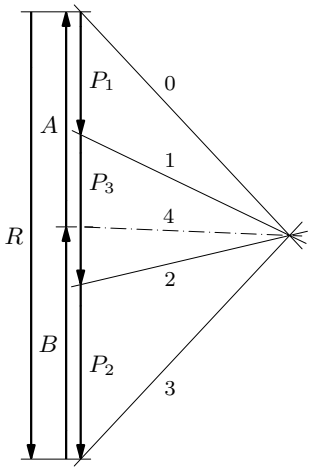
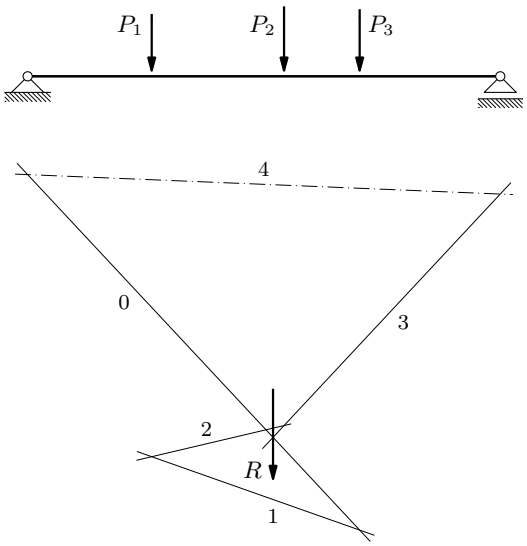
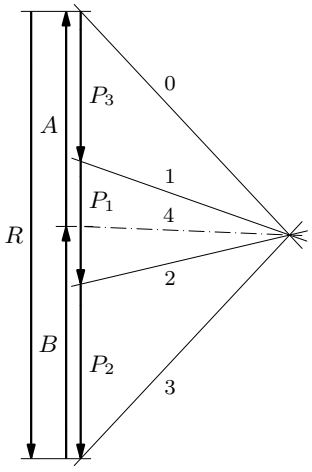
1
2
R


P_1
0
A
1
P_3
R
4
2
B
P_2
3


P_1
P_2
P_3
4
0
3
2
R
1


P_3
0
A
1
P_1
R
4
2
B
P_2
3