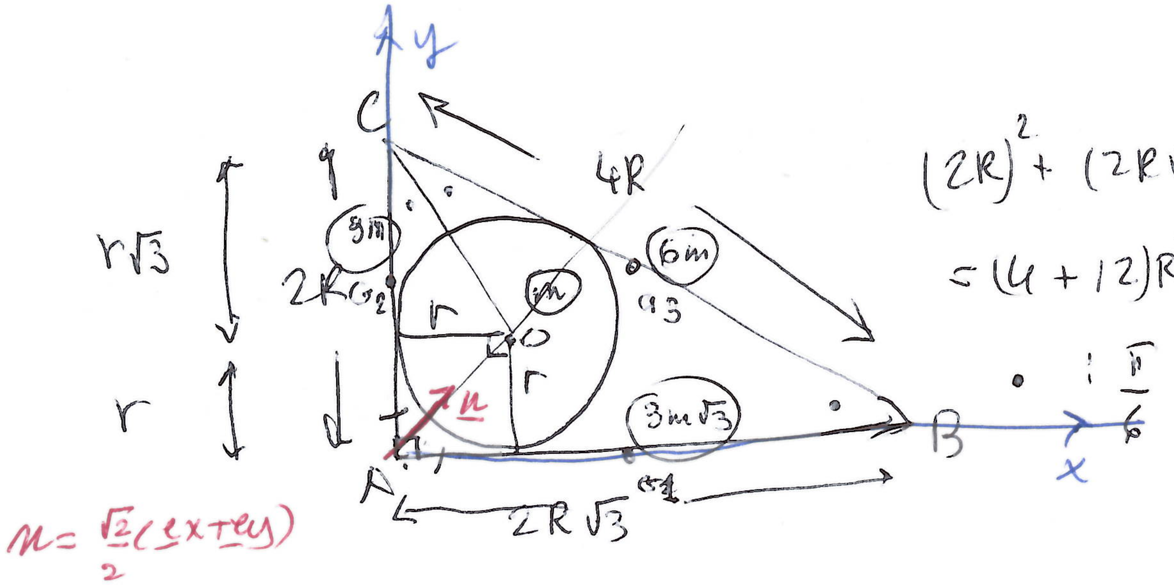


$(2R)^2 + (2R\sqrt{3})^2 =$

$= (4+12)R^2 = 16R^2 = (4R)^2$

$\Downarrow$

tr. Rettangolo

$$r + r\sqrt{3} = 2R \rightarrow r = \frac{2}{1+\sqrt{3}}R = \frac{2}{(1+\sqrt{3})}\frac{(1-\sqrt{3})}{(1-\sqrt{3})}R = \frac{2(1-\sqrt{3})}{1-3}R$$

$$\boxed{r = (\sqrt{3}-1)R}$$

AB: $I_{xx} = 0 \qquad I_{yy} = \frac{1}{3}(2R\sqrt{3})^2 \cdot 3m\sqrt{3} =$

$I_{xy} = 0 \qquad = \frac{1}{\cancel{3}} \cdot 4 \cdot \cancel{3} \cdot 3\sqrt{3}\, mR^2 = 12\sqrt{3}\, mR^2$

$$[I_A^{(AB)}]_{(xy)} = \begin{pmatrix} 0 & 0 \\ 0 & 12\sqrt{3}\, mR^2 \end{pmatrix}$$

AC: $I_{yy} = I_{xy} = 0 \qquad I_{xx} = \frac{1}{\cancel{3}}\cancel{3}m(2R)^2 = 4mR^2$

$[I_A^{BC}]$: $I_{xx} = \frac{1}{3} 6m (4R)^2 \sin^2\frac{\pi}{6} =$

$= \frac{1}{\cancel{3}} \cdot \cancel{6}^{2} \cdot \cancel{16}^{4} \cdot \frac{1}{\cancel{4}} mR^2 = 8mR^2$

$I_{yy} = \frac{1}{3} 6m (4R)^2 \sin^2\frac{\pi}{3} = \frac{1}{\cancel{3}} \cancel{6}^{2} \cdot \cancel{16}^{4} \cdot \frac{\cancel{3}}{\cancel{4}} mR^2 = 24mR^2$

$$\underset{\sim}{I}_A^{BC} = \overbrace{\frac{1}{\cancel{12}_{2}}\, 6m\,(4R)^2\left(\underset{\sim}{1} - \underline{e}\otimes\underline{e}\right)}^{\underset{\sim}{I}_G^{BC}} + 6m\,(2R)^2\left(\underset{\sim}{1} - \underline{e}_{G_3}\otimes\underline{e}_{G_3}\right)$$

$$= 8mR^2\left(\underset{\sim}{1} - \underline{e}\otimes\underline{e}\right) + 24mR^2\left(\underset{\sim}{1} - \underline{e}_{G_3}\otimes\underline{e}_{G_3}\right)$$

