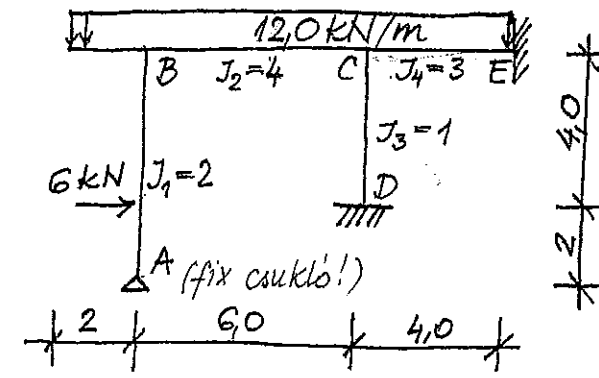


1. pl: Oldjuk meg a feladatot, ha az „A” támasz fix csukló!



- merevségek:

$$k_1 = \frac{3 \cdot 2}{6} = 1,0$$

$$k_2 = \frac{4 \cdot 4}{6} = 2,66$$

$$k_3 = \frac{1 \cdot 1}{4} = 1,0$$

$$k_4 = \frac{4 \cdot 3}{4} = 3,0$$

$$\left. \begin{matrix} k_1 \\ k_2 \end{matrix} \right\} \Sigma k_B = 3,66$$

$$\left. \begin{matrix} k_3 \\ k_4 \end{matrix} \right\} \Sigma k_C = 6,66$$

- nyomatékosztók:

$$\alpha_{1B} = \frac{1,0}{3,66} = 0,27; \alpha_{2B} = 0,73$$

$$\alpha_{2C} = \frac{2,66}{6,66} = 0,4; \alpha_{3C} = \frac{1,0}{6,66} = 0,15$$

$$\alpha_{4C} = \frac{3,0}{6,66} = 0,45$$

- nyomatékosztás:

	0,73	0,4	0,45	
24	0,27 + 36,0	- 36,0	0,15 + 16,0	- 16,0
1)	- 5,33	- 2,43		
2)	- 1,8	+ 8,97	+ 3,36 + 10,1	+ 5,05
3.)	+ 4,49	- 1,64		
4.)	- 3,28	+ 0,66	+ 0,25 + 0,74	+ 0,37
5)	+ 0,33			
	- 0,09	- 0,24		
	- 24,0	- 30,44	+ 3,61 + 26,84	- 10,58
	- 8,43		+ 1,68	
			+ 0,12	
			+ 1,80	

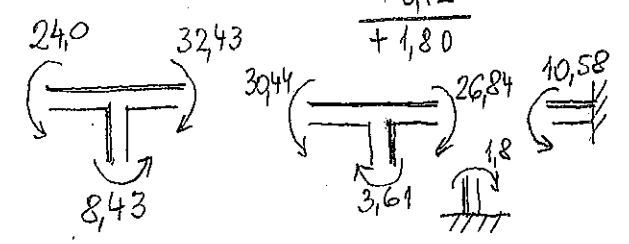
kezdeti bef. nyomatékok:

$$M_{BK}^0 = -\frac{1}{2} \cdot 12 \cdot 2^2 = -24,0 \text{ kNm}$$

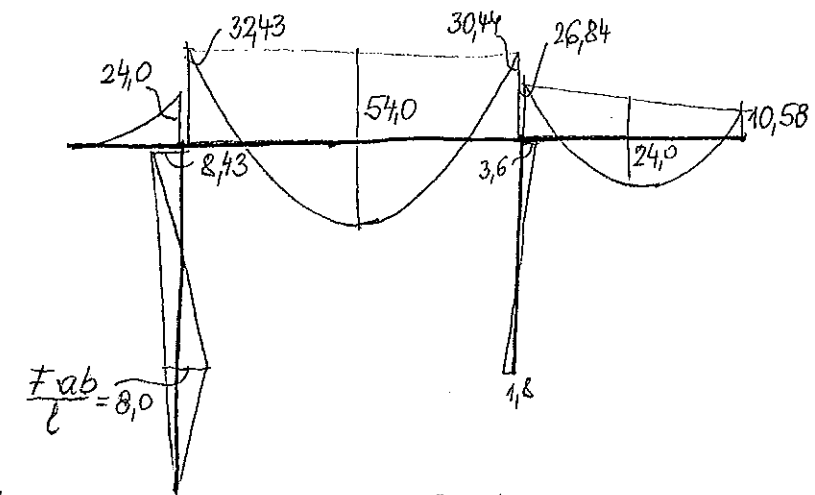
$$M_{B1}^0 = -\frac{F \cdot a \cdot b}{2 \cdot l^2} \cdot (l+a) = -\frac{6 \cdot 2 \cdot 4}{2 \cdot 6^2} \cdot 8 = -5,33 \text{ kNm}$$

