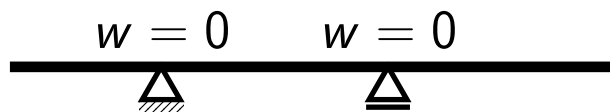
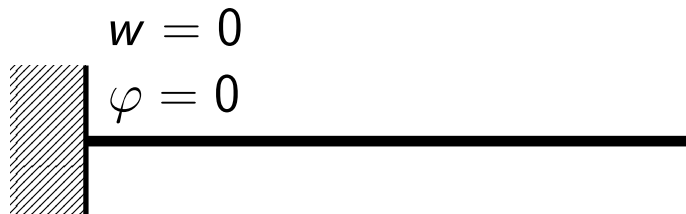
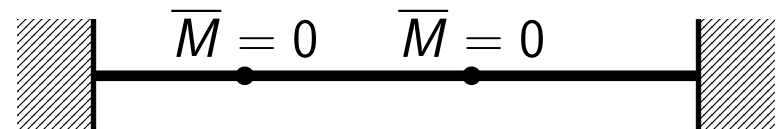
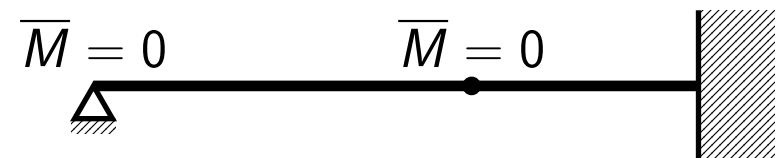


## Mohrova metoda náhradního nosníku

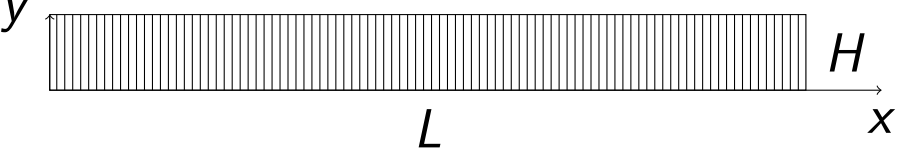
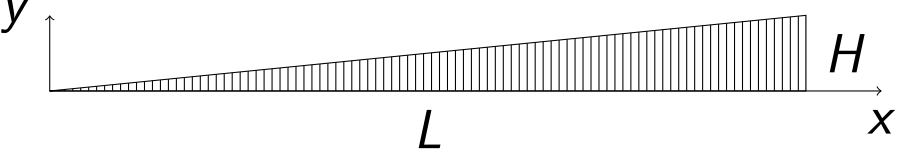
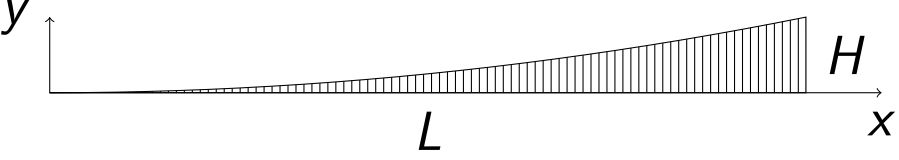
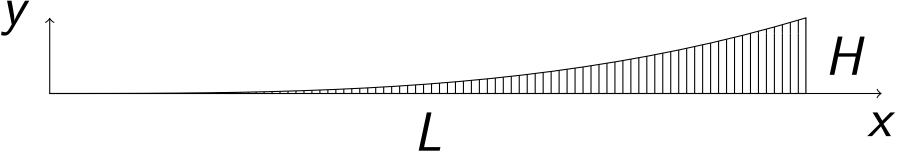
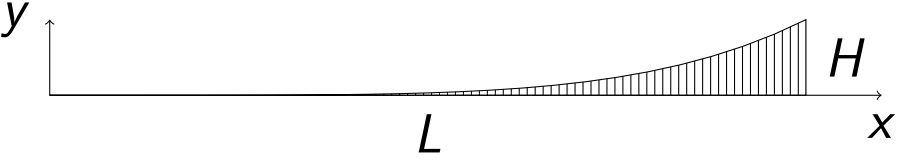
$$\frac{d^2 w(x)}{dx^2} = -\frac{1}{E \cdot J_y} \cdot M(x)$$



$$\frac{d^2 \bar{M}(x)}{dx^2} = -q(x) \rightarrow w = -\frac{\bar{M}}{E \cdot J_y}$$



