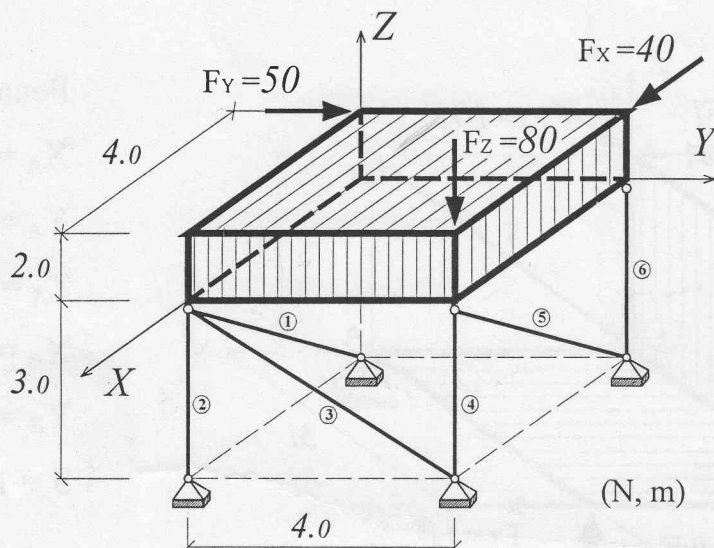


1. КОЛОКВИЈУМ

1. Круто тело је ослобођено и оптерећено као што је приказано на скици.

- Ослободити тело веза,
- Написати услове равнотеже у координатном систему X-Y-Z на скици,
- Одредити реакције веза.



Решење:

$$S_1 = -62.5 \text{ N}$$

$$S_2 = 100.0 \text{ N}$$

$$S_3 = -62.5 \text{ N}$$

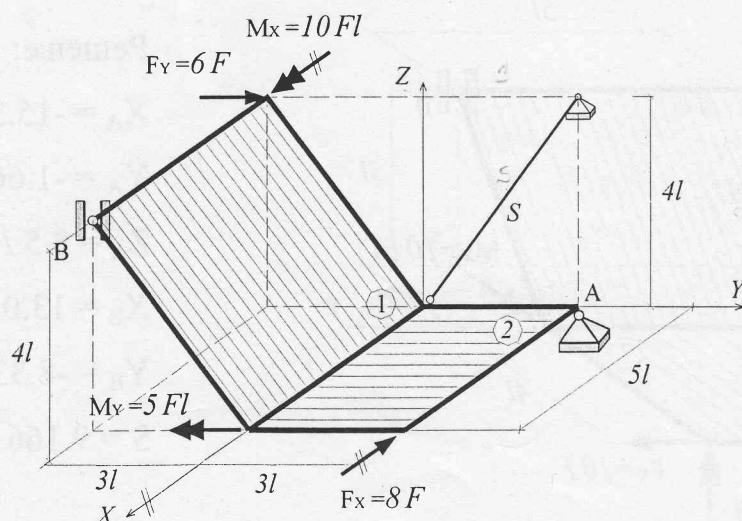
$$S_4 = -192.5 \text{ N}$$

$$S_5 = 112.5 \text{ N}$$

$$S_6 = 20.0 \text{ N}$$

2. Плоча 1 тежине $4F$, и плоча 2 тежине $3F$ међусобна су круто спојене. Оне су ослобођене и оптерећене као што је приказано на скици.

- Ослободити тело веза,
- Написати услове равнотеже у координатном систему X-Y-Z на скици,
- Одредити реакције веза.



Решење:

$$X_A = 11.125 F$$

$$Y_A = -8.125 F$$

$$Z_A = 9.166 F$$

$$X_B = -3.125 F$$

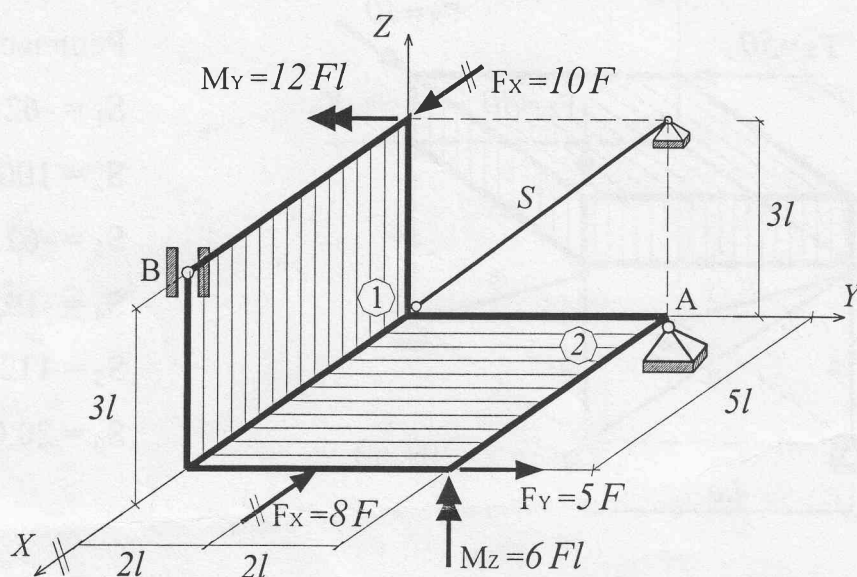
$$Y_B = 3.75 F$$

$$S = -2.708 F$$

1. КОЛОКВИЈУМ

3. Плоча 1 тежине $3F$, и плоча 2 тежине $4F$ међусобна су круто спојене. Оне су ослоњене и оптерећене као што је приказано на скици.

- Ослободити тело веза,
- Написати услове равнотеже у координатном систему X-Y-Z на скици,
- Одредити реакције веза.



Решење:

$$X_A = 9.833 F$$

$$Y_A = -11.666 F$$

$$Z_A = 0.85 F$$

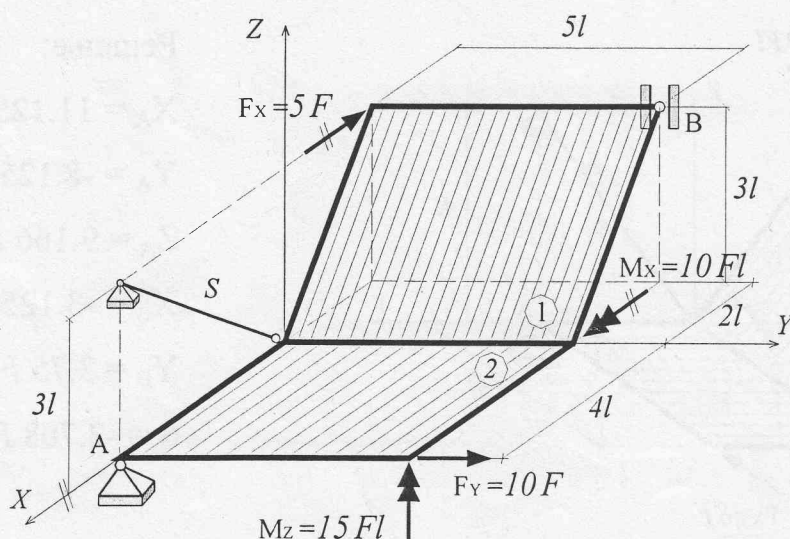
$$X_B = -11.833 F$$

$$Y_B = -1.533 F$$

$$S = 10.25 F$$

4. Плоча 1 тежине $6F$, и плоча 2 тежине $8F$ међусобна су круто спојене. Оне су ослоњене и оптерећене као што је приказано на скици.

- Ослободити тело веза,
- Написати услове равнотеже у координатном систему X-Y-Z на скици,
- Одредити реакције веза.



Решење:

$$X_A = -15.333 F$$

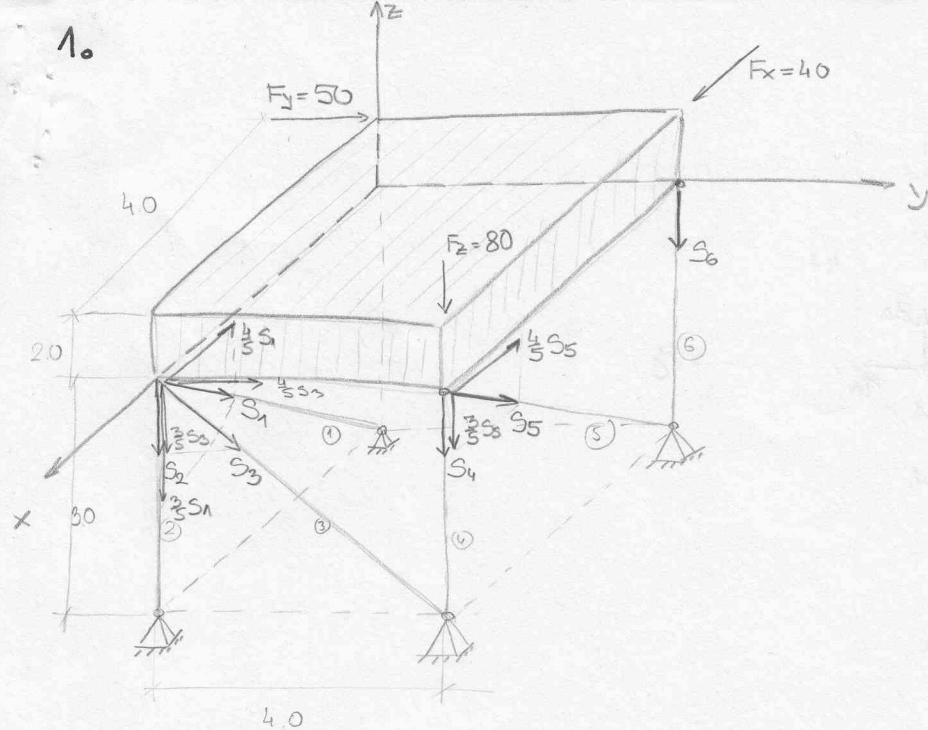
$$Y_A = -1.666 F$$

$$Z_A = 8.5 F$$

$$X_B = 13.0 F$$

$$Y_B = -8.333 F$$

$$S = 9.166 F$$



$$\sum F_x = 0: -\frac{4}{5} S_1 - \frac{4}{5} S_5 + 40 = 0 \quad S_1 = -62,5 \text{ N}$$

$$\sum F_y = 0: \frac{4}{5} S_3 + 50 = 0 \Rightarrow S_3 = -62,5 \text{ N}$$

$$\sum F_z = 0: -\frac{3}{5} S_1 + S_2 - \frac{3}{5} S_3 - S_4 - \frac{3}{5} S_5 - S_6 - 80 = 0$$

$$S_6 = 20 \text{ N}$$

$$\sum M_x = 0: -4 S_4 - \frac{12}{5} S_5 - 4 S_6 - 100 - 320 = 0$$

$$S_4 = -192,5 \text{ N}$$

$$\sum M_y = 0: 4 S_2 + \frac{12}{5} S_3 + \frac{12}{5} S_1 + 4 S_4 + \frac{12}{5} S_5 + 80 + 320 = 0$$

$$S_2 = 100 \text{ N}$$

$$\sum M_z = 0: \frac{16}{5} S_3 + \frac{16}{5} S_5 - 160 = 0 \quad S_5 = 112,5 \text{ N}$$

$$37,5 - S_2 + 37,5 - S_4 - 67,5 - S_6 - 80 = 0$$

$$-4 S_4 - 240 - 4 S_6 - 420 = 0$$

$$4 S_2 - 150 - 150 + 4 S_4 + 240 + 80 + 320 = 0$$

$$S_2 + S_4 + S_6 = -72,5$$

$$S_4 + S_6 = -172,5$$

$$S_2 + S_4 = -92,5$$

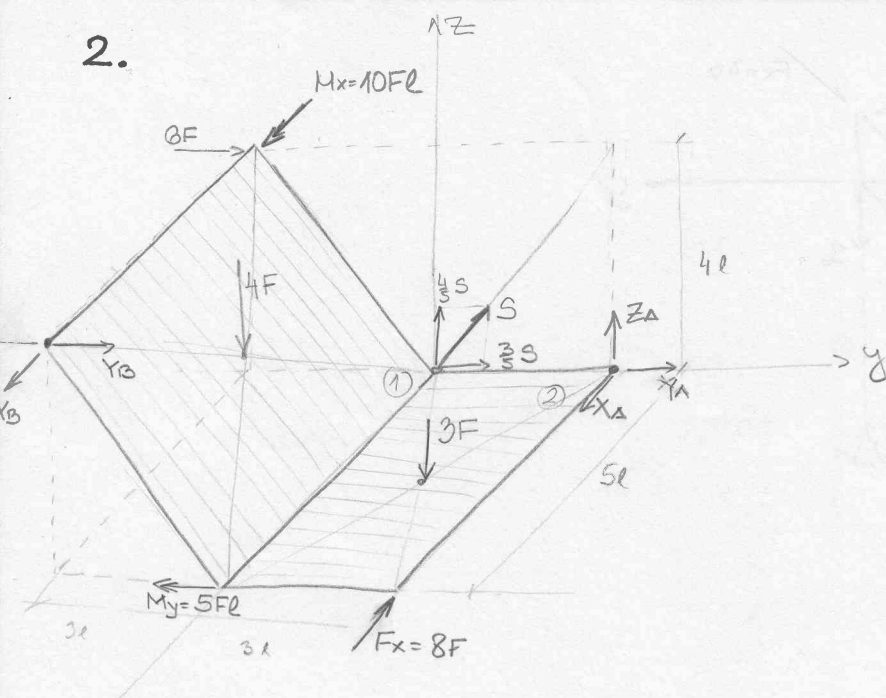
$$-92,5 + S_6 = -72,5$$

$$S_6 = 20 \text{ N}$$

$$S_4 = -192,5$$

$$S_2 = 100 \text{ N}$$

2.



