

$$V_B = ? \quad W_B = ? \quad \theta_B = ?$$

Реакции в опорах:

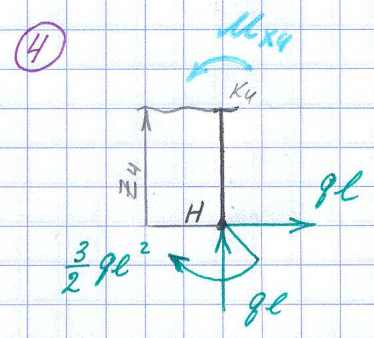
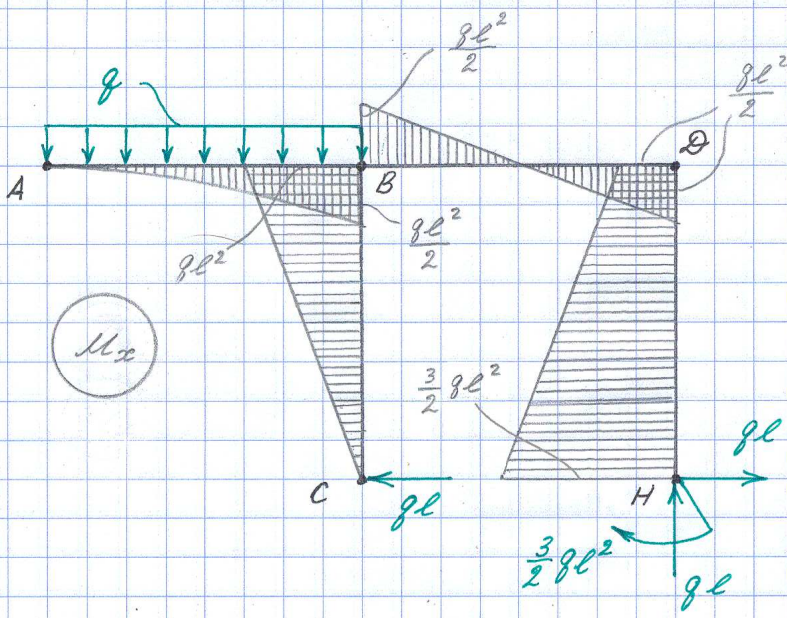
$$\sum F_z = 0 = -ql + Z_H \Rightarrow Z_H = ql$$

$$\sum F_y = 0 = -q \cdot l - Y_H \Rightarrow Y_H = -ql$$

$$\sum M_H = 0 = ql \cdot \frac{3}{2}l - M_{RH}$$

$$M_{RH} = \frac{3}{2}ql^2$$

Силовая схема:



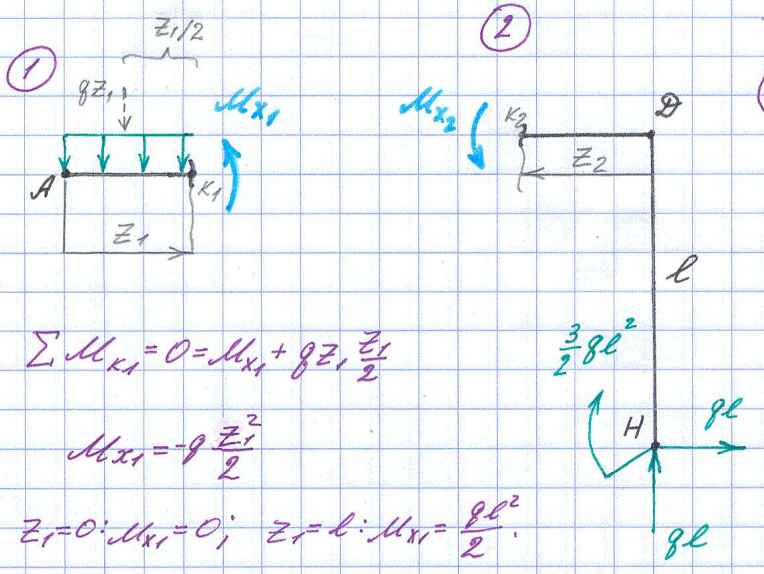
$$\sum M_{x_4} = 0 = +M_{x_4} + qlZ_4 - \frac{3}{2}ql^2$$