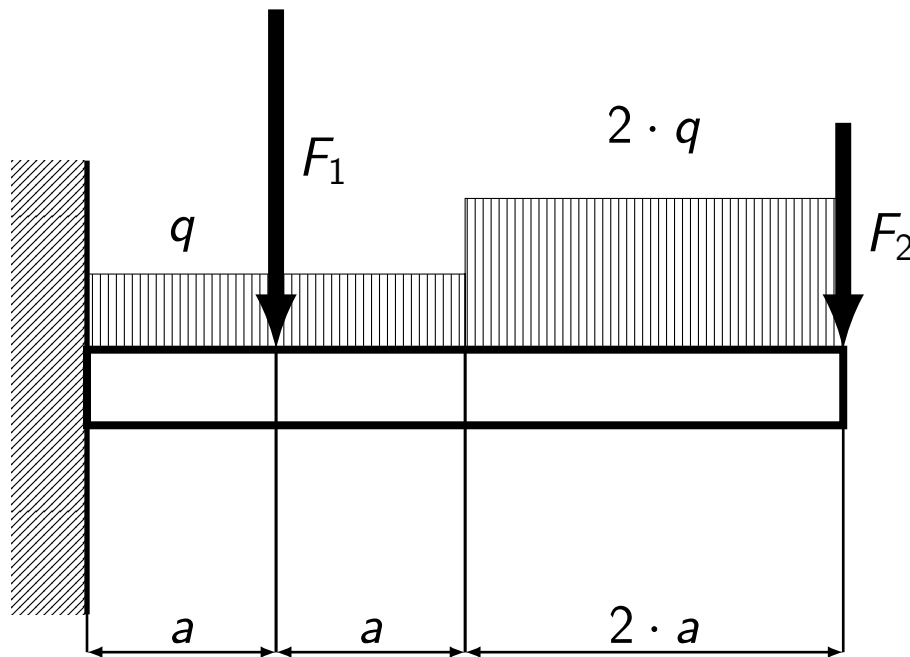
## Momentové plochy ve formě polynomu

$n$		$S$	$x_t$
0		$L \cdot H$	$\frac{1}{2} \cdot L$
1		$\frac{1}{2} \cdot L \cdot H$	$\frac{2}{3} \cdot L$
2		$\frac{1}{3} \cdot L \cdot H$	$\frac{3}{4} \cdot L$
3		$\frac{1}{4} \cdot L \cdot H$	$\frac{4}{5} \cdot L$
$n$		$\frac{1}{n+1} \cdot L \cdot H$	$\frac{n+1}{n+2} \cdot L$