$$\vec{F}_R = 0$$

$$\vec{M}_R = 0$$

$$\sum F_x = 0: X_B - 8F + X_A = 0 \quad \boxed{X_A = 11,125F}$$

$$\sum F_y = 0: Y_B + Y_A + \frac{3}{5}S + 6F = 0 \quad \boxed{Y_A = 8,125F}$$

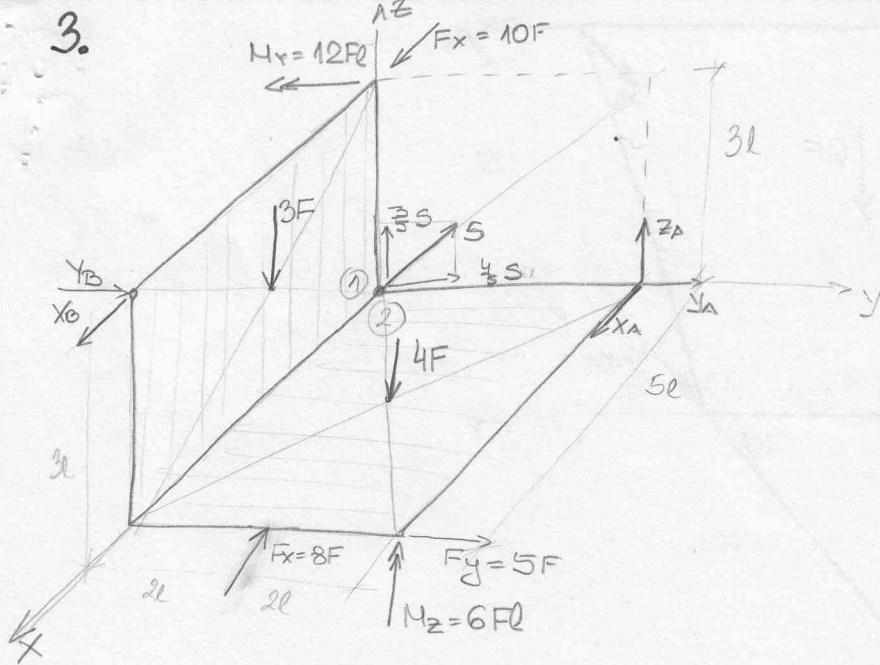
$$\sum F_z = 0: Z_A + \frac{4}{5}S + 4F - 3F = 0 \quad \boxed{S = -2,408F}$$

$$\sum M_x = 0: -4Y_B l + 3Z_A - 4 \cdot 6Fl + 4 \cdot 15Fl - 3 \cdot 15Fl + 10Fl = 0 \quad \boxed{Z_A = 9,166F}$$

$$\sum M_y = 0: -4X_B l + 4 \cdot 2,5Fl + 3 \cdot 2,5Fl - 5Fl = 0 \quad \boxed{X_B = -3,125F}$$

$$\sum M_z = 0: 3X_B l + 5Y_B l + 3 \cdot 8Fl - 3X_A = 0 \quad \boxed{Y_B = 3,75F}$$

3.



$$\sum F_x = 0: \quad X_B + X_A + 10F - 8F = 0$$

$$X_A = 9,833F$$

$$\sum F_y = 0: \quad Y_B + 5F + Y_A + \frac{4}{5}S = 0$$

$$Y_A = -11,66F$$

$$\sum F_z = 0: \quad Z_A + \frac{3}{5}S - 3F - 4F = 0$$

$$S = 10,25F$$

$$\sum M_x = 0: \quad -3Y_B l + 4Z_A l - 2 \cdot 4F l = 0$$

$$Z_A = 0,85F$$

$$\sum M_y = 0: \quad 3X_B l + 3 \cdot 10F l + 2,5 \cdot 3F l + 2,5 \cdot 4F l - 12F l = 0$$

$$X_B = -11,833F$$

$$\sum M_z = 0: \quad 5Y_B l + 2 \cdot 8F l + 5 \cdot 5F l - 4X_A l + 6F l = 0$$

$$Y_B = 1,533F$$

4.

$$\vec{M}_R = 0$$

$$X_A + X_B - 5F + \frac{4}{5}S = 0$$

$$Y_A + 10F + Y_B = 0$$

$$\Sigma_A - 6F - 8F + 3_S S = 0$$

$$-32 Y_B - 8 \cdot 2,5F - 6 \cdot 2,5F + 10F L = 0$$

$$-4Z_{A2} + 3X_{B2} - 15F_{L2} - 6F_{L2} + 16F_{L2} = 0$$

$$+4Y_A l + 15Fl + 40Fl - 5x_B l - 2Y_B l = 0$$

$$X_B = 13,0 \text{ F}$$

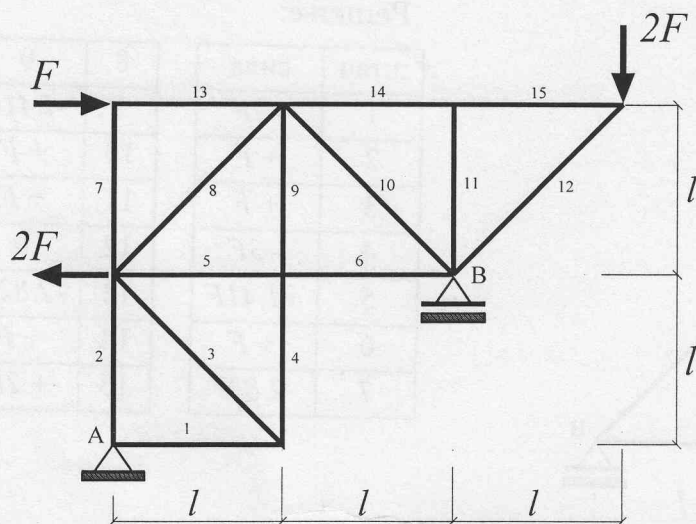
ЗАДАЦИ ЗА ВЕЖБУ

ШКОЛ. ГОД. 2008/09

2. КОЛОКВИЈУМ

1. За решеткасти носач на скици одредити:

- Силе у свим штаповима Крмониним поступком (или Силе у свим штаповима методом равнотеже чворова),
- Силе у штаповима 6, 10 и 14 Ритеровим поступком.



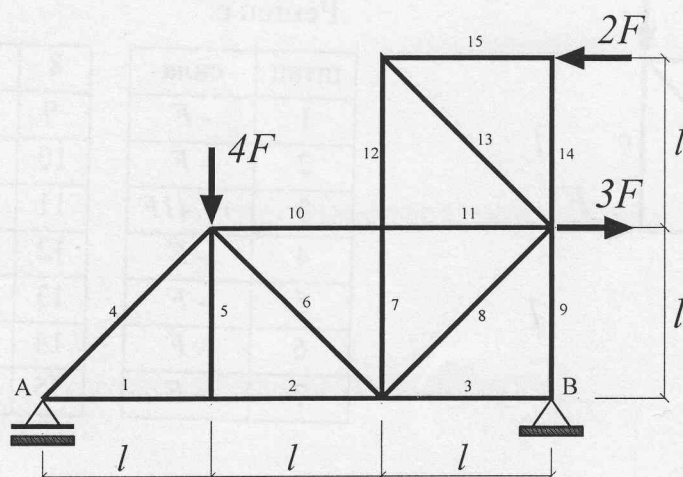
Решење:

штап	сила
1	$-F$
2	$+F$
3	$+1,41F$
4	$-F$
5	$-F$
6	$-F$
7	0

8	$+2,82F$
9	$-F$
10	$-1,41F$
11	0
12	$-2,82F$
13	$-F$
14	$+2F$
15	$+2F$

2. За решеткасти носач на скици одредити:

- Силе у свим штаповима Крмониним поступком (или Силе у свим штаповима методом равнотеже чворова),
- Силе у штаповима 2, 6 и 10 Ритеровим поступком.



Решење:

штап	сила
1	$+3F$
2	$+3F$
3	$-F$
4	$-4,24F$
5	0
6	$-1,41F$
7	$-2F$

8	$+4,24F$
9	$-F$
10	$-2F$
11	$-2F$
12	$-2F$
13	$+2,82F$
14	0
15	$-2F$

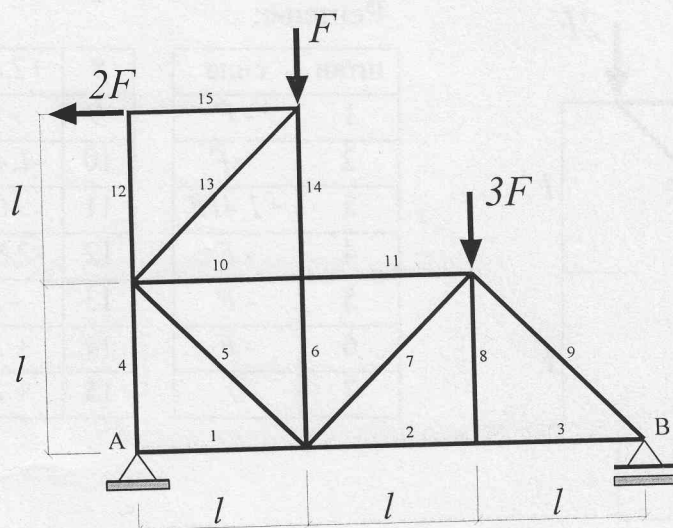
ЗАДАЦИ ЗА ВЕЖБУ

ШКОЛ. ГОД. 2008/09

2. КОЛОКВИЈУМ

3. За решеткасти носач на скици одредити:

- Силе у свим штаповима Крмониним поступком (или Силе у свим штаповима методом равнотеже чворова),
- Силе у штаповима 2, 7 и 11 Ритеровим поступком.