$$M_{x_4} = \frac{ql}{2}(3l - 2Z_4)$$

$$Z_4 = 0: M_{x_4} = \frac{3}{2}ql^2$$

$$Z_4 = l: M_{x_4} = \frac{ql^2}{2}$$

Р034:



$$\sum M_{x_1} = 0 = M_{x_1} + qz_1 \cdot \frac{z_1}{2}$$

$$M_{x_1} = -q \frac{z_1^2}{2}$$

$$z_1 = 0: M_{x_1} = 0; \quad z_1 = l: M_{x_1} = \frac{ql^2}{2}$$

$$\sum M_{x_3} = 0 = -M_{x_3} - ql \cdot z_3$$

$$M_{x_3} = -qlz_3$$

$$z_3 = 0: M_{x_3} = 0; \quad z_3 = l: M_{x_3} = -ql^2$$

$$\sum M_{x_2} = 0 = M_{x_2} + ql \cdot l + qlz_2 - \frac{3}{2}ql^2$$

$$M_{x_2} = \frac{ql}{2}(l - 2z_2)$$

$$z_2 = 0: M_{x_2} = \frac{ql^2}{2}$$

$$z_2 = l: M_{x_2} = -\frac{ql^2}{2}$$

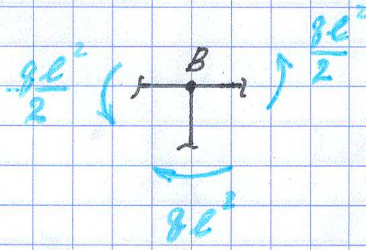
Проверка - равновесие узлов рамы:

(A)



$$\sum M_A = 0$$

(B)



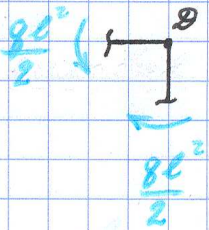
$$\sum M_B = \frac{ql^2}{2} - ql^2 + \frac{ql^2}{2} = 0$$

(C)



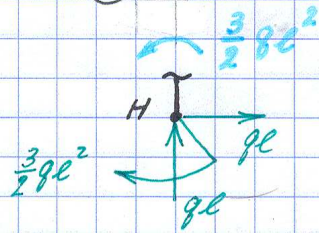
$$\sum M_C = 0$$

(D)