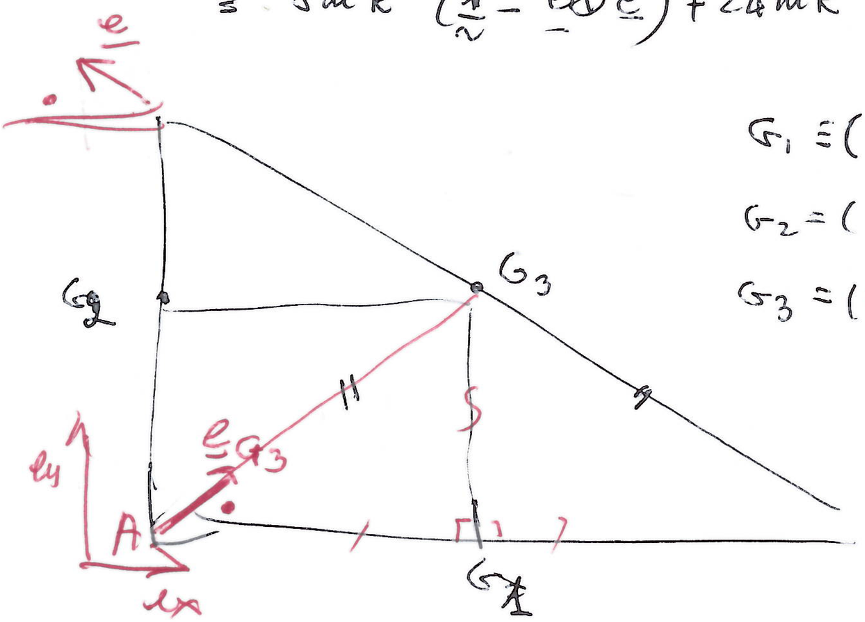
$$\underline{e} = -\frac{\sqrt{3}}{2}\underline{e}_x - \frac{1}{2}\underline{e}_y$$

$$\underline{e}_{G_3} = +\frac{\sqrt{3}}{2}\underline{e}_x + \frac{1}{2}\underline{e}_y$$

$G_1 \equiv (R\sqrt{3}, 0)$

$G_2 = (0, R)$

$G_3 = (R\sqrt{3}, R)$



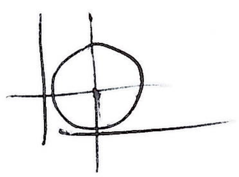
$$\left[\underset{\sim}{I}_A^{BC}\right]_{xy} = \underline{e}_x \cdot \underset{\sim}{I}_A^{BC}\,\underline{e}_y = -8mR^2(\underline{e}\cdot\underline{e}_x)(\underline{e}\cdot\underline{e}_y) - 24mR^2(\underline{e}_{G_3}\cdot\underline{e}_x)(\underline{e}_{G_3}\cdot\underline{e}_y)$$

$$= -\overset{2}{\cancel{8}}mR^2\left(+\frac{\sqrt{3}}{\cancel{2}}\right)\left(\frac{1}{\cancel{2}}\right) - \overset{6}{\cancel{24}}mR^2\left(\frac{\sqrt{3}}{\cancel{2}}\right)\left(\frac{1}{\cancel{2}}\right) =$$

$$= -4\sqrt{3}\,mR^2$$

$$\left[I_A^{BC}\right] = \begin{pmatrix} 8mR^2 & -4\sqrt{3}mR^2 \\ -4\sqrt{3}mR^2 & 24mR^2 \end{pmatrix}$$

Disco



$$I_{xx} = I_{yy} = \frac{1}{4}mr^2 + mr^2 = \frac{5}{4}mr^2$$

$$= \frac{5}{4}m(\sqrt{3}-1)^2R^2 = \frac{5}{2}(2-\sqrt{3})mR^2$$

$$(\sqrt{3}-1)^2 = 3+1-2\sqrt{3} =$$
$$= 4 - 2\sqrt{3} =$$
$$= 2(2-\sqrt{3})$$

$$I_{xy} = -m\,x_G\,y_G = -m\,r\cdot r =$$

$$= -mr^2 = -2(2-\sqrt{3})mR^2$$

$$= 2(\sqrt{3}-2)mR^2$$

$$\left[I_A^d\right] = \begin{pmatrix} \frac{5}{2}(2-\sqrt{3})mR^2 & 2(\sqrt{3}-2)mR^2 \\ 2(\sqrt{3}-2)mR^2 & \frac{5}{2}(2-\sqrt{3})mR^2 \end{pmatrix}$$