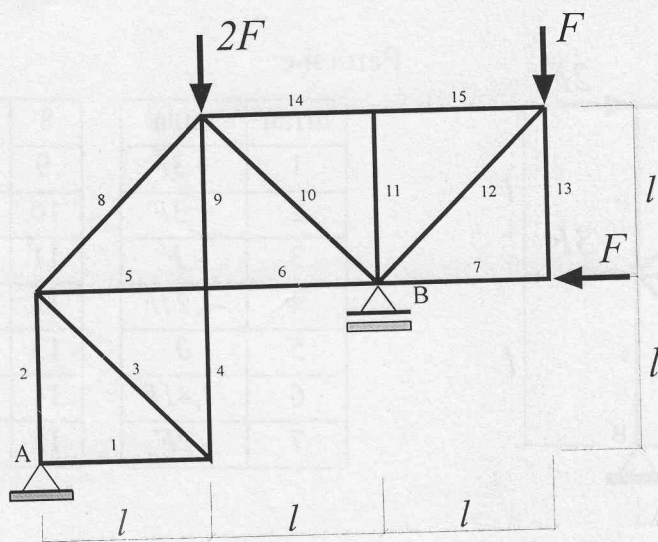
Решење:

штап	сила
1	$-2F$
2	$+F$
3	$+F$
4	$-3F$
5	$+1,41F$
6	$+F$
7	$-2,82F$

8	0
9	$-1,41F$
10	$+F$
11	$+F$
12	0
13	$-2,82F$
14	$+F$
15	$+2F$

4. За решеткасти носач на скици одредити:

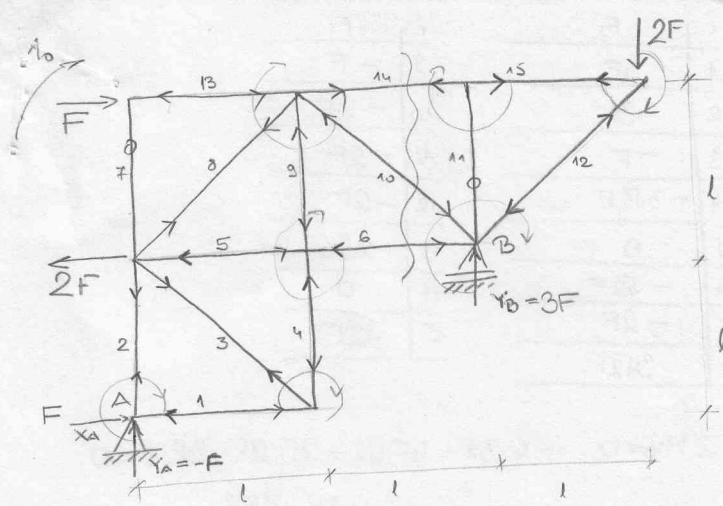
- Силе у свим штаповима Крмониним поступком (или Силе у свим штаповима методом равнотеже чворова),
- Силе у штаповима 6, 10 и 14 Ритеровим поступком.



Решење:

штап	сила
1	$-F$
2	$-F$
3	$+1,41F$
4	$-F$
5	$-F$
6	$-F$
7	$-F$

8	0
9	$-F$
10	$-1,41F$
11	0
12	$-1,41F$
13	0
14	$+F$
15	$+F$



i	F _i
1	-F
2	F
3	$\sqrt{2}F$
4	-F
5	-F
6	-F
7	0
8	$2\sqrt{2}F$

i	F _i
9	-F
10	$-\sqrt{2}F$
11	0
12	$-2\sqrt{2}F$
13	-F
14	2F
15	2F

$$\sum M_A = 0 \quad 2F \cdot l - F \cdot 2l - 2F \cdot 3l + 2Y_B l = 0$$

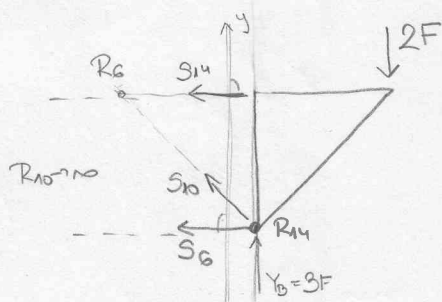
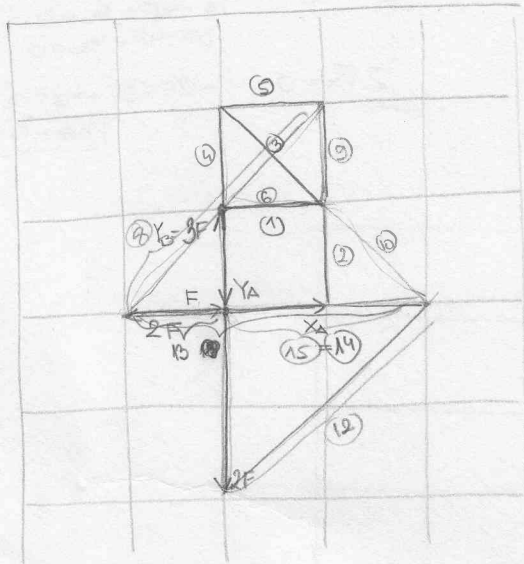
$$Y_B = 3F$$

$$\sum F_y = 0 \quad Y_A - 2F + Y_B = 0$$

$$Y_A = -F$$

$$\sum F_x = 0 \quad X_A - 2F + F = 0$$

$$X_A = F$$



$$\sum M_{R14} = 0 \quad S_{14} \cdot l - 2F \cdot l = 0$$

$$S_{14} = 2F$$

$$\sum M_{R6} = 0 \quad -2F \cdot 2l + 3F \cdot l - S_6 l = 0$$

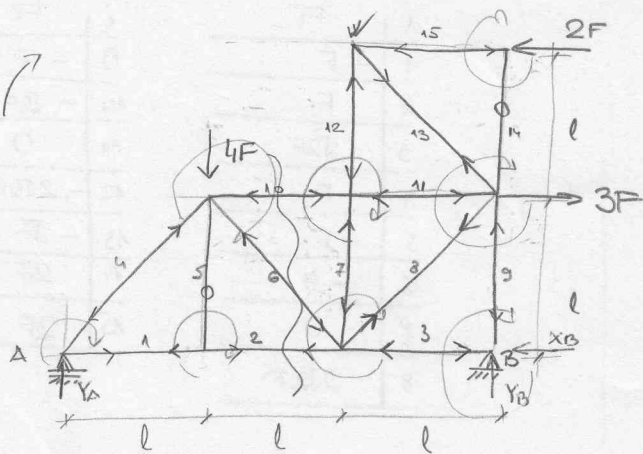
$$S_6 = F$$

$$\sum Y = 0 \quad \frac{\sqrt{2}}{2} S_{10} + 3F - 2F = 0$$

$$\frac{\sqrt{2}}{2} S_{10} = -F$$

$$S_{10} = -F \cdot \frac{2}{\sqrt{2}}$$

$$S_{10} = -\sqrt{2}F$$



i	F_i
1	$3F$
2	$3F$
3	$-F$
4	$-3\sqrt{2}F$
5	0
6	$-\sqrt{2}F$
7	$-2F$
8	$3\sqrt{2}F$

i	F_i
9	$-F$
10	$-2F$
11	$-2F$
12	$-2F$
13	$2\sqrt{2}F$
14	0
15	$-2F$

$$\sum M_B = 0 \quad -Y_A \cdot 3l + 4F \cdot 2l + 2F \cdot 2l - 3F \cdot l = 0$$

$$-3Y_A l - 9Fl$$

$$Y_A = 3F$$

$$\sum F_y = 0$$

$$Y_A - 4F + Y_B = 0$$

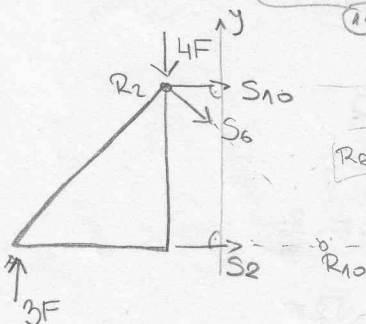
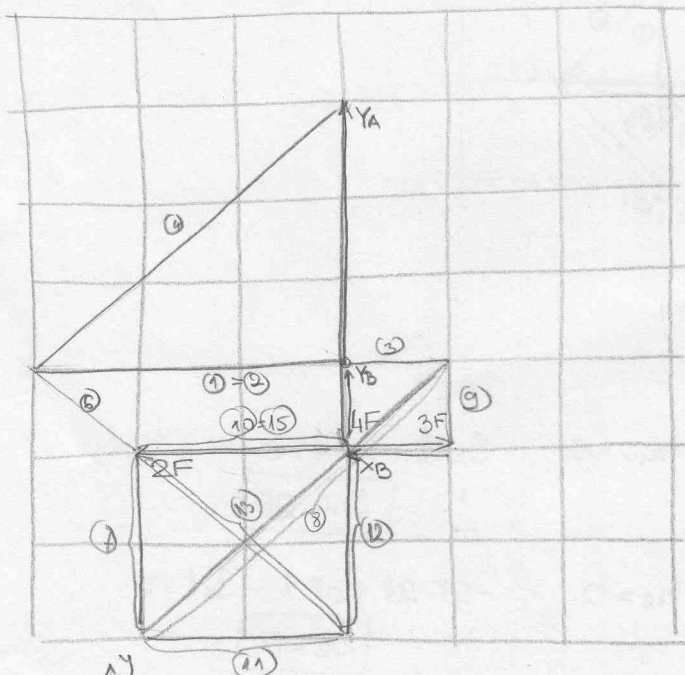
$$3F - 4F + Y_B = 0$$

$$Y_B = F$$

$$\sum F_x = 0$$

$$-2F + 3F - X_B = 0$$

$$X_B = F$$



$$\sum M_{R10} = 0$$

$$4F \cdot l - S_{10} \cdot l - 3F \cdot 2l = 0$$

$$S_{10} = -2F$$

$$\sum M_{R2} = 0$$

$$+S_2 \cdot l - 3F \cdot l = 0$$

$$S_2 = 3F$$

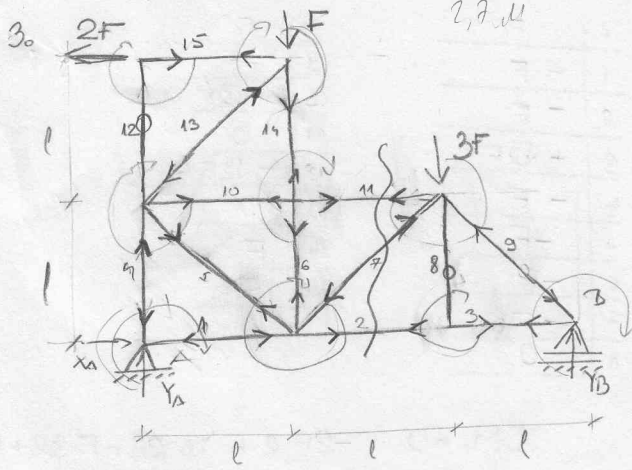
$$\sum Y = 0$$

$$-\frac{\sqrt{2}}{2} S_6 - 4F + 3F = 0$$

$$\frac{\sqrt{2}}{2} S_6 = -F$$

$$S_6 = \frac{2}{\sqrt{2}} \cdot (-F)$$

$$S_6 = -\sqrt{2}F$$



i	F _i
1	-2F
2	F
3	F
4	-3F
5	-√2F
6	F
7	-2√2F
8	0

i	F _i
9	-√2F
10	F
11	F
12	0
13	-2√2F
14	F
15	2F

$$\sum M_A = 0 \quad 2F \cdot 2l - F \cdot l - 3F \cdot 2l + Y_B \cdot 3l = 0$$

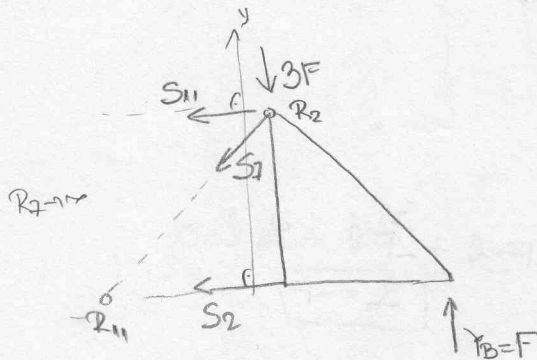
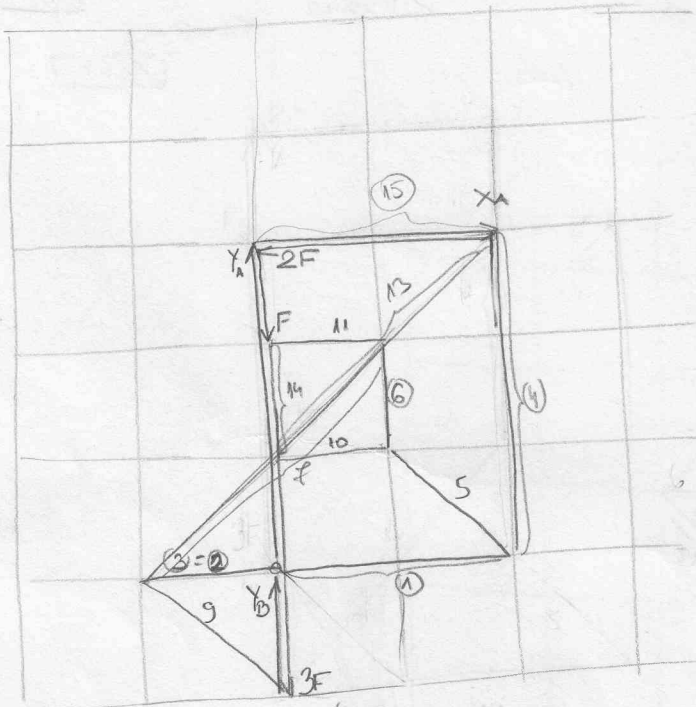
$$Y_B = F$$