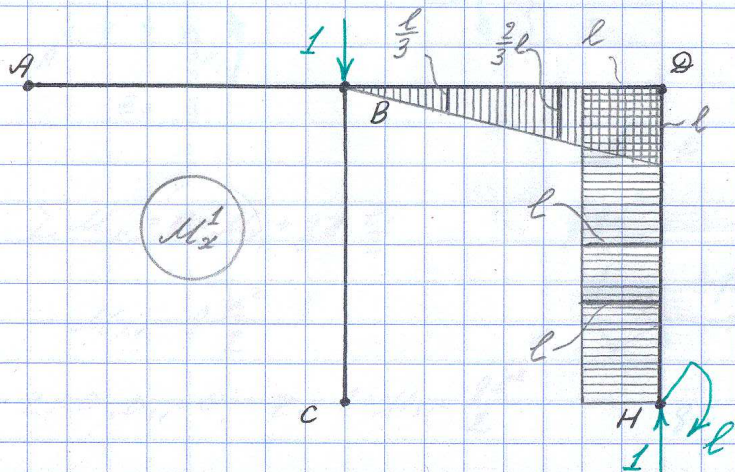
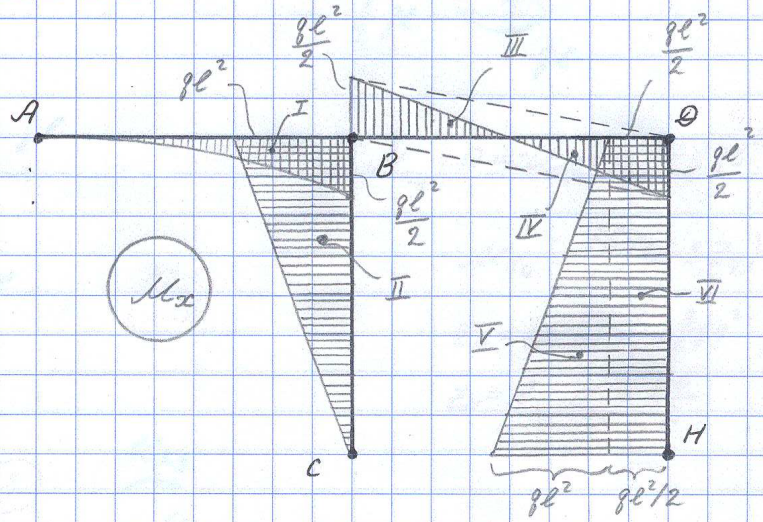
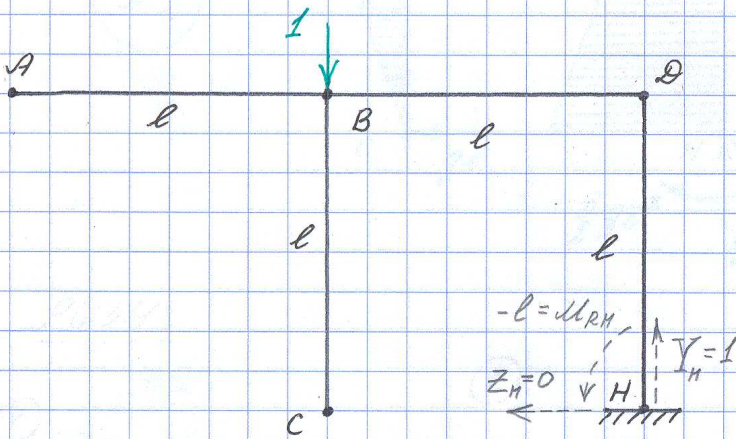
$$\sum M_D = \frac{ql^2}{2} - \frac{ql^2}{2} = 0$$

(H)