$$M_{B2}^0 = -M_{C2}^0 = \frac{1}{12} \cdot 12 \cdot 6^2 = +36,0 \text{ kNm}$$

$$M_{C4}^0 = -M_E^0 = \frac{1}{12} \cdot 12 \cdot 4^2 = +16,0 \text{ kNm}$$



M dbra:



Mekkora v_B , ha $I_3 = 6,0 \cdot 10^8 \text{ mm}^4$ és $E = 10,0 \text{ kN/mm}^2$?

$$\Delta M_B = + 11,49 \cdot 10^3 \text{ kNmm}$$

$$\Sigma k_B = \frac{3,66 \cdot 6 \cdot 10^9}{1000} = 2,2 \cdot 10^7$$

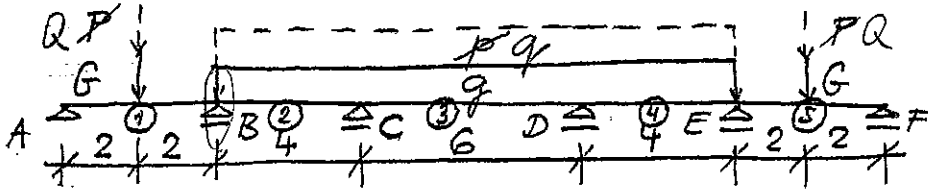
$$v_B = \frac{+ 11,49 \cdot 10^3}{2,2 \cdot 10^7} = + 5,2 \cdot 10^{-4} \text{ m}$$

$$v_B = \frac{\Delta M_B}{\Sigma k_B}$$

N. 11. elf. T. 8. gyak.

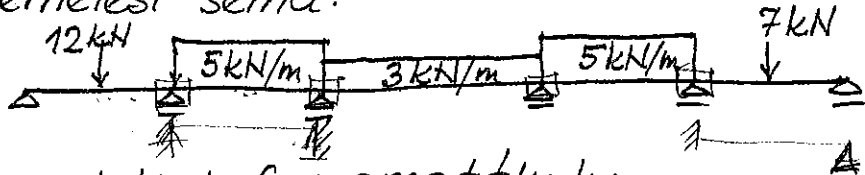
2. pl.: Határozzuk meg a többtámaszú tartó M_{Bmax} értékét! Rajzoljunk M ábrát!

(A páros ill. páratlan belső cs. pontokon felváltva crossolunk!)



$G = 7 \text{ kN}$, $q = 3 \text{ kN/m}$
 $Q = 5 \text{ kN}$, $p = 2 \text{ kN/m}$
 (I-állandó!)

Terhelési séma:



merevségek:

$$k_1 = k_5 = \frac{3 \cdot 1}{4} = 0,75$$

$$k_2 = k_4 = \frac{4 \cdot 1}{4} = 1,0$$

$$k_3 = \frac{4 \cdot 1}{6} = 0,66$$

ny. osztók:

$$\alpha_{1B} = \frac{0,75}{1,75} = 0,43 \quad \alpha_{2B} = 0,57$$

$$\alpha_{2C} = \frac{1,0}{1,66} = 0,6 \quad \alpha_{3C} = 0,4$$

kezdeti bef. nyomatékok:

$$M_{B1}^0 = -\frac{3}{16} Fl = -\frac{3}{16} \cdot 12 \cdot 4 = -9,00 \text{ kNm}$$