$$\sum F_y = 0 \quad -F - 3F + Y_A + Y_B = 0$$

$$Y_A = 3F$$

$$\sum F_x = 0 \quad X_A - 2F = 0$$

$$X_A = 2F$$



$$\sum M_{R_2} = 0 \quad F \cdot l - S_2 \cdot l = 0$$

$$S_2 = F$$

$$\sum M_{R_1} = 0 \quad F \cdot 2l - 3F \cdot l + l \cdot S_1 = 0$$

$$S_1 = F$$

$$\sum F_y = 0 \quad -3F - \frac{\sqrt{2}}{2} S_4 + F = 0$$

$$\frac{\sqrt{2}}{2} S_4 = -2F$$

$$S_4 = -2F \cdot \frac{2}{\sqrt{2}}$$

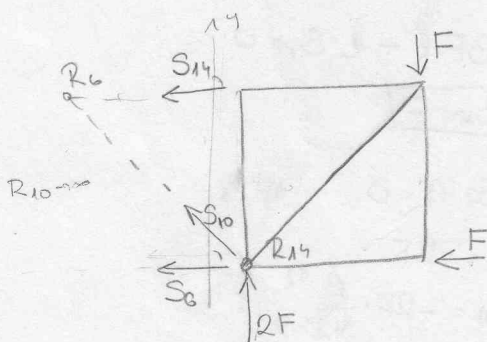
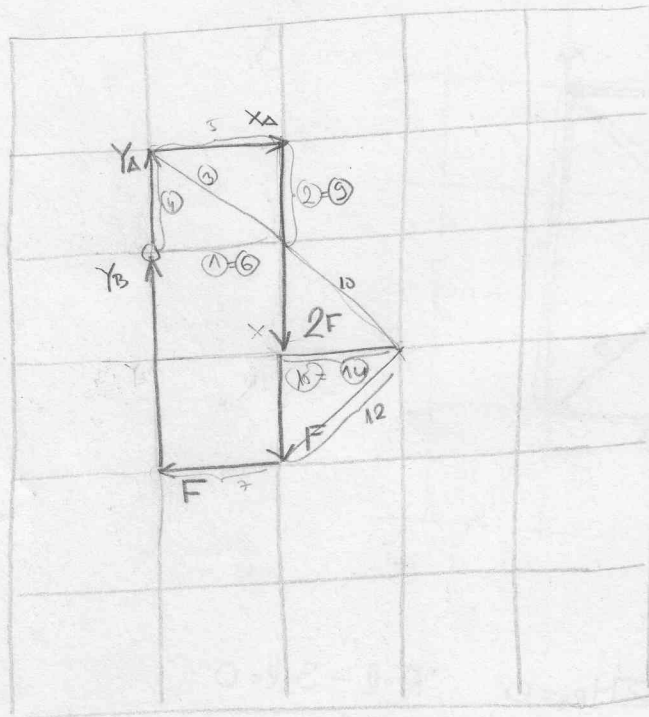
$$S_4 = -2\sqrt{2}F$$

i	F_i
9	-F
10	$-\sqrt{2}F$
11	0
12	$-\sqrt{2}F$
13	0
14	F
15	F

$$Y_B = 2F$$

$$Y_A = F$$

$$Y_A \cdot 2l - X_A \cdot l - 2F \cdot l_A \quad \text{Sis. } l = 0$$



$$\sum M_{R6} = 0 \quad -F \cdot 2l + F \cdot l + 2F \cdot l - S_6 \cdot l = 0$$

$S_6 = -F$

$$\sum M_{RH} = 0 \quad -F \cdot l + S_{1u} \cdot l = 0$$

$S_{1u} = F$

$$\sum F_y = 0 \quad \frac{\sqrt{2}}{2} S_{10} + 2F - F = 0$$

$$S_{10} = -F \cdot \frac{2}{\sqrt{2}}$$

$$S_{10} = -\sqrt{2}F$$

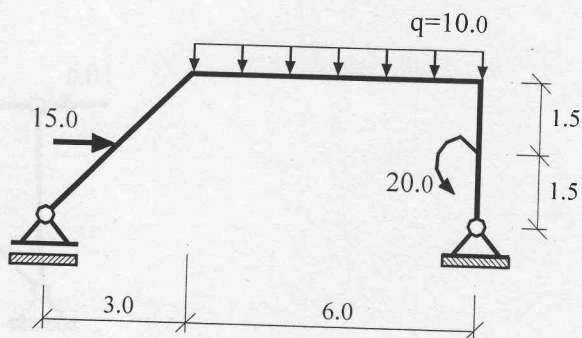
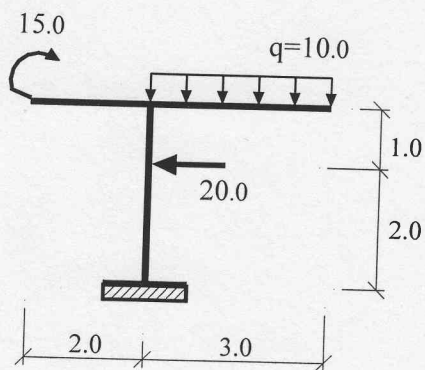
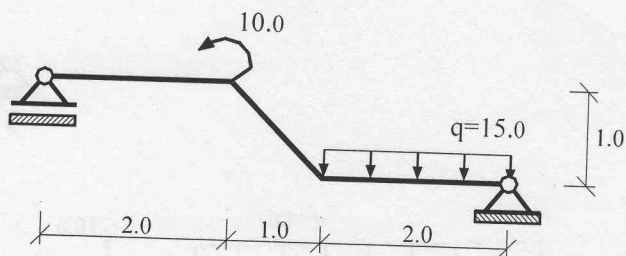
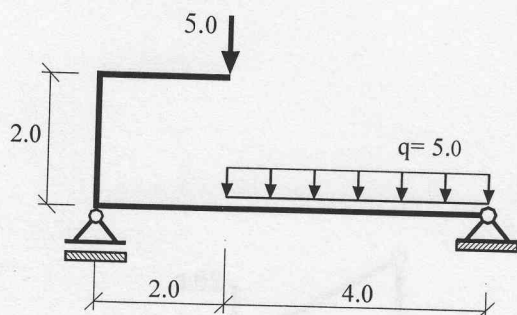
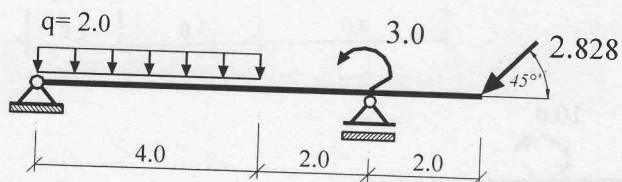
ТЕХНИЧКА МЕХАНИКА 1

3. КОЛОКВИЈУМ

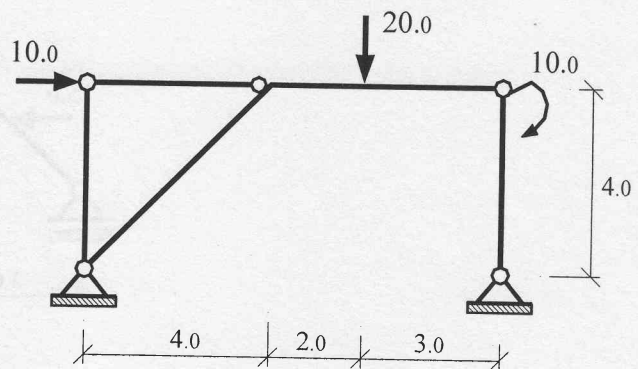
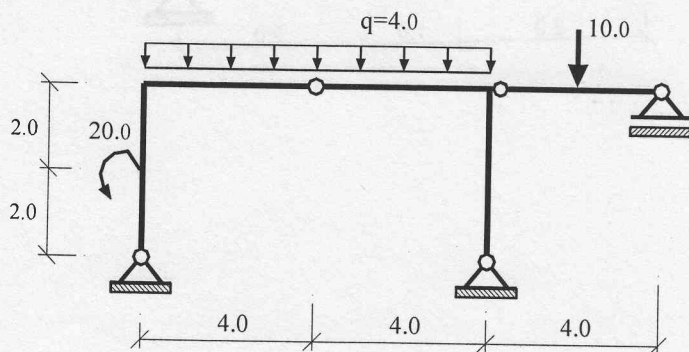
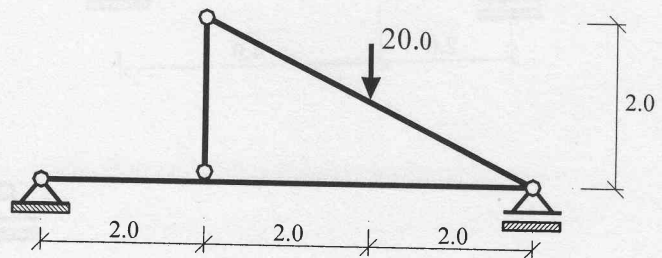
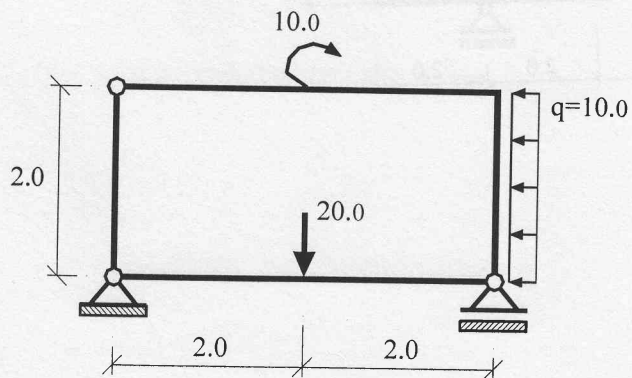
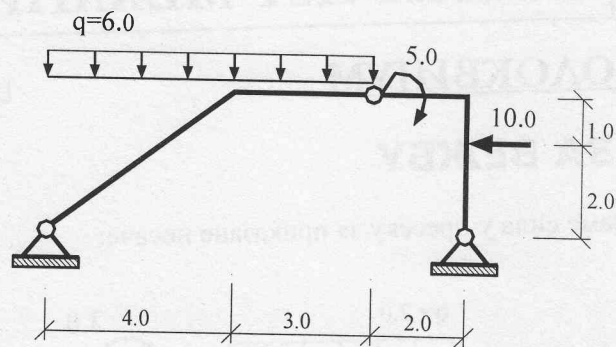
ШКОЛ. ГОД. 2008/09

ЗАДАЦИ ЗА ВЕЖБУ

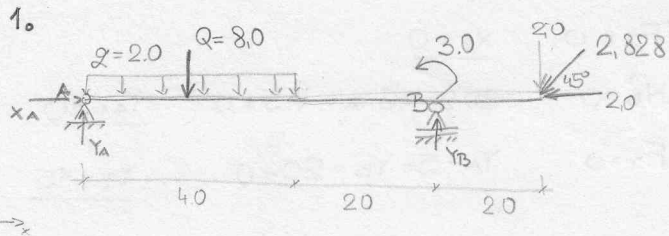
Нацртати дијаграме сила у пресеку за приказане носаче:



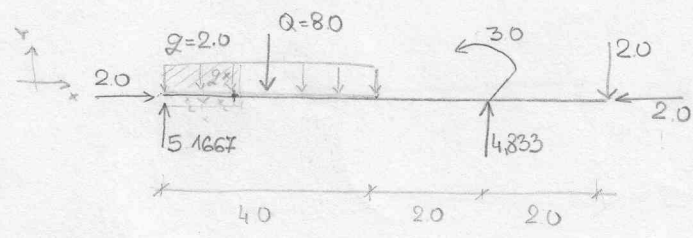
Нацртати дијаграме сила у пресеку за приказане носаче:



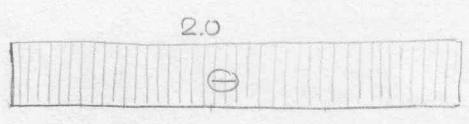
$$\cos 45^\circ = \frac{2}{2,828}$$



$$\begin{aligned} \sum F_x = 0: & \quad X_A - 2.0 = 0 \quad \boxed{X_A = 2.0} \\ \sum M_A = 0: & \quad -8.2 + 3 - 8.2 + 6Y_B = 0 \quad \boxed{Y_B = 4.833} \\ \sum F_y = 0: & \quad Y_A + 4.833 - 2 - 8 = 0 \quad \boxed{Y_A = 5.1667} \end{aligned}$$

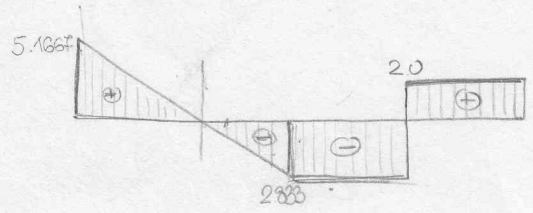


(N)



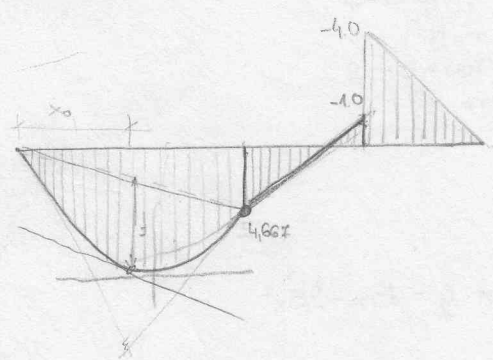
$$0 < x < 8 \quad N = -2.0$$

(T)



$$\begin{aligned} 0 < x < 4 & \quad T(x) = 5.1667 - 2x \\ 4 < x < 6 & \quad T = -2.833 \\ 6 < x < 8 & \quad T = 2.0 \end{aligned}$$

(M)



(M)

$$\begin{aligned} x=0 & \quad M=0 \\ 0 < x < 4 & \quad M(x) = 5.1667 \cdot x - 2x \cdot \frac{x}{2} \\ x=4 & \quad M = 5.1667 \cdot 4 - 16 = 4.667 \\ 4 < x < 6 & \quad M(x) = 5.1667x - 8 \cdot (x-2) \\ x=6 & \quad M = 5.1667 \cdot 6 - 8 \cdot 4 = -1 \\ x=6 & \quad M = -1 - 3 = -4 \\ 6 < x < 8 & \quad M(x) = 5.1667x - 8(x-2) - 3 + 4.833 \cdot (x-6) \\ x=8 & \quad M = 5.1667 \cdot 8 - 8 \cdot 6 - 3 + 4.833 \cdot 2 = 0 \end{aligned}$$

$$M(x) = 5.1667 \cdot x - 2 \cdot x \cdot \frac{x}{2} =$$

$$= 5.1667x - x^2$$

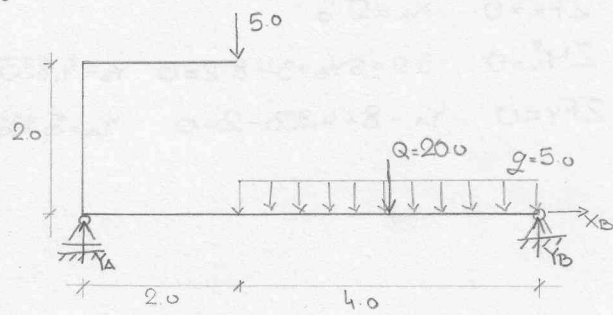
$$\frac{dM}{dx} = 5.1667 - 2x$$

$$5.1667 - 2x_0 = 0$$

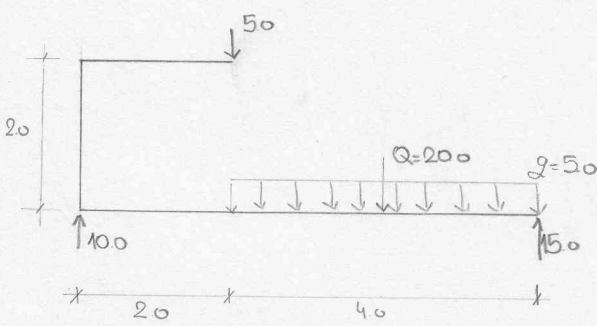
$$x_0 = 2.58$$

$$\text{ext } M = 6.674$$

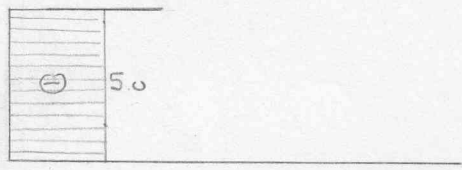
$$f = \frac{2l^2}{8} = \frac{2 \cdot 4^2}{8} = 4$$



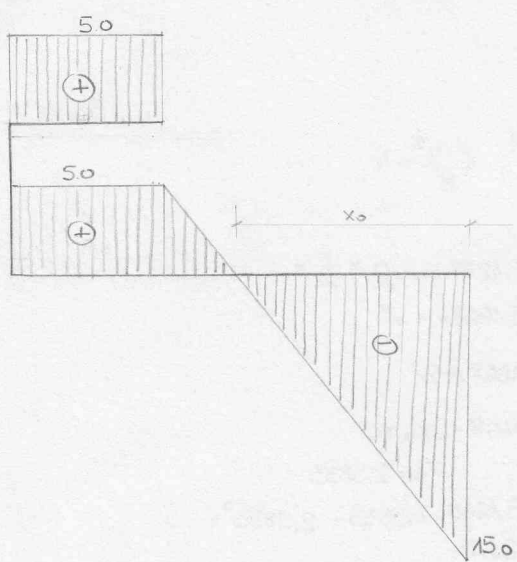
$$\begin{aligned}\sum F_x &= 0 & X_B &= 0 \\ \sum M_B &= 0 & 20 \cdot 2 + 5 \cdot 4 - 6 Y_A &= 0 & Y_A &= 10.0 \\ \sum F_y &= 0 & -5 - 20 + 10 + Y_B &= 0 & Y_B &= 15.0\end{aligned}$$



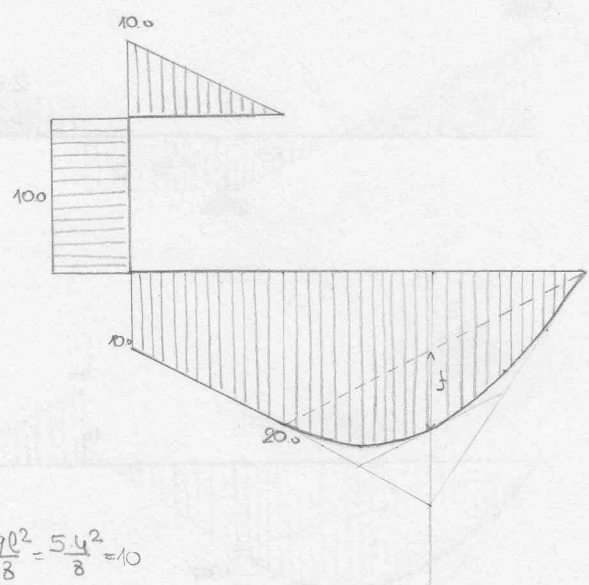
(N)



(T)



(M)



$$\begin{aligned}f &= \frac{ql^2}{8} = \frac{5 \cdot 4^2}{8} = 10 \\ M(x) &= 15x - q \cdot x \cdot \frac{x}{2} = \\ &= 15x - 2.5x^2 \\ \frac{dM}{dx} &= 15 - 5x \\ 15 - 5x_0 &= 0 \\ x_0 &= 3 \\ \text{ext } M &= 15 \cdot 3 - 2.5 \cdot 3^2 = \\ &= 22.5\end{aligned}$$

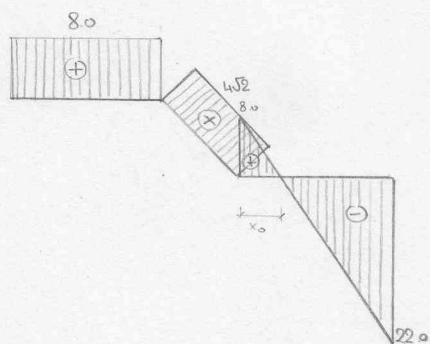
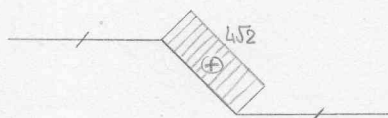
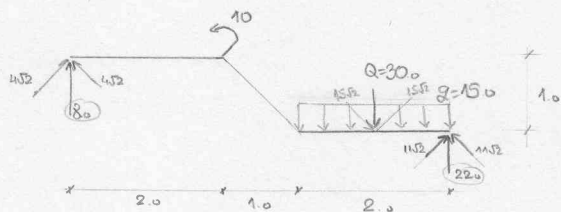
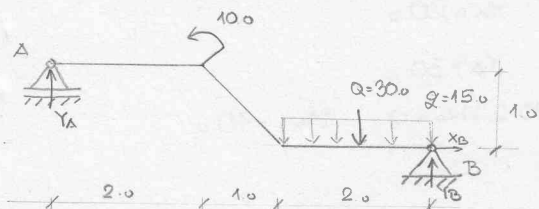
$$\sum F_x = 0: \quad X_B = 0$$

$$\sum M_B^0 = 0: \quad -5Y_A + 10 + 30 = 0 \quad Y_A = 8.0$$

$$\sum F_y = 0: \quad Y_A - 30 + Y_B = 0 \quad Y_B = 22.0$$

КОНТРОЛЬ

$$\sum M_A^0 = 0 \quad 10 - 30 \cdot 4 + 22 \cdot 5 = 0 \quad \checkmark$$



$$J = \frac{ql^2}{8} = \frac{15 \cdot 2^2}{8} = 7.5$$

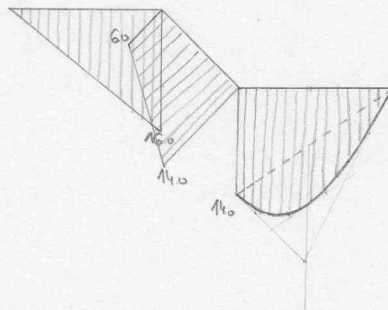
$$\begin{aligned} M(x) &= 8 \cdot (3+x) - 10 - q \cdot x \cdot \frac{x}{2} = \\ &= 24 + 8x - 10 - 7.5x^2 = \\ &= 14 + 8x - 7.5x^2 \end{aligned}$$

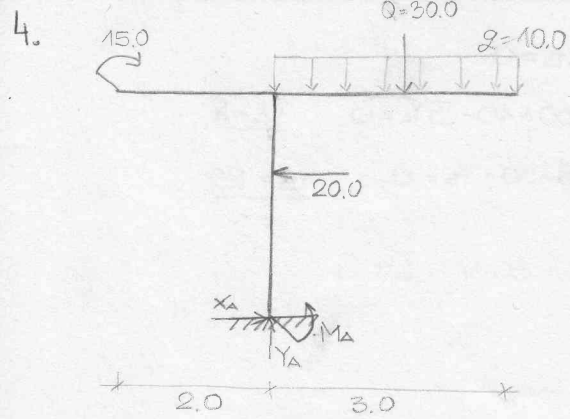
$$\frac{dM}{dx} = 8 - 15x$$

$$8 - 15x_0 = 0$$

$$x_0 = 0.533$$

$$\begin{aligned} \text{ext } M &= 14 + 8 \cdot 0.533 - 7.5 \cdot 0.533^2 = \\ &= 16.133 \end{aligned}$$