$$\sum M_H = \frac{3}{2} ql^2 - \frac{3}{2} ql^2 - ql^2 = 0$$

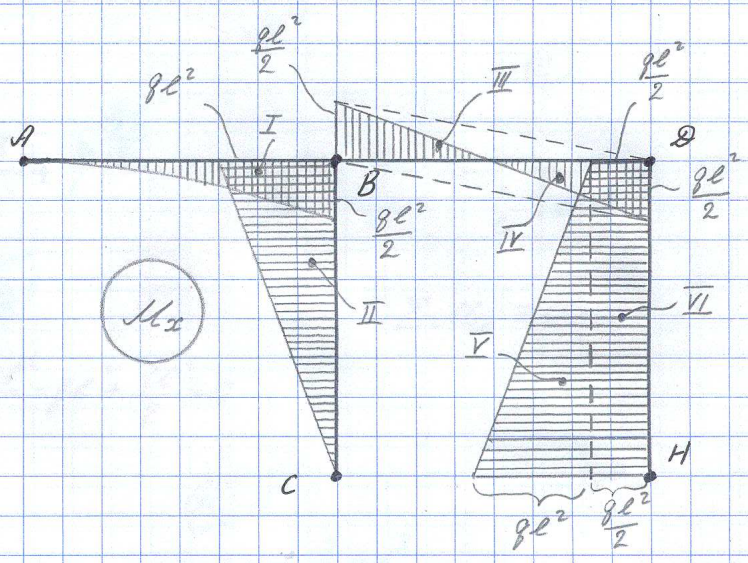
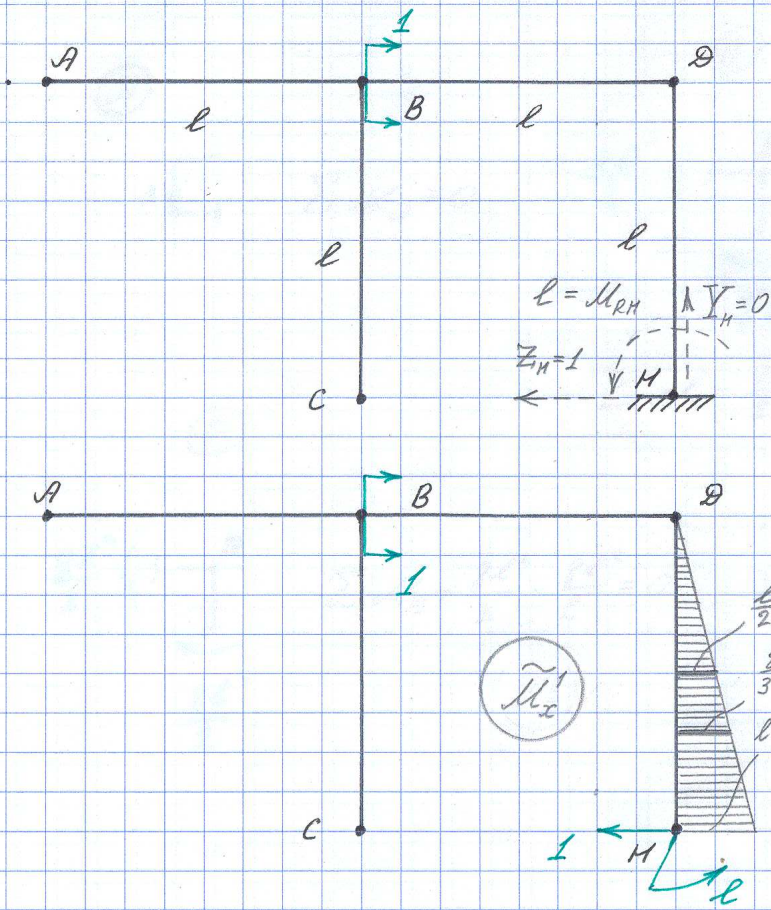
Вертикальное перемещение точки B:



$$V_B = \frac{M_x \cdot M_x'}{EJ_x} =$$

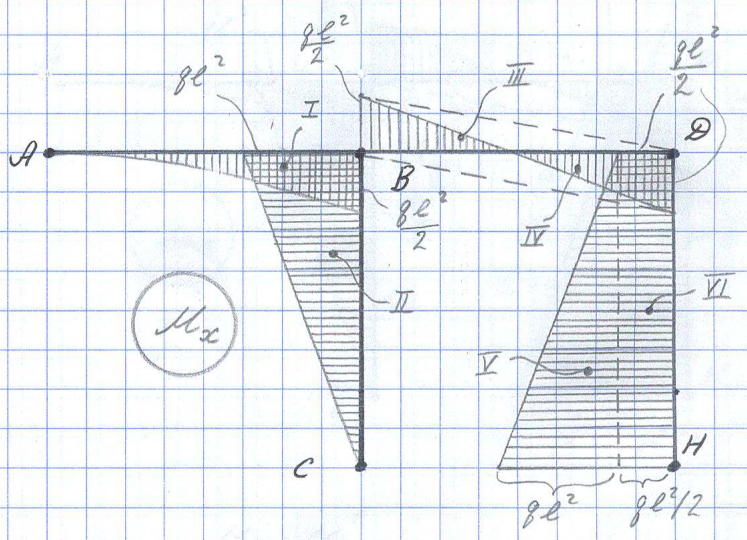
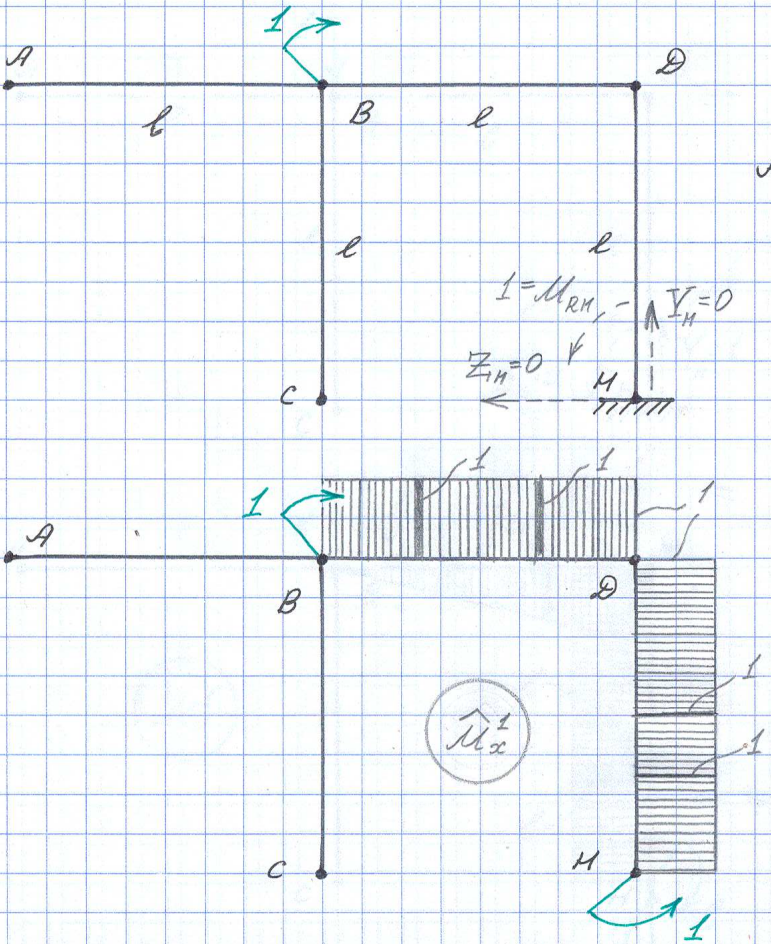
$$= \frac{1}{EJ_x} \left[\left(\frac{1}{2} \frac{ql^2}{2} \cdot l \right) \cdot \frac{l}{3} + \left(\frac{1}{2} \frac{ql^2}{2} \cdot l \right) \cdot \frac{2}{3} l + \right. \\ \left. + \left(\frac{1}{2} \frac{ql^2}{2} \cdot l \right) \cdot l + \left(\frac{ql^2}{2} \cdot l \right) \cdot l \right] = \\ = \frac{13 \cdot ql^4}{12 EJ_x} > 0 \Rightarrow \text{вниз}$$

Горизонтальное перемещение точки B:



$$W_B = \frac{M_x \cdot \tilde{M}_x^1}{EJ_x} = \frac{1}{EJ_x} \left[-\left(\frac{1}{2} \cdot 9l^2 \cdot l\right) \frac{2}{3} l - \left(\frac{9l^2}{2} \cdot l\right) \frac{l}{2} \right] = -\frac{7}{12} \cdot \frac{9l^4}{EJ_x} < 0 \Rightarrow \text{влево}$$

Угловое перемещение точки B:



$$\Theta_B = \frac{M_x \cdot \hat{M}_x^1}{EJ_x} = \frac{1}{EJ_x} \left[\left(\frac{1}{2} \cdot 9l^2 \cdot l\right) 1 - \left(\frac{1}{2} \cdot 9l^2 \cdot l\right) 1 - \left(\frac{1}{2} \cdot 9l^2 \cdot l\right) 1 - \left(\frac{9l^2}{2} \cdot l\right) 1 \right] = -\frac{9l^3}{EJ_x} < 0 \Rightarrow \text{против з.с.}$$