равнодействующая распределенной нагрузки

Реакции опор:

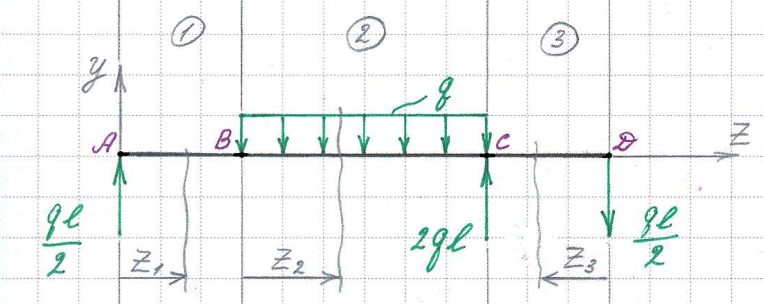$$\sum F_z = 0 = -Z_A \implies Z_A = 0$$

$$\sum M_A = 0 = -2ql \cdot 2l + Y_C \cdot 3l - \frac{ql}{2} \cdot 4l$$

$$Y_C = 2ql$$

$$\sum M_C = 0 = -Y_A \cdot 3l + 2ql \cdot l - \frac{ql}{2} \cdot l$$
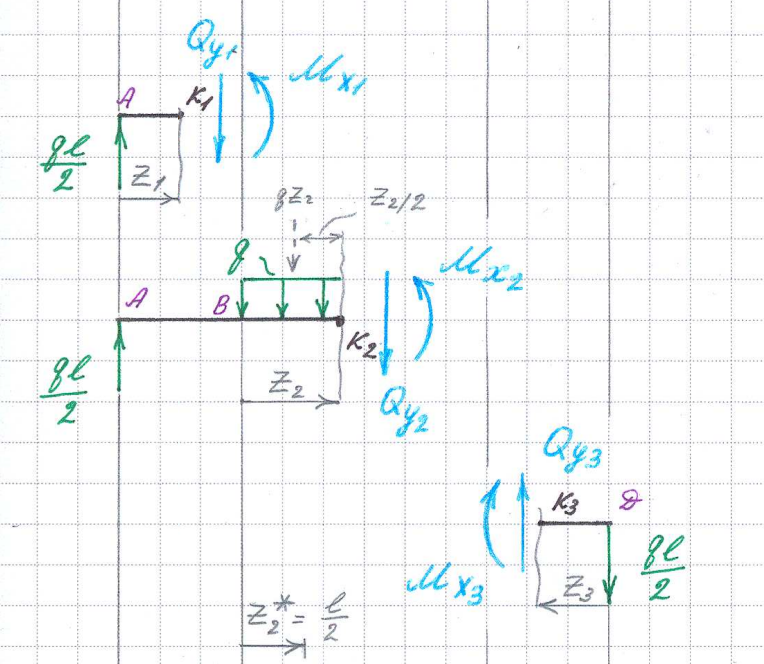
$$Y_A = \frac{ql}{2}$$

РОЗУ:

$$\sum F_{y_1} = 0 = \frac{ql}{2} - Q_{y_1} \implies Q_{y_1} = \frac{ql}{2}$$

$$\sum M_{K_1} = 0 = -\frac{ql}{2} \cdot Z_1 + M_{x_1}$$

$$M_{x_1} = \frac{ql}{2} \cdot Z_1$$

$$Z_1 = 0: \quad M_{x_1} = 0$$

$$Z_1 = l: \quad M_{x_1} = \frac{ql^2}{2}$$

$$\sum F_{y_2} = 0 = \frac{ql}{2} - q \cdot Z_2 - Q_{y_2}$$

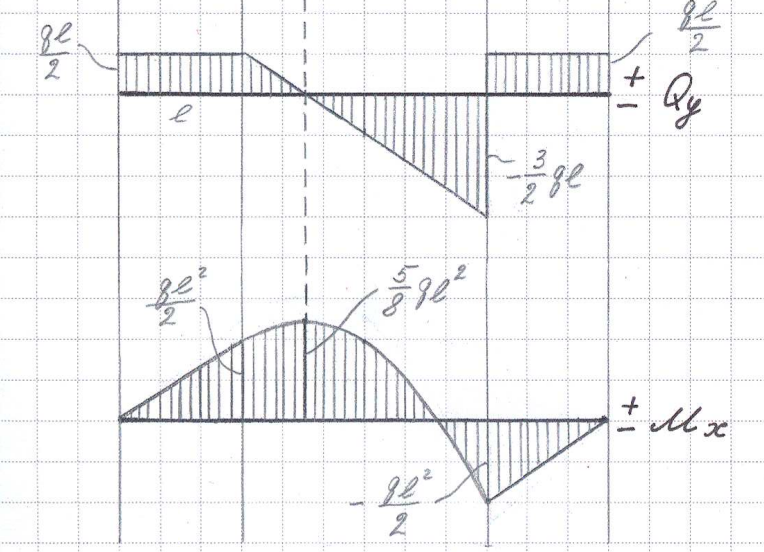$$Q_{y_2} = \frac{q}{2}(l - 2 \cdot Z_2)$$

$$Z_2 = 0: \quad Q_{y_2} = \frac{ql}{2}$$

$$Z_2 = 2l: \quad Q_{y_2} = -\frac{3}{2}ql$$

$$\sum M_{K_2} = 0 = -\frac{ql}{2}(l + Z_2) + qZ_2 \cdot \frac{Z_2}{2} + M_{x_2}$$

$$M_{x_2} = \frac{q}{2}(l^2 + lZ_2 - Z_2^2)$$

$$Z_2 = 0: \quad M_{x_2} = \frac{ql^2}{2}$$

$$Z_2 = 2l: \quad M_{x_2} = -\frac{ql^2}{2}$$

Экстремум параболы:

$$Q_{y_2}(Z_2^*) = 0 = \frac{q}{2}(l - 2 \cdot Z_2^*) \implies \boxed{Z_2^* = \frac{l}{2}}$$

$$M_{x_2}(Z_2^*) = M_{x_2}\left(\frac{l}{2}\right) = \frac{q}{2}\left(l^2 + l\frac{l}{2} - \frac{l^2}{4}\right) = \boxed{\frac{5}{8}ql^2}$$

$$\sum F_{y_3} = 0 = Q_{y_3} - \frac{ql}{2} \quad \Rightarrow \quad Q_{y_3} = \frac{ql}{2}$$

$$\sum M_{K_3} = 0 = -M_{x_3} - \frac{ql}{2} \cdot z_3 \quad \Rightarrow \quad M_{x_3} = -\frac{ql}{2} z_3$$

$$z_3 = 0: \quad M_{x_3} = 0$$

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