

1. Определяем реакции.

$$\sum M_A = 0 \quad -q \cdot 7l \cdot 2,5l + M + R_B \cdot 5l = 0$$

$$R_B = \frac{1}{5l} [q \cdot 7l \cdot 2,5l - 2ql^2] = 3,19l$$

$$\sum M_B = 0 \quad -R_A \cdot 5l + q \cdot 7l \cdot 2,5l + M = 0$$

$$R_A = \frac{1}{5l} [q \cdot 7l \cdot 2,5l + 2ql^2] = 3,99l$$

$$\sum y = 0 \quad R_A - q \cdot 7l + R_B = 3,99l - q \cdot 7l + 3,19l = 0$$

2. Строим эпюры Q и M.

I участок $0 \leq z_1 \leq l$.

$$Q(z_1) = -q \cdot z_1 \quad \begin{cases} z_1 = 0 & Q(z_1) = 0 \\ z_1 = l & Q(z_1) = -ql \end{cases} \quad (10)$$

$$M(z_1) = -q \frac{z_1^2}{2} \quad \begin{cases} z_1 = 0 & M(z_1) = 0 \\ z_1 = l & M(z_1) = -0,59l^2 \end{cases}$$

II участок $l \leq z_2 \leq 4l$.

$$Q(z_2) = -q \cdot z_2 + R_A = -q \cdot z_2 + 3,99l \quad \begin{cases} z_2 = l & Q(z_2) = 2,99l \\ z_2 = 4l & Q(z_2) = -0,19l \end{cases}$$

$$Q(z_0) = -q \cdot z_0 + 3,99l = 0 \quad z_0 = \frac{3,99l}{q} = 3,9l$$

$$M(z_2) = -q \frac{z_2^2}{2} + 3,99l \cdot (z_2 - l) \quad \begin{cases} z_2 = l & M(z_2) = -0,59l^2 \\ z_2 = 3,9l & M(z_2) = 3,7059l^2 \\ z_2 = 4l & M(z_2) = 3,79l^2 \end{cases}$$

III участок $0 \leq z_3 \leq l$.

$$Q(z_3) = q \cdot z_3 \quad \begin{cases} z_3 = 0 & Q(z_3) = 0 \\ z_3 = l & Q(z_3) = ql \end{cases}$$

$$M(z_3) = -q \frac{z_3^2}{2} \quad \begin{cases} z_3 = 0 & M(z_3) = 0 \\ z_3 = l & M(z_3) = -0,59l^2 \end{cases}$$

IV участок $l \leq z_4 \leq 3l$.

$$Q(z_4) = q \cdot z_4 - R_B = q \cdot z_4 - 3,19l \quad \begin{cases} z_4 = l & Q(z_4) = -2,19l \\ z_4 = 3l & Q(z_4) = -0,19l \end{cases}$$

$$M(z_4) = -q \frac{z_4^2}{2} + R_B (z_4 - l) = -q \frac{z_4^2}{2} + 3,19l (z_4 - l) \quad \begin{cases} z_4 = l & M(z_4) = -0,59l^2 \\ z_4 = 3l & M(z_4) = 1,79l^2 \end{cases}$$

$$M_{\max} = 3,7059l^2 = 3,705 \cdot 13 \cdot 0,5^2 = 12,041 \text{ кН} \cdot \text{м}$$