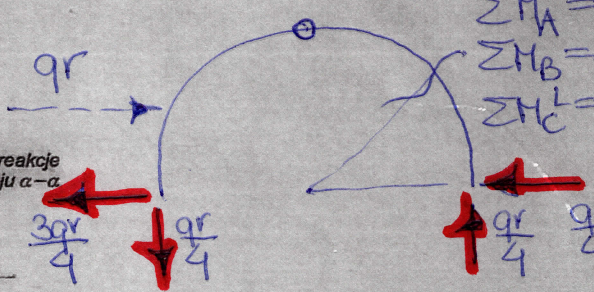
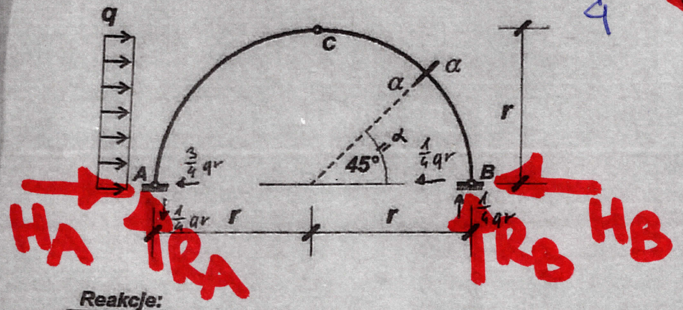
$\sum M_A = 0 \Rightarrow R_B$
$\sum M_B = 0 \Rightarrow R_A$
$\sum M_C^L = 0 \Rightarrow H_A$
$\sum M_C^P = 0 \Rightarrow H_B$
$\sum P_y$
$\sum P_x = 0$



Zad. 3c

Dla danego łuku kołowego obliczyć reakcje oraz siły wewnętrzne w zaznaczonym przekroju $\alpha-\alpha$



Reakcje:

$= qr\cdot\frac{1}{2}r - 2r\cdot R_B = 0$

$R_B = \frac{1}{4}qr$

$qr\cdot\frac{1}{2}r - R_A\cdot 2r = 0$

$= \frac{1}{4}qr$

$M_C^P = H_B\cdot r - \frac{qr}{4}\cdot r = 0$

$H_B = \frac{1}{4}qr$

$M_C^L = H_A\cdot r - \frac{1}{4}qr^2 = 0$

$H_A = \frac{3}{4}qr^2$

$\alpha = 45°$

$N\alpha = -\left(\frac{1}{4}qr\left(\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2}\right)\right) = -\frac{1}{4}qr\sqrt{2} = -\frac{\sqrt{2}}{4}qr$ [kN]

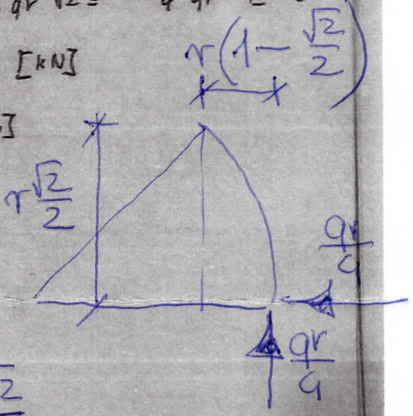
$T\alpha = \frac{1}{4}qr\left(\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}\right) = 0$ [kN]

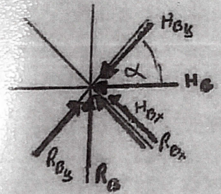
$M\alpha = \frac{1}{4}qr^2(1-\sqrt{2})$ [kNm]

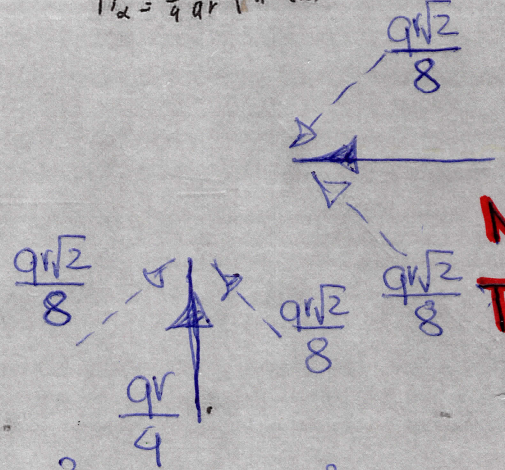
jak w zadaniu 3a)

stąd:

$M_\alpha = \frac{1}{4}qr^2(1-\sqrt{2})$





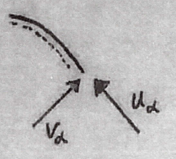


$N_\alpha = -\frac{qr\sqrt{2}}{4}$

$T_\alpha = 0$

$V_\alpha = H_B\cos\alpha - R_B\sin\alpha$

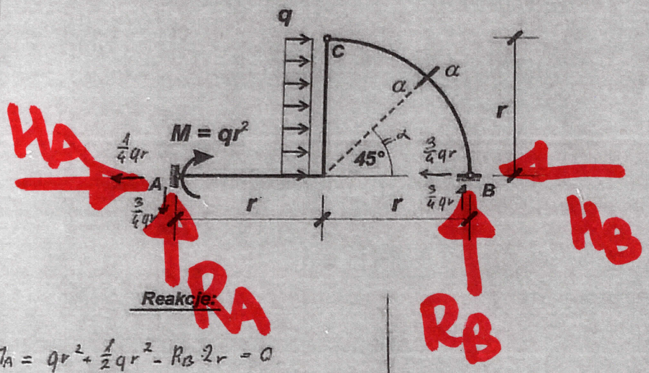
$U_\alpha = -\cos\alpha\, R_B - \sin\alpha\, H_B$



$M_\alpha = \frac{qr^2}{4}\left(1-\frac{\sqrt{2}}{2}\right) - \frac{qr^2}{4}\frac{\sqrt{2}}{2} = \frac{qr^2}{4}(1-\sqrt{2}) < 0$

Rozwiązanie przygotował Jan Kądzielewski

Zad. 3i Dla danego układu złożonego obliczyć reakcje, siłę normalną i tnącą oraz moment zginający w przekroju α–α.



$N\alpha = \frac{\sqrt{2}}{2}\left(-\frac{3}{4}qr - \frac{3}{4}qr\right) = -1{,}5qr\cdot\frac{\sqrt{2}}{2}$

$T\alpha = \frac{\sqrt{2}}{2}\left(\frac{3}{4}qr - \frac{3}{4}qr\right) = 0$ [kN]

$M\alpha = \frac{3}{4}qr^2\left(1-\frac{\sqrt{2}}{2}\right) - \frac{3}{4}qr^2\left(\frac{\sqrt{2}}{2}\right) = \frac{3}{4}qr^2(1-\sqrt{2})$

[kNm]

Reakcje:

$M_A = qr^2 + \frac{1}{2}qr^2 - R_B\, 2r = 0$

$R_B = \frac{3}{4}qr$

$M_B = 0 \Rightarrow R_A = \frac{3}{4}qr$

$M_C^P = -R_B\cdot r + H_B\cdot r = 0$

$H_B = \frac{3}{4}qr$

$M_C^L = -\frac{1}{2}qr^2 + qr^2 - \frac{3}{4}qr^2 + H_A\cdot r = 0$

$H_A = \frac{1}{4}qr$

$\Sigma M_A = 0 \Rightarrow R_B = \frac{3qr}{4}$

$\Sigma M_B = 0 \Rightarrow R_A = -\frac{3}{4}qr$

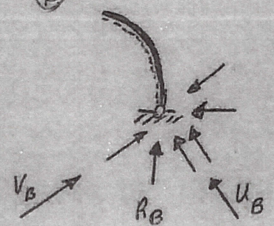
$\Sigma P_y = 0$

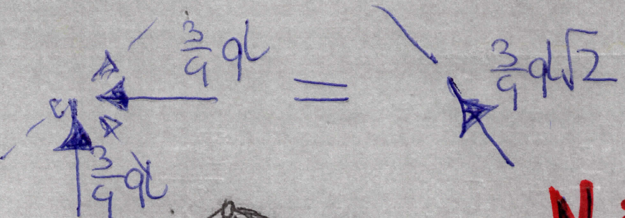
$\Sigma M_C^L = 0 \Rightarrow H_A = -\frac{qr}{4}$

$\Sigma M_C^P = 0 \Rightarrow H_B = \frac{3}{4}qr$

$\Sigma P_x = 0$

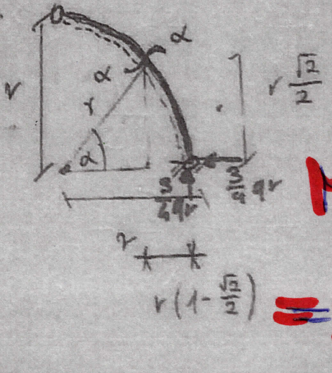
(B)





$= -H_B\cdot\sin\alpha - R_B\cdot\cos\alpha$

$H_B\cdot\cos\alpha - R_B\cdot\sin\alpha$



$N_\alpha = -\frac{3}{4}ql\sqrt{2}$

$T_\alpha = 0$

$M_\alpha = \frac{3}{4}ql^2\left(1-\frac{\sqrt{2}}{2}\right) - \frac{3}{4}ql^2\frac{\sqrt{2}}{2} = \frac{3}{4}ql^2(1-\sqrt{2}) < 0$