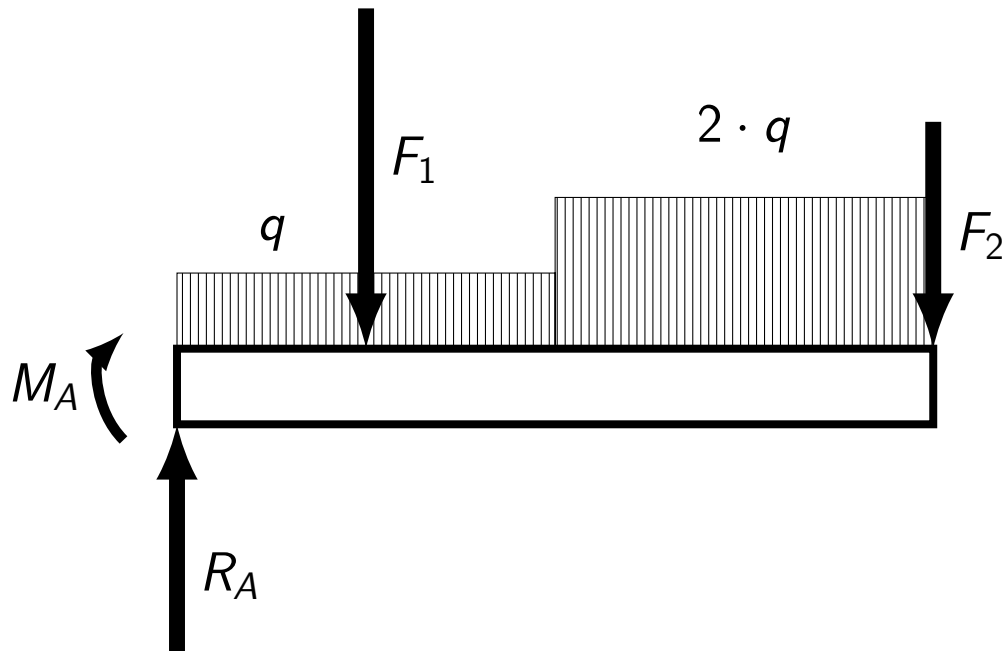
Příklad 1:

Dáno:  $a$ ,  $E$ ,  $J_y$ ,  $q$ ,  $F_1 = 3 \cdot q \cdot a$ ,  $F_2 = 2 \cdot q \cdot a$

Určete: průhyb na konci



Řešení 1:



Rovnice rovnováhy:

