

Kräftezerlegung

Lagerreaktionen:

$$\rightarrow: A_H - F \cdot \cos(65^\circ) = 0$$

$$A_H = F \cdot \cos(65^\circ) = 75\text{N} \cdot \cos(65^\circ) = 31,70\text{N}$$

$$\uparrow: A_V + B - g_0 \cdot 3m - F \cdot \sin(65^\circ) - \frac{1}{2} g_0 \cdot 3m = 0$$

$$\curvearrow A) : - (g_0 \cdot 3m) \cdot 1,5m - F \cdot \sin(65^\circ) \cdot 4m \\ + \underline{B} \cdot 6m - \left( \frac{1}{2} g_0 \cdot 3m \right) \cdot 7m = 0$$

$$B = \frac{(g_0 \cdot 3m) \cdot 1,5m + F \cdot \sin(65^\circ) \cdot 4m + \left( \frac{1}{2} g_0 \cdot 3m \right) \cdot 7m}{6m}$$

$$\boxed{B = 64,07 N}$$

$$\uparrow: A_V = -B + q_0 \cdot 3m - F \cdot \sin(65^\circ) + \frac{1}{2} q_0 \cdot 3m$$

$$A_V = 37,65N$$

1. Schritt:  $0 \leq x \leq 3$

$$\uparrow: A_v - Q - g_0 \cdot x = 0$$

$$Q = A_v - g_0 \cdot x$$

$$Q = 37,65 \text{ N} - 7,5 \frac{\text{N}}{\text{m}} \cdot x$$

$$\curvearrowright S) : -A_v \cdot x + (q_0 \cdot x) \cdot \frac{1}{2} x + M = 0$$

$$M = A_v \cdot x - (q_0 \cdot x) \cdot \frac{1}{2} x$$

$$M = 37,65 \text{ N} \cdot x - \frac{1}{2} \cdot 7,5 \frac{\text{N}}{\text{m}} \cdot x^2$$

$$\rightarrow : A_L + N = 0$$

$$N = -A_L = -31,70 \text{ N}$$

$$\uparrow: A_v - Q - g_0 \cdot 3m = 0$$

$$Q = A_v - g_0 \cdot 3m$$

$$Q = 37,65 \text{ N} - 7,5 \frac{\text{N}}{\text{m}} \cdot 3m$$

$$Q = 15,15 \text{ N}$$

2. Schnitt:  $3 \leq x \leq 4$

$$\curvearrowleft M): M - A_v \cdot x + (q_0 \cdot 3m) \cdot (x - 1,5m) = 0$$

$$M = A_v \cdot x - (q_0 \cdot 3m) \cdot (x - 1,5m)$$

$$M = 15,15N \cdot x + 33,75Nm$$

$$\rightarrow: A_L + N = 0$$

$$N = -A_L = -31,70N$$

$$\uparrow: Q + B - \frac{1}{2} \cdot 76 \cdot 3\text{m} = 0$$

$$Q = -B + \frac{1}{2} \cdot 76 \cdot 3\text{m}$$

$$Q = -52,82 \text{ N}$$

3. Schnitt:  $4 \leq x \leq 6$

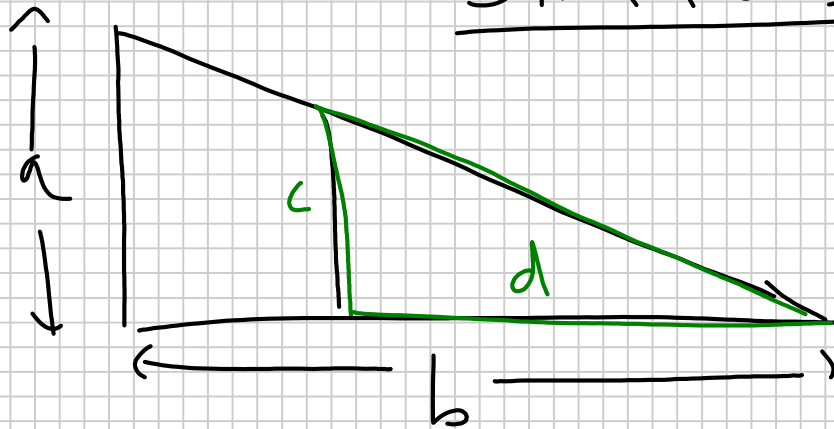


$$\curvearrowleft : B \cdot (6m - x) - \left( \frac{1}{2} \cdot 9,81 \cdot 3m \right) \cdot (7m - x) - M = 0$$

$$M = B \cdot (6m - x) - \left( \frac{1}{2} \cdot 9,81 \cdot 3m \right) \cdot (7m - x)$$