$$M_{B2}^0 = -M_{C2}^0 = +\frac{1}{12} \cdot 5 \cdot 4^2 = +6,66 \text{ kNm}$$

$$M_{C3}^0 = -M_{D3}^0 = +\frac{1}{12} \cdot 3 \cdot 6^2 = +9,0 \text{ kNm}$$

$$M_{D4}^0 = -M_{E4}^0 = +6,66 \text{ kNm}$$

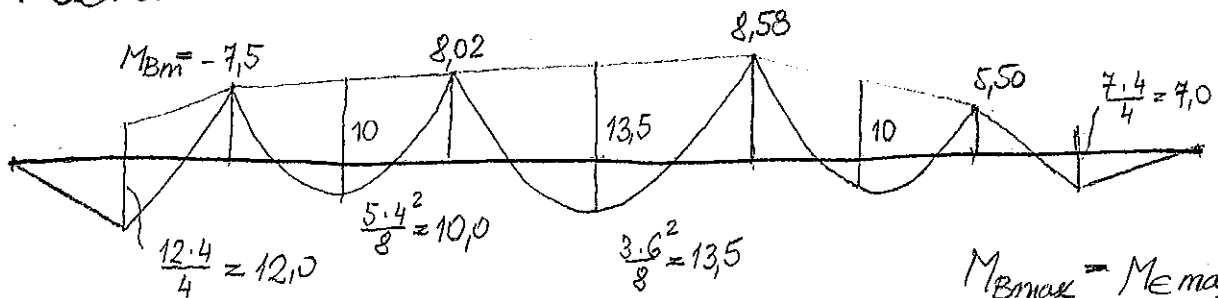
$$M_{E5}^0 = +\frac{3}{16} \cdot 7 \cdot 4 = +5,25 \text{ kNm}$$

nyomatékosztás:

B		C		D		E	
0,43	0,57	0,6	0,4	0,4	0,6	0,57	0,43
-9,0	+6,66	-6,66	+9,0	-9,0	+6,66	-6,66	+5,25
+1,00	+1,34	+0,67	+0,47	+0,94	+1,40	+0,70	
	-1,04	-2,09	-1,39	-0,69	+0,20	+0,40	+0,31
+0,45	+0,59	+0,30	+0,1	+0,20	+0,29	+0,15	
	-0,12	-0,24	-0,16	-0,08	-0,04	-0,09	-0,06
+0,05	+0,07	~	~	+0,05	+0,07	~	
-7,50	+7,50	-8,02	+8,02	-8,58	+8,58	-5,50	+5,50

1. lépés: B, D
 2. lépés: C, E
 ...

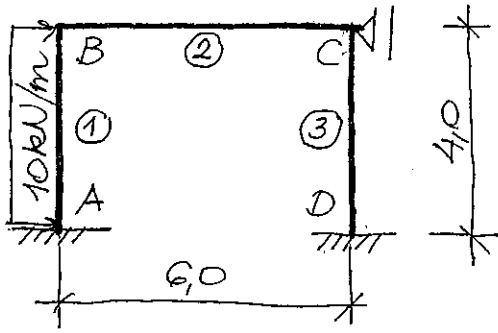
M ábra:



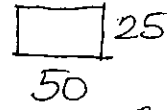
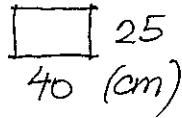
$$M_{Bmax} = M_{Emax}$$

N. II. évf. T. B. gyak.

3.) Rajzoljuk meg a fix keret M ábráját!



1. & 2. km.: 3. km.:



E (áll.) = 100 kN/mm²

$I_1 = I_2 = 133.333 \text{ cm}^4 = 13.3 \cdot 10^8 \text{ mm}^4$

$I_3 = \frac{260417 \text{ cm}^4}{260 \cdot 10^8 \text{ mm}^4} = 1.953 I_1$

merevségek:

$k_1 = \frac{4 \cdot 1}{4} = 1.0$

$\alpha_{B1} = \frac{1}{1.67} = 0.6$

$k_2 = \frac{4 \cdot 1}{6} = \frac{2}{3}$

$\alpha_{B2} = 0.4$

$\alpha_{C2} = \frac{0.67}{2.62} = 0.255$

$k_3 = \frac{4 \cdot 1.953}{4} = 1.953$

$\alpha_{C3} = 0.745$

kerdési bef. nyomatékok:

$M_{A1}^0 = + \frac{1}{12} \cdot 10 \cdot 4^2 = + 13.33 \text{ kNm} = - M_{B1}^0$