$$R_A - 3 \cdot q \cdot a - 2 \cdot q \cdot a$$

$$- 4 \cdot q \cdot a - 2 \cdot q \cdot a = 0$$

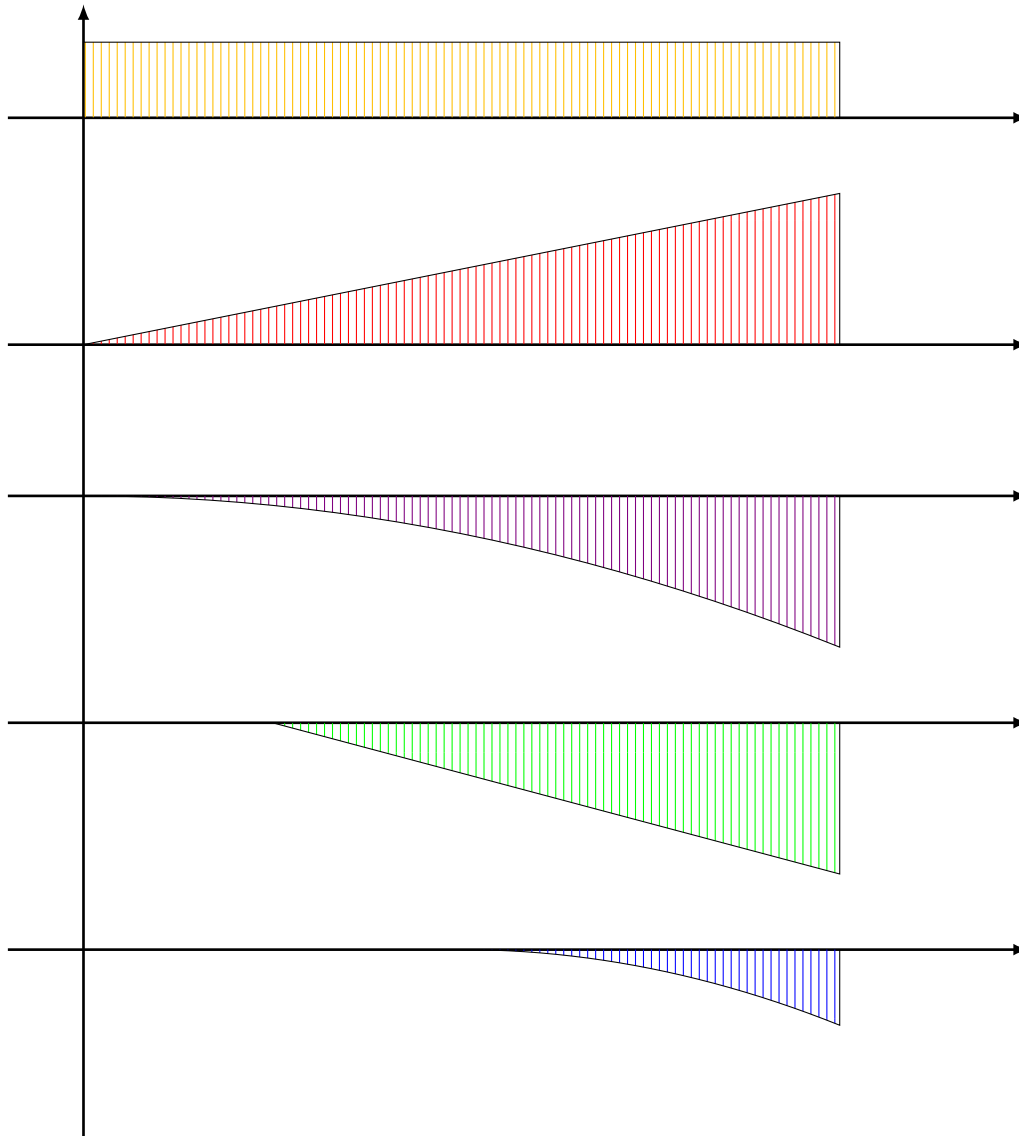
$$M_A + 3 \cdot q \cdot a^2 + 8 \cdot q \cdot a^2$$