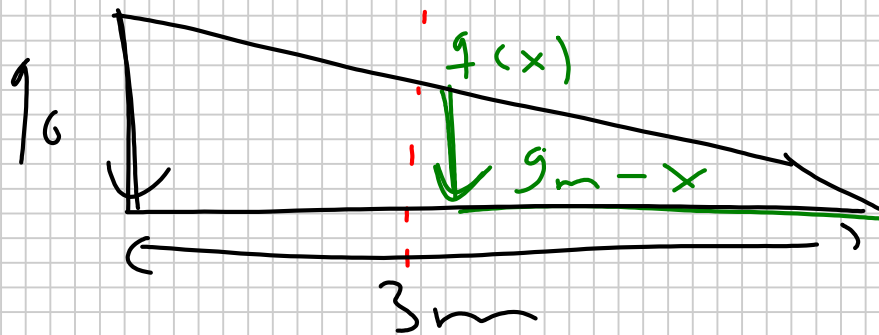
$$M = -52,82 \text{ N} \cdot x + 305,67 \text{ Nm}$$

# Strahlensatz



$$V = \frac{a}{b}$$

$$V = \frac{c}{d}$$



$$V = \frac{f_0}{3m} = \frac{f(x)}{9m-x}$$

$$f(x) = \frac{f_0}{3m} \cdot (9m-x)$$

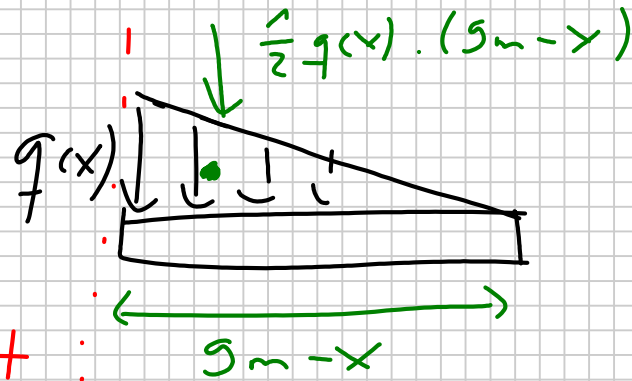
$$\frac{1}{2} q(x) \cdot (g_m - x)$$

$$q(x) = \frac{q_0}{3m} \cdot (g_m - x)$$

$$\frac{1}{2} \frac{q_0}{3m} \cdot (g_m - x)^2$$

$$\frac{1}{6} \cdot q_0 \cdot (g_m - x)^2$$

→ Einzellast der Teildreieckslast



$$\uparrow: Q - \frac{1}{6m} \cdot q_0 \cdot (g_m - x)^2 = 0$$

$$Q = \frac{1}{6m} q_0 \cdot (g_m - x)^2$$

$$Q = 1,25 \frac{\text{N}}{\text{m}^2} \cdot (9\text{m} - x)^2$$

$$\curvearrowright: -M - \left[ \frac{1}{6m} \cdot q_0 \cdot (g_m - x)^2 \right] \cdot \frac{1}{3} (g_m - x)$$

$$M = - \frac{1}{18\text{m}^2} q_0 \cdot (g_m - x)^3$$

$$M = -\frac{1}{18\text{m}^2} \cdot 7,5\text{N} \cdot (9\text{m} - x)^3$$

Überprüfung:  $\frac{dM}{dx} = Q$  .

$$\frac{dM}{dx} = -\frac{3}{18\text{m}^2} \cdot 7,5\text{N} \cdot (9\text{m} - x)^2 \cdot (-1)$$

$$Q = \frac{1}{6\text{m}^2} \cdot 7,5\text{N} \cdot (9\text{m} - x)^2$$