$$I_{AO}^{tot} = \underline{I_{AO}^{AB}} + I_{AO}^{BC} + \underline{I_{AO}^{AC}} + \underline{I_{AO}^{d}}$$

$$I_{AO}^{(AB)} = \frac{1}{3} 3m\sqrt{3}\,(2R\sqrt{3})^2 \cdot \sin^2\frac{\pi}{4} =$$

$$= \frac{1}{\cancel{3}}\cancel{3}\sqrt{3}\,\overset{2}{\cancel{4}}\cdot 3 \cdot \frac{\cancel{1}}{\cancel{2}}\, mR^2 = 6\sqrt{3}\, mR^2$$

$$I_{AO}^{AC} = \frac{1}{3} 3m\,(2R)^2 \cdot \sin^2\frac{\pi}{4} = \frac{1}{\cancel{3}} \cdot \cancel{3} \cdot \overset{2}{\cancel{4}} \cdot \frac{1}{\cancel{2}}\, mR^2 = 2mR^2$$

$$I_{AO}^{d} = \frac{1}{4} m r^2 = \frac{1}{4} m\,(\sqrt{3}-1)^2 R^2 = \frac{1}{\underset{2}{\cancel{4}}}\cancel{2}(2-\sqrt{3})\, mR^2 =$$

$$= mR^2 - \frac{1}{2}\sqrt{3}\, mR^2$$

$$I_{AO}^{BC} : \quad \underline{n} \cdot \underline{\underline{I}}_A^{BC}\, \underline{n} = \frac{\sqrt{2}}{2}(1 \quad 1)\begin{pmatrix} 8 & -4\sqrt{3} \\ -4\sqrt{3} & 24 \end{pmatrix}\begin{pmatrix} 1 \\ 1 \end{pmatrix}\frac{\sqrt{2}}{2}\, mR^2$$

$$\underline{n} = \frac{\sqrt{2}}{2}(\underline{e_x} + \underline{e_y})$$

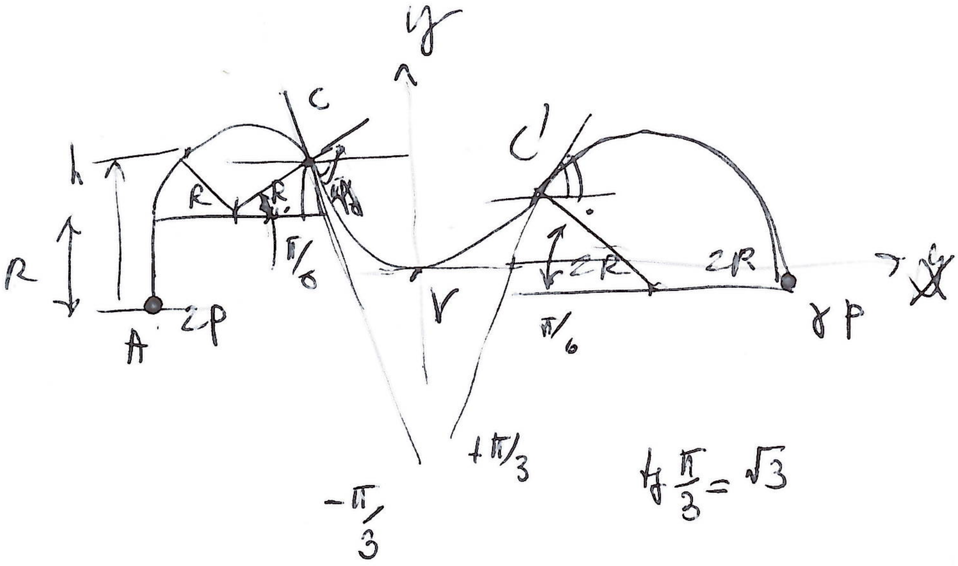
$$= \frac{1}{2}(1 \quad 1)\begin{pmatrix} 8 - 4\sqrt{3} \\ -4\sqrt{3} + 24 \end{pmatrix} mR^2 = \frac{1}{2}\left(8 - 4\sqrt{3} - 4\sqrt{3} + 24\right) mR^2$$

$$= (16 - 4\sqrt{3})\, mR^2$$

$$I_{AO}^{tot} = \left(19 + \frac{3}{2}\sqrt{3}\right) mR^2$$

$$6 - \frac{1}{2} - 4 = \frac{3}{2}$$

$2p/R$



$tg\frac{\pi}{3} = \sqrt{3}$

$x_C = -x_{C'} \longrightarrow \tau_C = \tau_{C'}$ (cosh z é par)