$$+ 8 \cdot q \cdot a^2 + 6 \cdot q \cdot a^2 = 0$$

$$R_A = 11 \cdot q \cdot a$$

$$M_A = -25 \cdot q \cdot a^2$$

## Řešení 1:



$$M_A = 25 \cdot q \cdot a^2$$

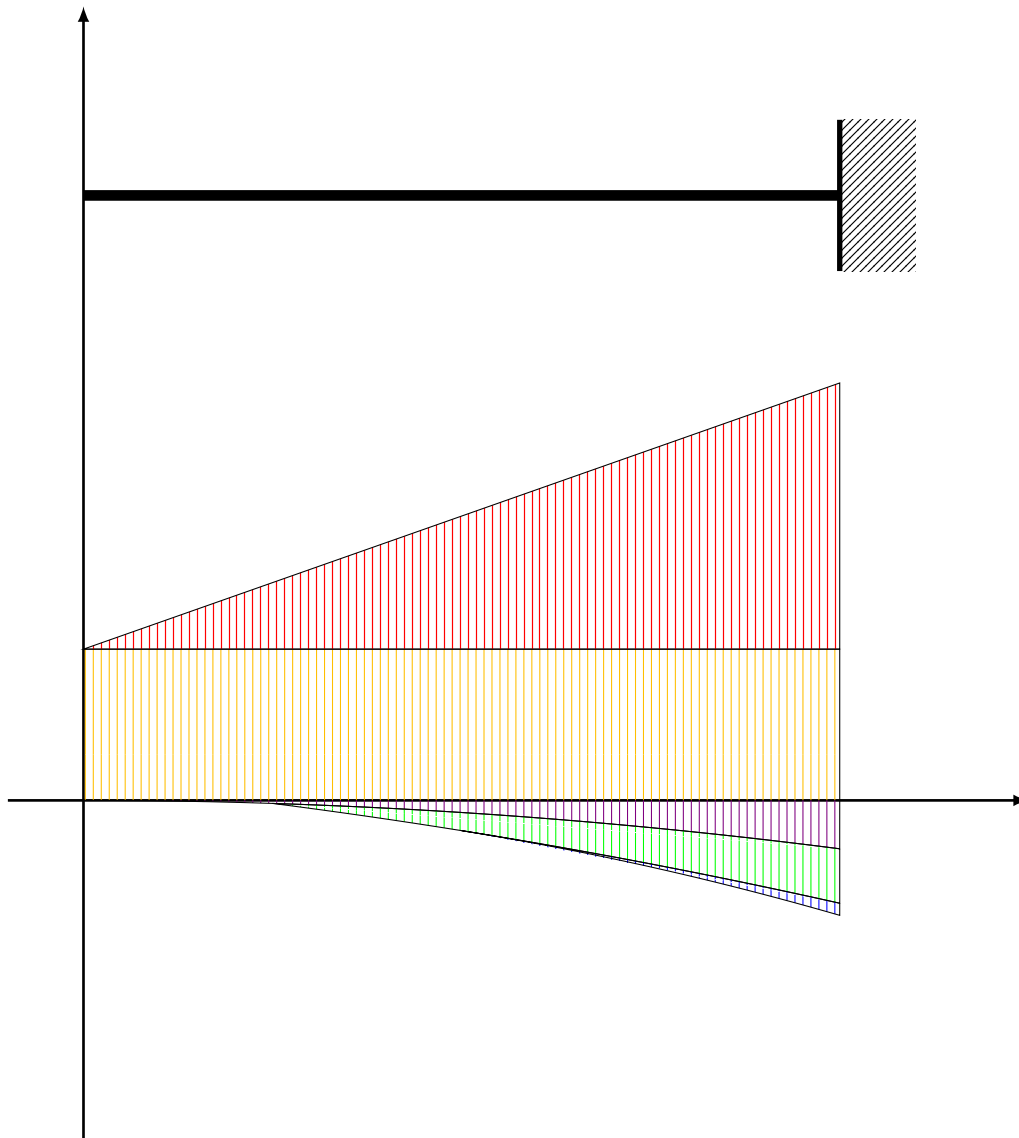
$$R_A \cdot 4 \cdot a = 44 \cdot q \cdot a^2$$