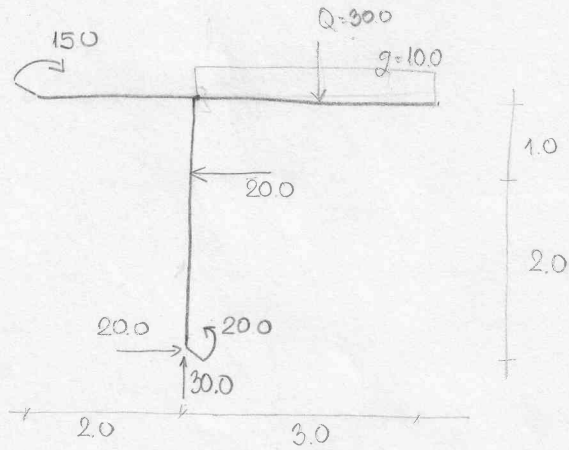




$$\sum F_x = 0: X_A = 20.0$$

$$\sum F_y = 0: Y_A = 30.0$$

$$\sum M_A = 0: M_A + 40 - 30 \cdot 1.5 - 15 = 0 \quad M_A = 20.0$$



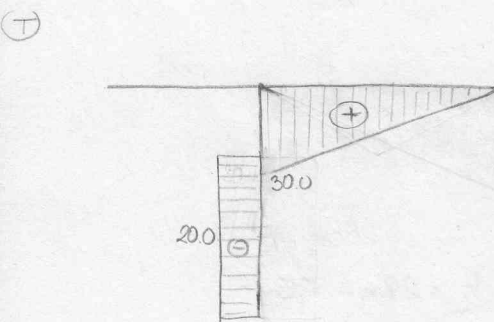
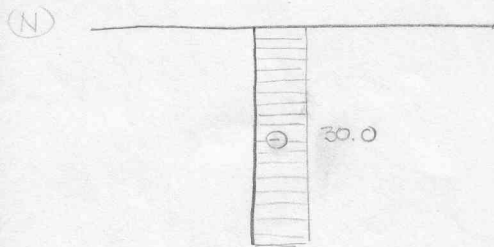
$$15 + 20 \cdot 1 - 20 \cdot 3 - 20 =$$

$$-15 - 60 = -41$$

$$15 + 20 \cdot 1 - 20 \cdot 3 + 30 \cdot 3 - 20 + 30 \cdot 1.5 =$$

$$-20 - 20 \cdot 2 = -60$$

$$-20 - 20 \cdot 3 + 20 = -60$$



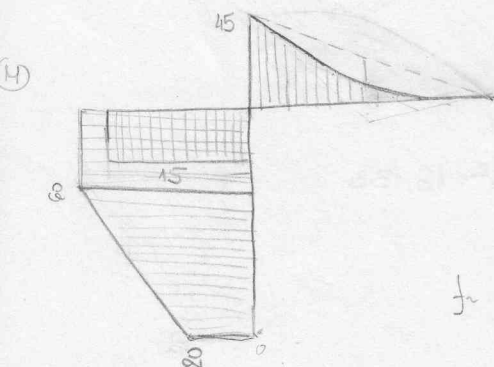
$$T(x) = -q \cdot x \quad q = 10$$

$$x=0 \quad T=0$$

$$x=1 \quad T=10$$

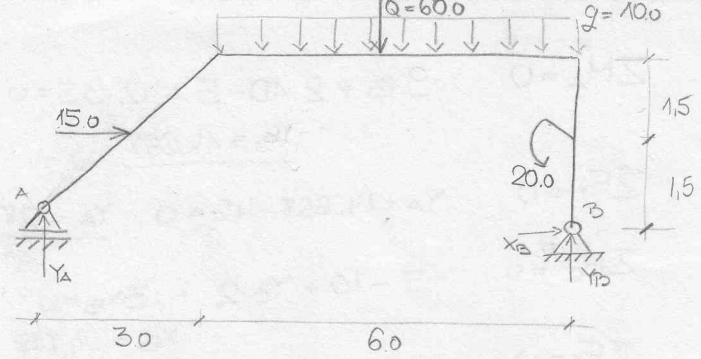
$$x=2 \quad T=20$$

$$x=3 \quad T=30$$

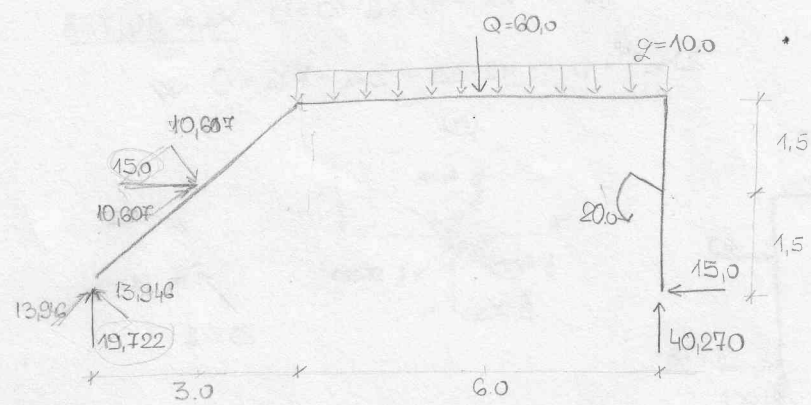


$$\int_0^3 \frac{q x^2}{2} = \frac{10 \cdot 3^3}{6} = 45$$

5.

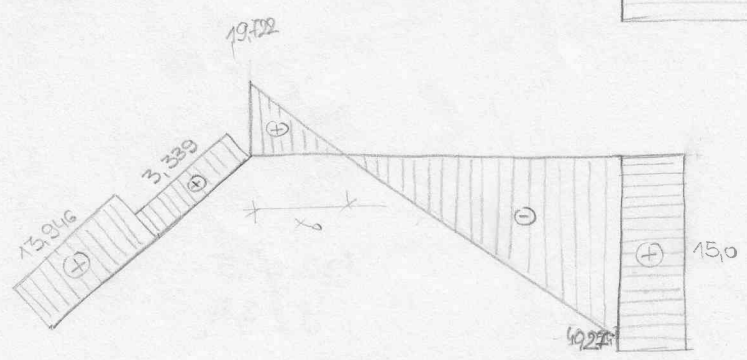
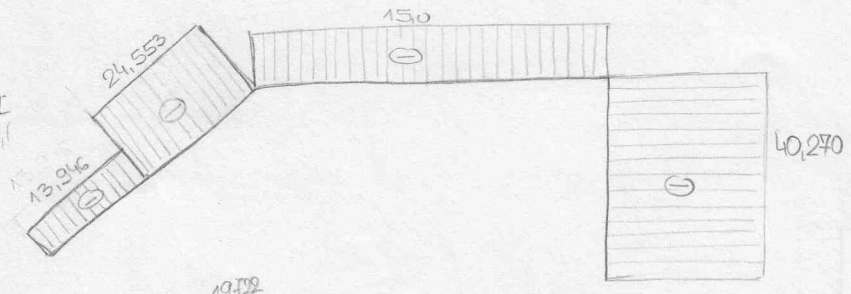
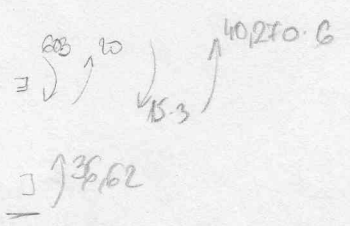
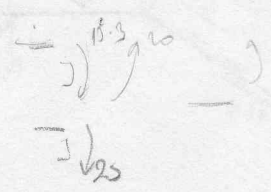


$$\begin{aligned} \sum F_x = 0 & \quad 15 + X_B = 0 & \quad X_B = -15,0 \\ \sum M_B = 0 & \quad -9Y_A - 15 \cdot 1,5 + 60 \cdot 3 + 20 = 0 & \quad Y_A = 19,722 \\ \sum F_y = 0 & \quad Y_A - 60 + Y_B = 0 & \quad Y_B = 40,278 \\ \sum M_A = 0 & \quad -15 \cdot 1,5 - 60 \cdot 6 + 20 + 9 \cdot 40,278 = 0 \end{aligned}$$

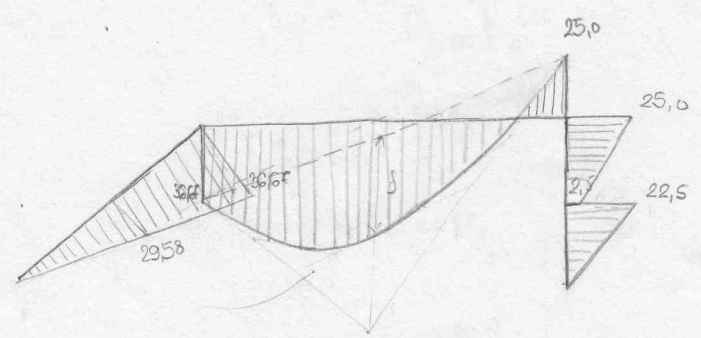


$$40,270 \cdot 3 - 15 \cdot 3 + 20$$

$$- 30 \cdot 1,5 = 52,18$$



(N)



$$\begin{aligned} M(x) &= 19,722(3+x) - 15 \cdot 1,5 - 10 \times \frac{x}{2} = \\ &= 38,666 + 19,722x - 5x^2 \end{aligned}$$

$$\frac{dM}{dx} = 19,722 - 10x$$

$$19,722 - 10x_0 = 0$$

$$x_0 = 1,972$$

$$\text{ext } M = 56,114$$

$$f = \frac{10 \cdot 0^2}{8} = 45$$

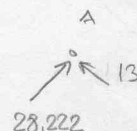
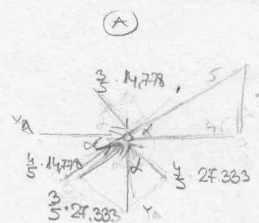
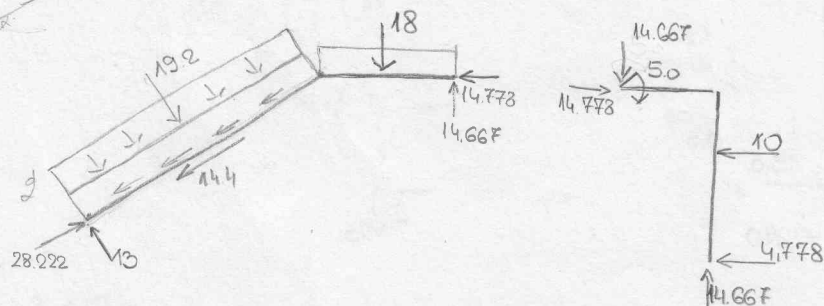
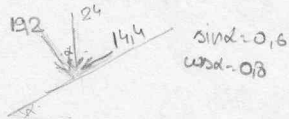
The diagram shows a frame structure with a horizontal beam of length 10.0 and a vertical column of height 2.0. A distributed load of $q = 6.0$ acts downwards on the beam. A point load of 4.2 acts downwards at the midpoint of the beam (5.0 from the left support). A horizontal point load of 1.0 acts to the left at the top of the column. A counter-clockwise moment of 5.0 is applied at the joint between the beam and the column. The left support is a pin support with reactions X_A and Y_A . The right support is a roller support with reaction Y_B . The horizontal distance is divided into segments of 4.0, 3.0, and 2.0. The vertical distance is divided into segments of 1.0 and 2.0.

$$Y_B = 14,667$$

$$\sum M_C^{\uparrow} = 0 \quad -5 - 10 + Y_B \cdot 2 + 3 \times Y_B = 0$$

$$\sum F_x = 0 \quad x_A - 4,778 - 10 = 0 \quad \begin{array}{l} x_B = -4,778 \\ x_A = 14,778 \end{array}$$

$$\sum M_c^{\text{left}} = 0 \quad 42.35 + 3x_A - 7y_A = 0 \quad \checkmark$$



A hand-drawn diagram of a polygonal area, possibly a field, with dimensions and area calculations. The diagram shows a polygon with several sides. The dimensions are labeled as follows:

- Top-left side: 28.222
- Top side: 13.822
- Top-right side: 14.778
- Right side: 14.778
- Bottom-right side: 14.667

The area is divided into sections, some of which are shaded with diagonal lines. There are also some handwritten notes and symbols:

- A circled 'O' is located in the bottom-left shaded section.
- A circled 'O' is located in the bottom-right shaded section.
- A circled 'O' is located in the bottom-right unshaded section.
- A circled 'O' is located in the bottom-right shaded section.