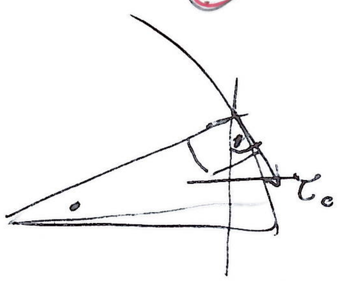
$\hookrightarrow y_C = y_{C'}$

$\cancel{\tau_p = \tau_A}$

$\tau_p = k + \frac{2p}{R}\cdot h \qquad h = 0 \qquad \tau_A = k = 2p$

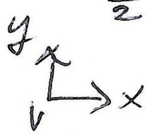
$\tau_C = 2p + \frac{2p}{R}\cdot\left(R + \frac{R}{2}\right) = \left(2 + 2\cdot\frac{3}{2}\right)p = 5p = \tau_{C'}$

$\tau_x = (4) = \tau_C \cdot \sin\frac{\pi}{6} = \frac{\tau_C}{2} = \frac{5}{2}p = \tau_V$

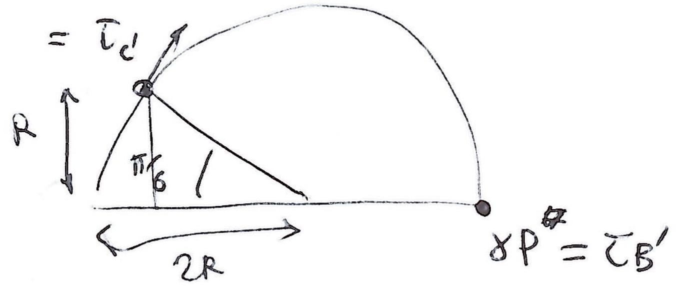


$\tau_C = \tau_V + \frac{2p}{R}\cdot h_{VC} \longrightarrow 5p - \frac{5}{2}p = \frac{2p}{R} h_{VC}$

$\frac{5}{2}\cancel{p}\cdot\frac{R}{2\cancel{p}} = h_{VC} = \frac{5}{4}R$



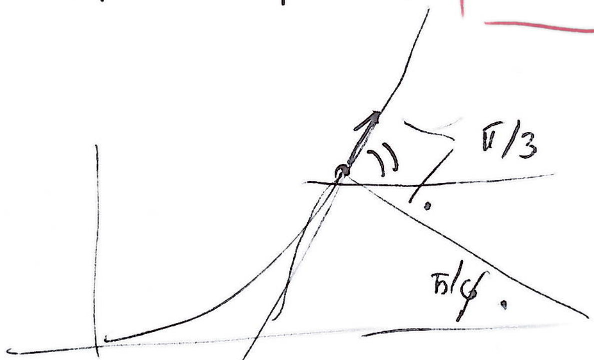
$y(x) = \frac{5/2\,p}{2p/R}\left[\cosh\left(\frac{2p/R}{5/2\,p}x\right) - 1\right] = \frac{5}{4}R\left[\cosh\left(\frac{4x}{5R}\right) - 1\right]$



$$\tau_C' = \tau_{B'} + \frac{2p}{R}\cdot\cancel{R} \Rightarrow$$

$$5p - 2p = \gamma p \qquad 3p = \gamma p \qquad \boxed{\gamma = 3}$$

$x_{C'}$



$$y'(x_{C'}) = \operatorname{tg}\frac{\pi}{3} = \sqrt{3}$$

$$y'(x) = \frac{\cancel{5}}{\cancel{4}}\cancel{R}\left(\sinh\frac{4x}{5R}\right)\cdot\frac{\cancel{4}}{\cancel{5R}} = \sinh\frac{4x}{5R}$$

$$\frac{4x}{5R} = t \qquad \frac{e^{t} - e^{-t}}{2} = \sqrt{3} \qquad z - \frac{1}{z} = 2\sqrt{3}$$

$$e^{t} = z \qquad z^2 - 2\sqrt{3}z - 1 = 0 \qquad z = \sqrt{3} \underset{(-)}{\pm} \sqrt{3+1} = 2+\sqrt{3}$$

$$t = \ln(2+\sqrt{3}) \qquad \frac{4x_{C'}}{5R} = \ln(2+\sqrt{3})$$

$$x_{C'} = \frac{5}{4}R\ln(2+\sqrt{3}) \qquad d_{CC'} = 2x_{C'} = \frac{5}{2}R\ln(2+\sqrt{3})$$