$$-\frac{1}{2} \cdot q \cdot (4 \cdot a)^2 = -8 \cdot q \cdot a^2$$

$$-3 \cdot q \cdot a \cdot 3 \cdot a = -9 \cdot q \cdot a^2$$

$$-\frac{1}{2} \cdot q \cdot (2 \cdot a)^2 = -2 \cdot q \cdot a^2$$

## Řešení 1: zatížení sruženého nosníku



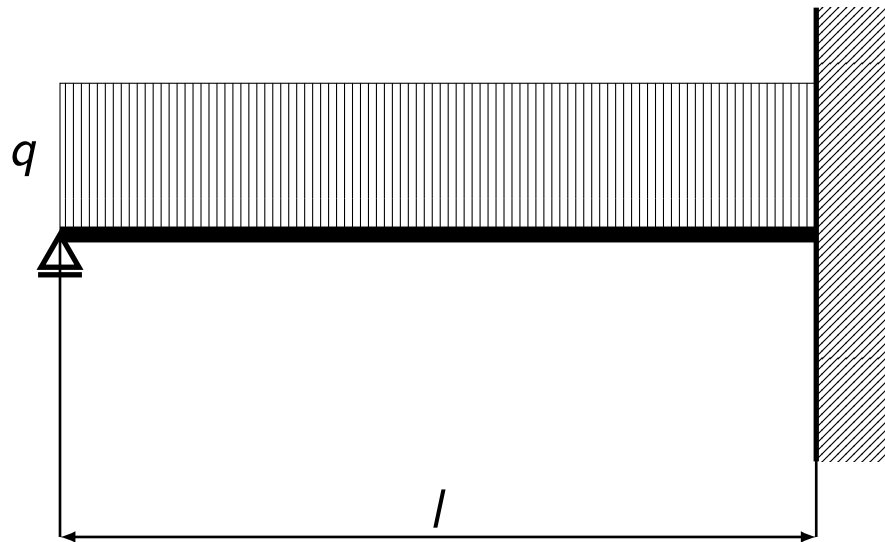
$$\begin{aligned}
 \bar{M}_D &= \frac{1}{3} \cdot 8 \cdot q \cdot a^2 \cdot 4 \cdot a \cdot \frac{1}{4} \cdot 4 \cdot a \\
 &+ \frac{1}{2} \cdot 9 \cdot q \cdot a^2 \cdot 3 \cdot a \cdot \frac{1}{3} \cdot 3 \cdot a \\
 &+ \frac{1}{3} \cdot 2 \cdot q \cdot a^2 \cdot 2 \cdot a \cdot \frac{1}{4} \cdot 2 \cdot a \\
 &- 25 \cdot q \cdot a^2 \cdot 4 \cdot a \cdot \frac{1}{2} \cdot 4 \cdot a \\
 &- \frac{1}{2} \cdot 44 \cdot q \cdot a^2 \cdot 4 \cdot a \cdot \frac{1}{3} \cdot 4 \cdot a \\
 &= \dots = \frac{325}{3} \cdot q \cdot a^4
 \end{aligned}$$

$$w_D = \frac{325 \cdot q \cdot a^4}{3 \cdot E \cdot J_y}$$

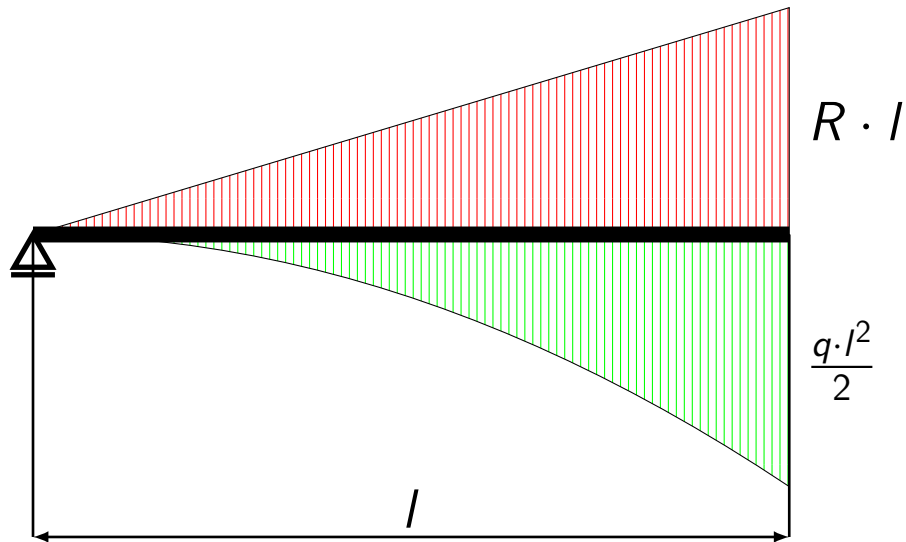
Příklad 2:

Dáno: rozměry,  $q$

Určete: reakce



## Řešení 2:



$$\frac{1}{2} \cdot R_A \cdot l \cdot l - \frac{2}{3} \cdot l -$$

$$- \frac{1}{3} \cdot \frac{q \cdot l^2}{2} \cdot l \cdot \frac{3}{4} \cdot l = 0$$

$$\frac{R_A \cdot l^3}{3} - \frac{q \cdot l^4}{8} = 0 \rightarrow R_A = \frac{3}{8} \cdot q \cdot l$$

$$R_B = q \cdot l - R_A = \frac{5}{8} \cdot q \cdot l$$

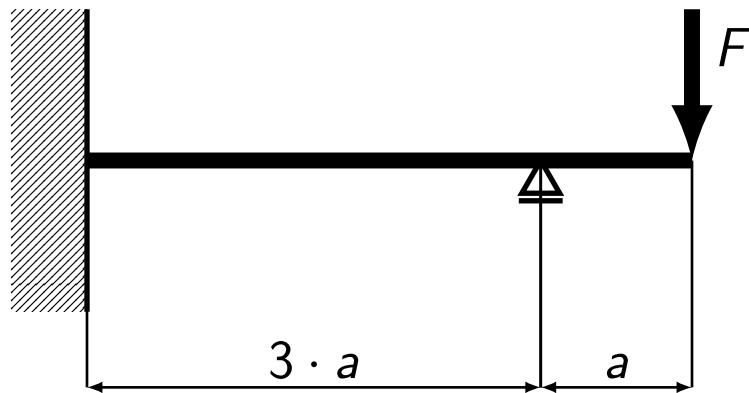
$$M_B = R_A \cdot l - \frac{q \cdot l^2}{2} = -\frac{1}{8} \cdot q \cdot l^2$$



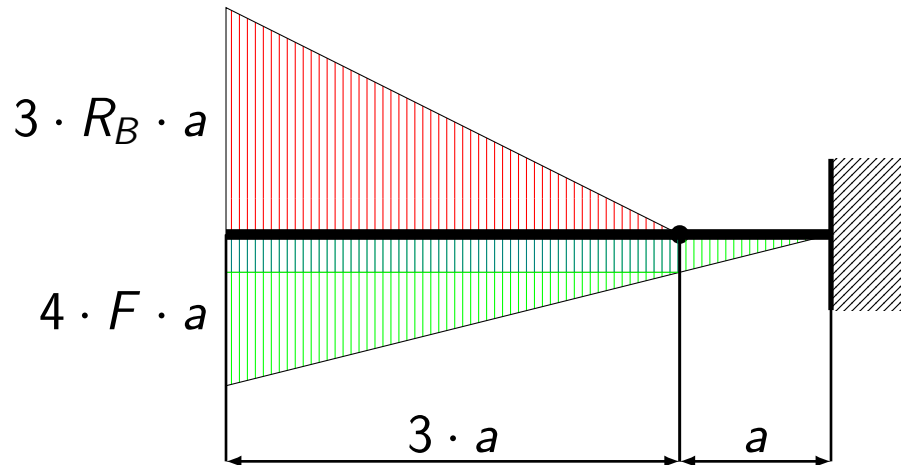
Příklad 3:

Dáno: rozměry,  $F$

Určete: reakce



## Řešení 3:



$$\begin{aligned} & \frac{1}{2} \cdot 3 \cdot R_B \cdot a \cdot 3 \cdot a \cdot \frac{2}{3} \cdot 3 \cdot a - \\ & - F \cdot a \cdot 3 \cdot a \cdot \frac{1}{2} \cdot 3 \cdot a - \\ & - \frac{1}{2} \cdot 3 \cdot F \cdot a \cdot 3 \cdot a \cdot \frac{2}{3} \cdot 3 \cdot a = 0 \end{aligned}$$

$$9 \cdot R_B \cdot a^3 - F \cdot a^3 \cdot \left( \frac{9}{2} + \frac{18}{2} \right) = 0$$

$$R_B = \frac{3}{2} \cdot F$$

$$R_A = R_B - F = \frac{1}{2} \cdot F$$

$$M_A = R_B \cdot 3 \cdot a - F \cdot 4 \cdot a = \frac{1}{2} \cdot F \cdot a$$

Příklad 4:

Dáno: rozměry,  $F$ ,  $\delta$

Určete: reakce