A hand-drawn diagram of a roof truss system. The diagram shows a series of connected truss members forming a roof structure. Key features include:

- Dimensions:**
 - 3.39.2 (at the top left peak)
 - 6.2 (horizontal distance between two vertical supports)
 - 14.667 (horizontal distance from the second vertical support to the right end)
 - 4.776 (vertical height of the rightmost section)
- Labels:**
 - ① (circled 1) in multiple locations, likely indicating specific joints or members.
 - ② (circled 2) near the first vertical support.
 - ③ (circled 3) at the bottom left corner.
 - ④ (circled 4) at the top right corner.
- Structural Elements:**
 - Diagonal members (rafters) and vertical members (posts).
 - Horizontal members (purlins or ties).
 - Vertical supports (columns) at the base.

$$192 = g' \cdot 5$$
$$\underline{g' = 3,84}$$

$3 \downarrow$ 10 4740.3 $14.667.2$ \uparrow 5

$$J \uparrow 14.667.3 \quad \downarrow 18.1.5 = \uparrow 17$$

$\downarrow \downarrow$ 4235 \uparrow 14.66E.7
 $\uparrow =$
 14.778.2

$$d_n = \frac{6.9}{8} \approx 6.75$$

$$J_2 = \frac{6 \cdot 16}{8} = 12$$

A hand-drawn sketch of a sailboat, viewed from the side. The boat has a hull with a curved bottom and a flat deck. The sail is a large, triangular shape with diagonal hatching. The mast is a vertical line. The boom is a horizontal line. The sail is attached to the boom and the mast. The boat is shown in a slightly angled position. Various measurements and labels are present: '24.334' is written at the top right; '24.334' is written on the right side; '9.53' is written on the right side; '5' is written near the mast; '4' is written on the sail; '1.5' is written on the hull.

$$M(x_1) = 14,667x - 6x \cdot \frac{x}{2}$$

$$\frac{dM}{dx_1} = 14.66x - 6x$$

$$x_{01} = 2,4445$$

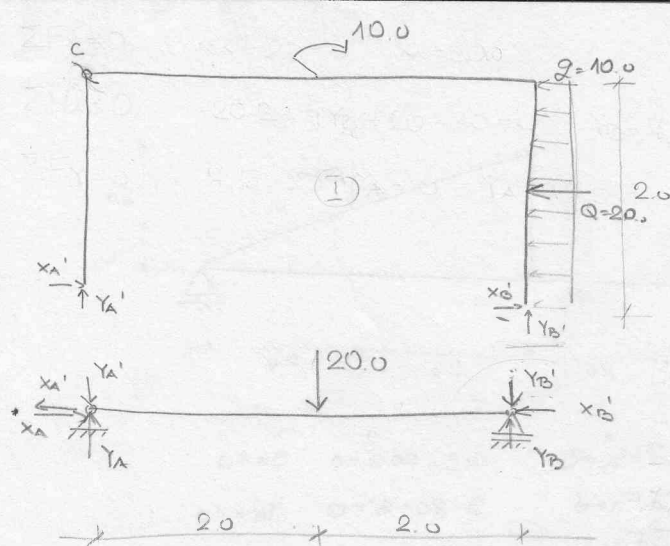
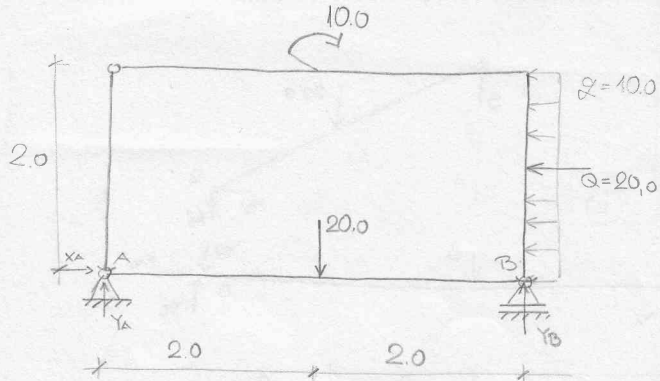
$$\text{ext } M_1 = 18$$

$$M(x_2) = 13 \cdot x - 3,84 \cdot x \cdot \frac{x}{2} =$$

$$\frac{dM}{dx_1} = 13 - 3,84x$$

$$x_{02} = 3,338$$

$$\text{ext } H_2 = 22$$



$$\sum M_C^{\text{Dole}} = 0:$$

$$x_A' \cdot 2 = 0 \quad x_A' = 0$$

$$\sum F_x = 0:$$

$$x_B' - 20 = 0 \quad x_B' = 20.0$$

$$\sum M_A' = 0:$$

$$20 + y_B' \cdot 4 - 10 = 0 \quad y_B' = -2.5$$

$$\sum F_y = 0:$$

$$y_A' - 2.5 = 0 \quad y_A' = 2.5$$

$$\sum M_C = 0:$$

$$+10 - 20 + 2x_B' + 4y_B' = 0 \quad \checkmark$$

$$\textcircled{II} \quad \sum M_A' = 0$$

$$-20 \cdot 2 - 4 \cdot (-2.5) + 4y_B = 0 \quad y_B = 7.5$$

$$\sum F_y = 0$$

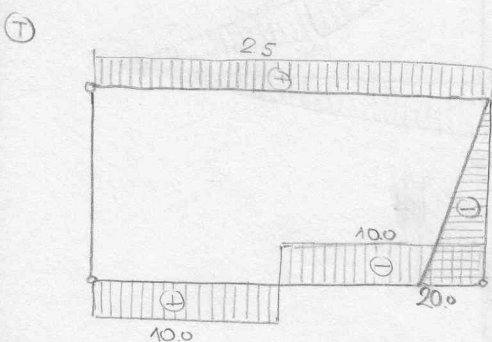
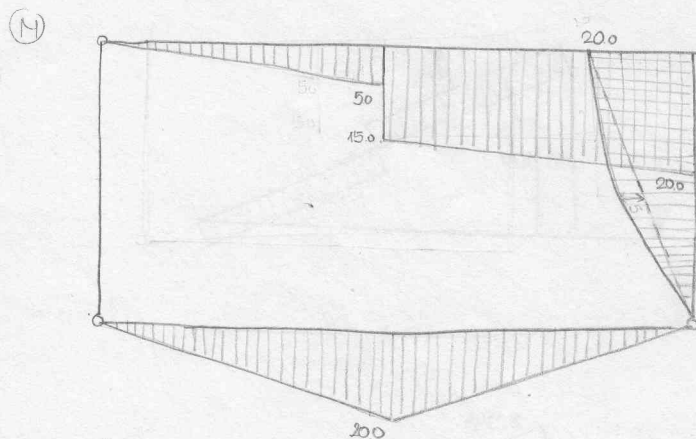
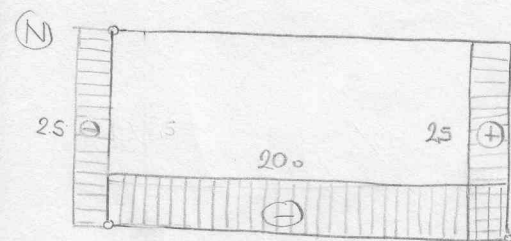
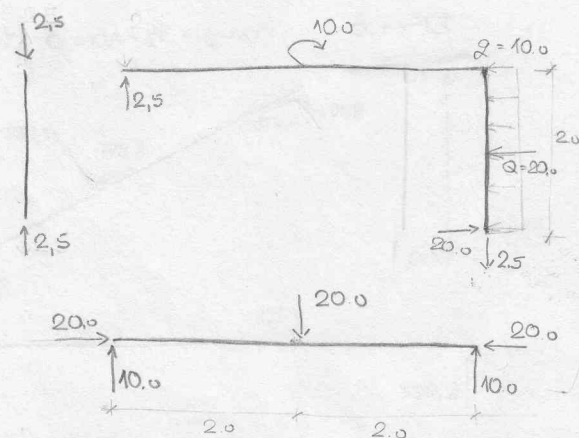
$$-2.5 + y_A + 2.5 + 7.5 - 20 = 0 \quad y_A = 12.5$$

$$\sum F_x = 0$$

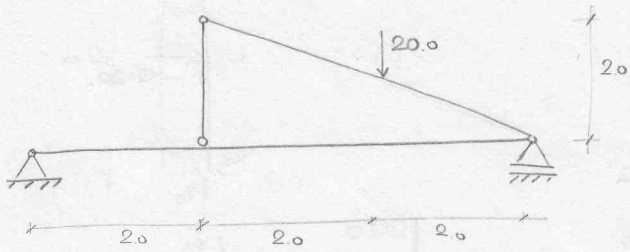
$$x_A - 20 = 0 \quad x_A = 20.0$$

$$\sum M_B' = 0$$

$$-4y_A + 4y_A' + 20 \cdot 2 = 0 \quad \checkmark$$

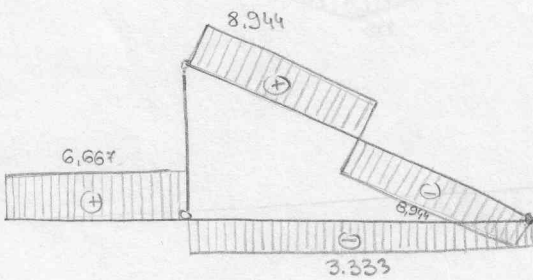
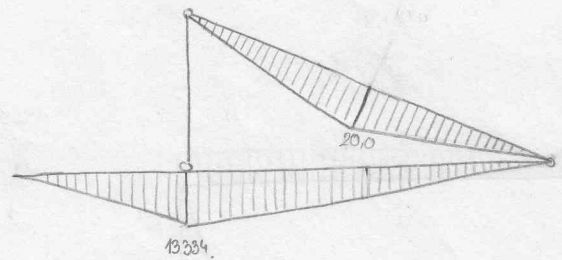
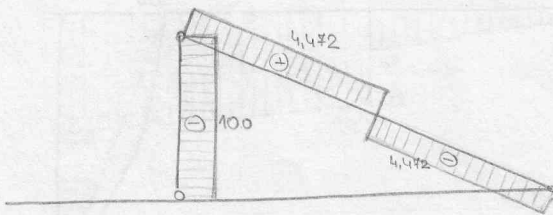
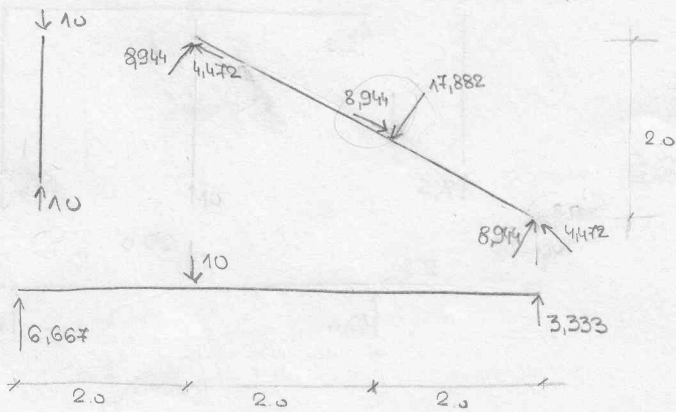
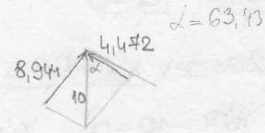
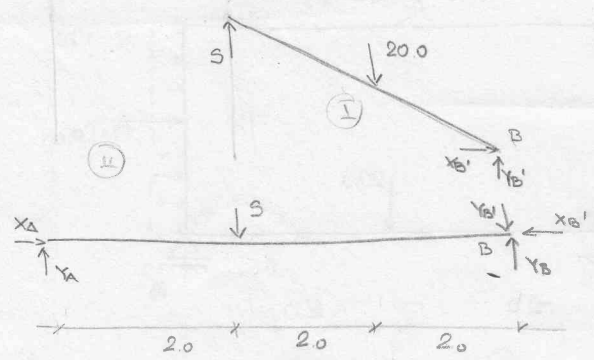


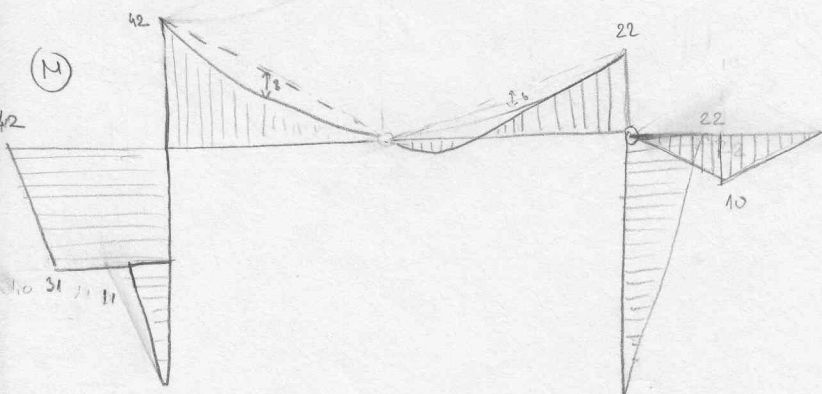
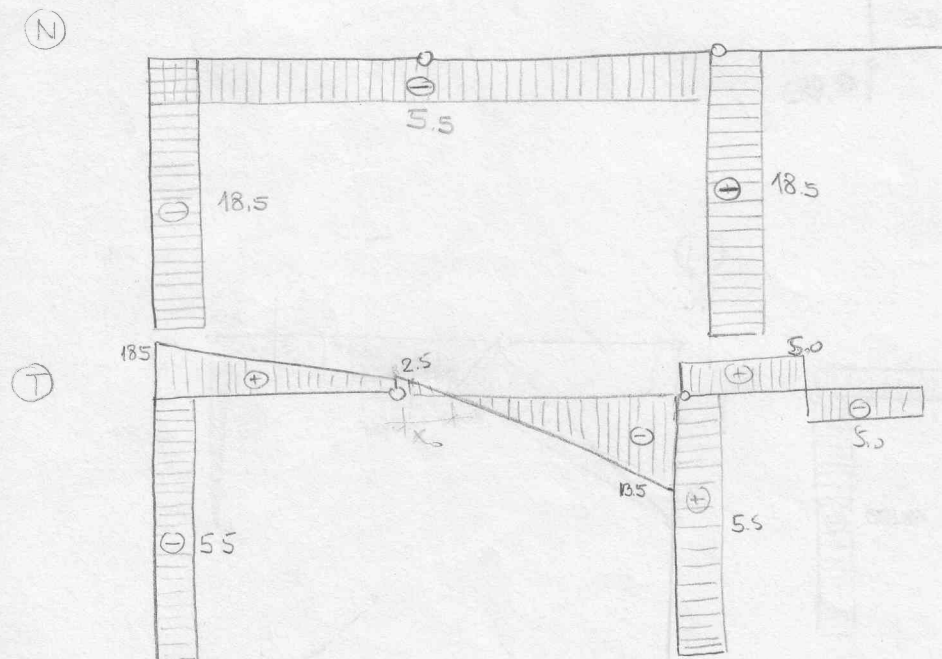
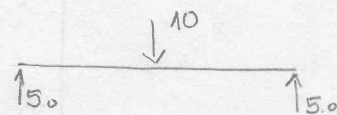
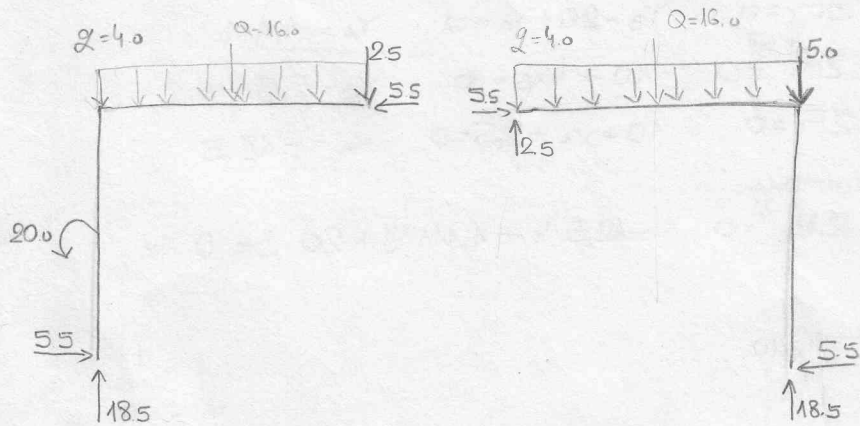
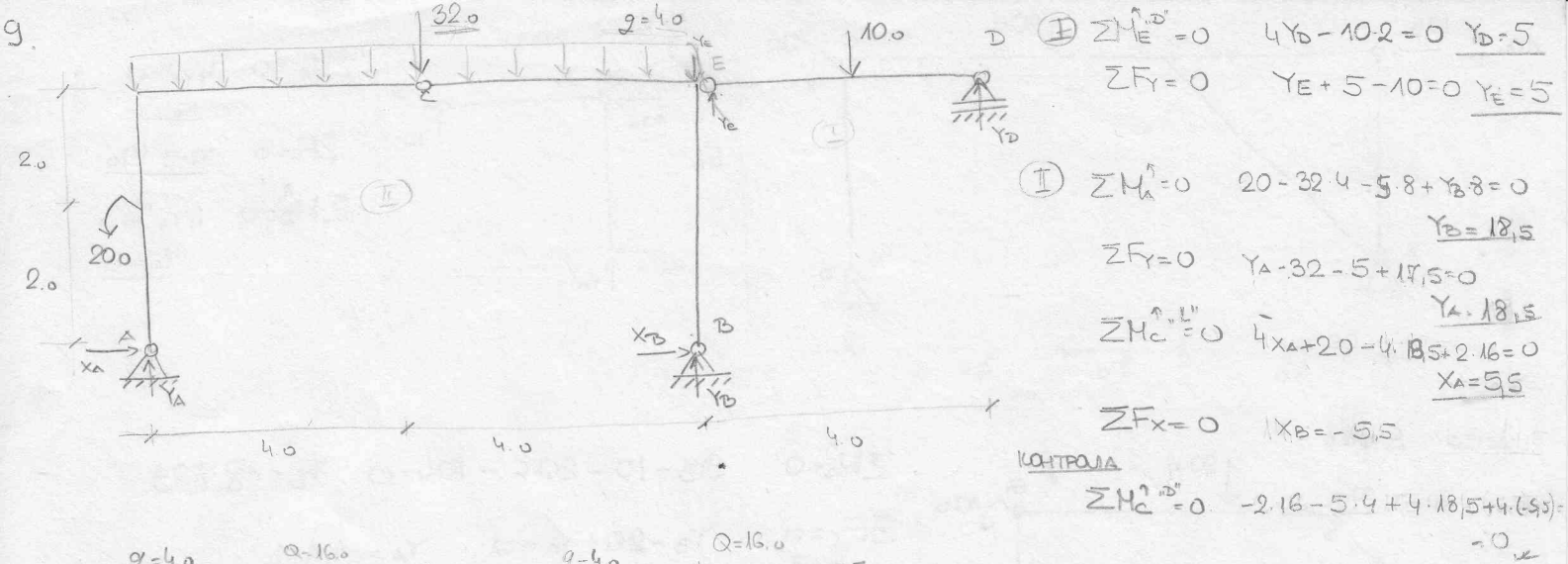
$$f = \frac{20 \cdot 2}{3} = 5$$



① $\sum M_B^{\uparrow} = 0$ $-4S + 20 \cdot 2 = 0$ $S = 10$
 $\sum F_y = 0$ $S - 20 + Y_B' = 0$ $Y_B' = 10$
 $\sum F_x = 0$ $X_B' = 0$

② $\sum M_A^{\uparrow} = 0$ $4S - 6Y_A = 0$ $Y_A = 6.667$
 $\sum F_x = 0$ $X_A = 0$
 $\sum F_y = 0$ $Y_A - S + Y_B - 10 = 0$ $Y_B = 13.333$



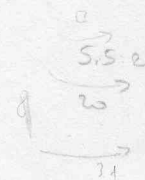
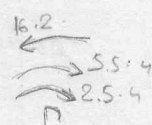


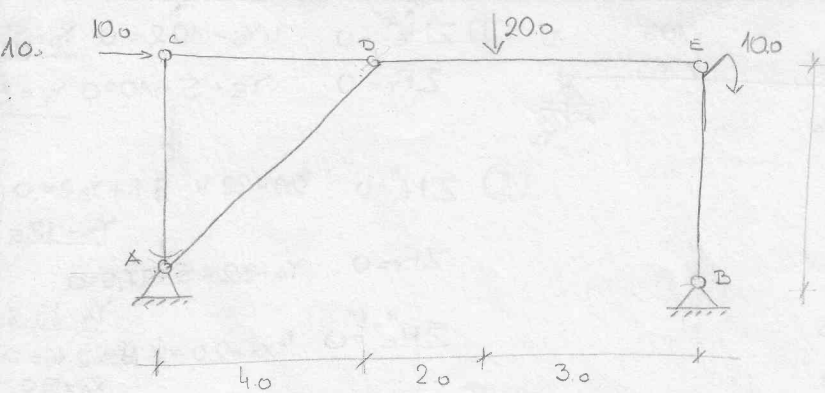
$$M(x) = 2.5 \cdot x - q \cdot \frac{x^2}{2} = 2.5x - 2x^2$$

$$\frac{dM}{dx} = 2.5 - 4x$$

$$2.5 - 4x_0 = 0 \Rightarrow x_0 = 0.625$$

$$M(x_0) = 0.7812$$



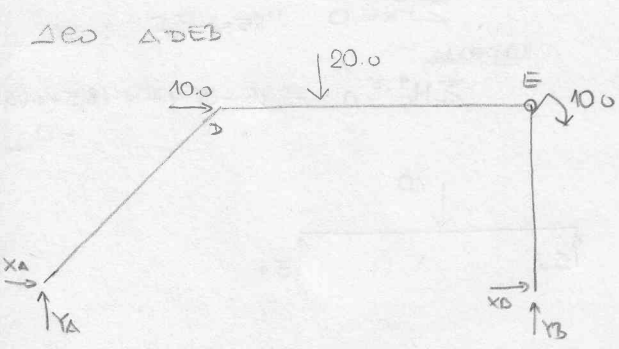


$\Delta_{EO} \Delta_{ACD}$

$$\sum \vec{M}_C = 0 \quad 4x_A' = 0 \quad x_A' = 0$$

$$\sum \vec{F}_x = 0 \quad x_B = 10.0$$

$$\sum \vec{M}_D = 0 \quad -4y_A' = 0 \quad y_A' = 0$$



$$\sum \vec{M}_E = 0 \quad y_B - 10 - 20 \cdot 6 - 10 \cdot 4 = 0 \quad y_B = 18.889$$

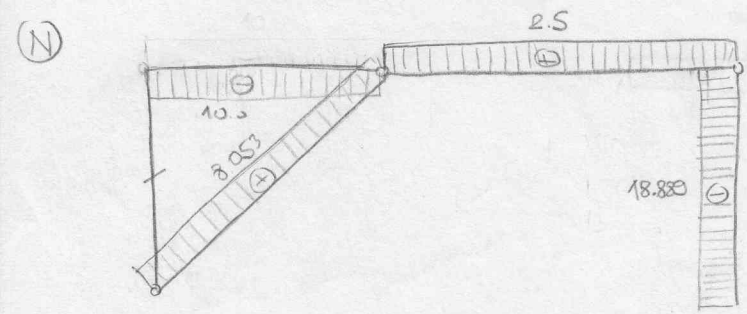
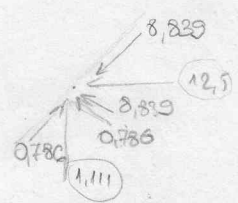
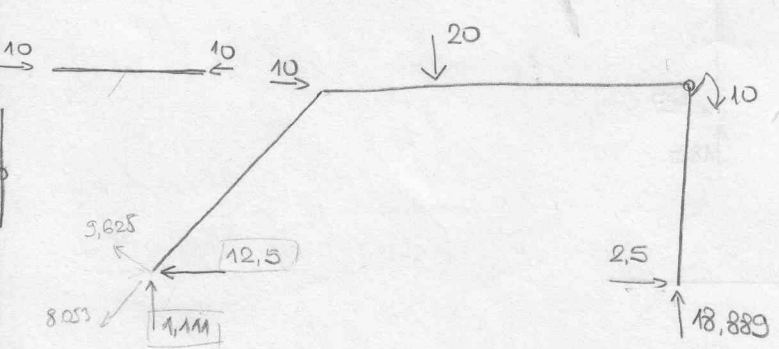
$$\sum \vec{F}_y = 0 \quad y_B - 20 + y_A = 0 \quad y_A = 1.111$$

$$\sum \vec{M}_E^{D''} = 0 \quad -10 + 4x_B = 0 \quad x_B = 2.5$$

$$\sum \vec{F}_x = 0 \quad 10 + x_A + 2.5 = 0 \quad x_A = -12.5$$

КОНТРОЛЬ

$$\sum \vec{M}_E^{D''} = 0 \quad -12.5 \cdot 4 - 1.111 \cdot 9 + 20 \cdot 3 = 0 \quad \checkmark$$



(M)

