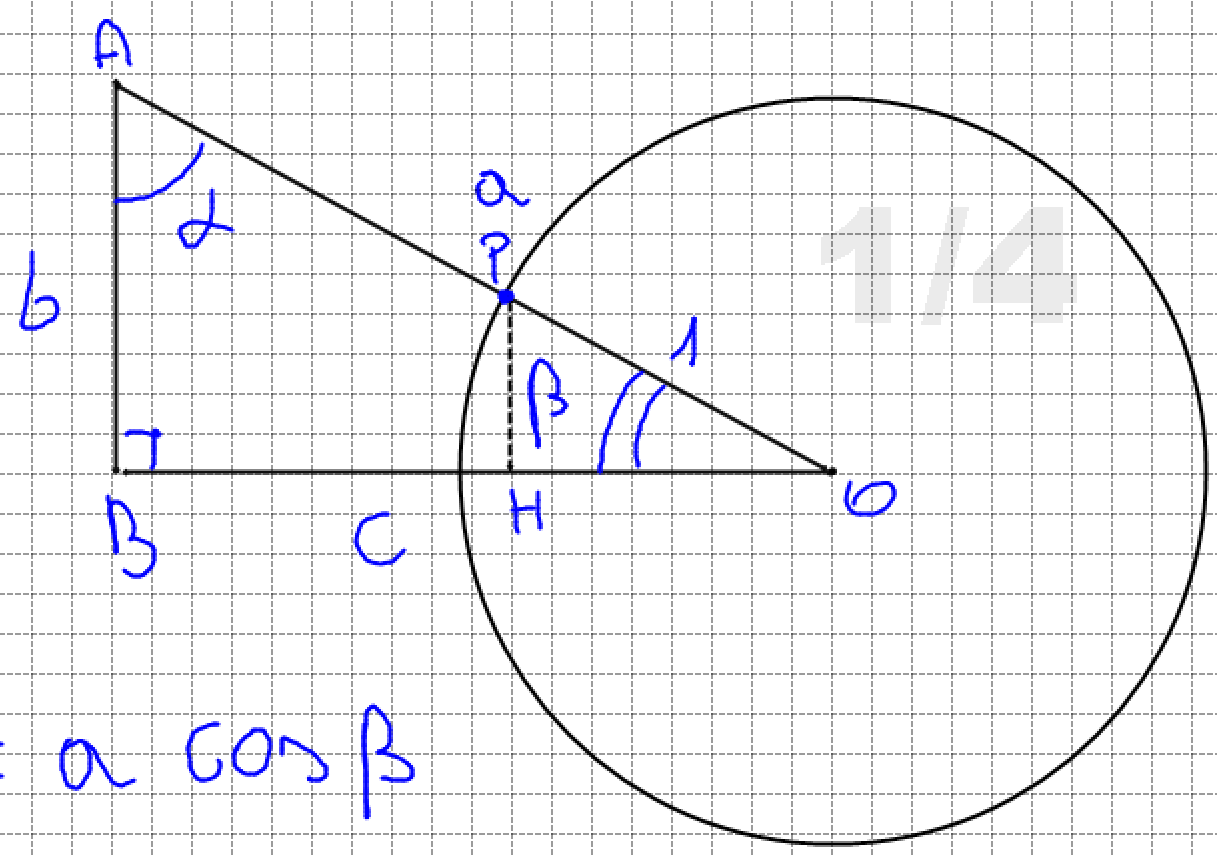

$$C = a \cos\beta$$

$$\frac{OH}{OB} = \frac{OP}{OA}$$

$$\frac{OH}{OP} = \frac{OB}{OA}$$

$$\cos\beta = \frac{OB}{OA}$$

$$C = \cos\beta$$

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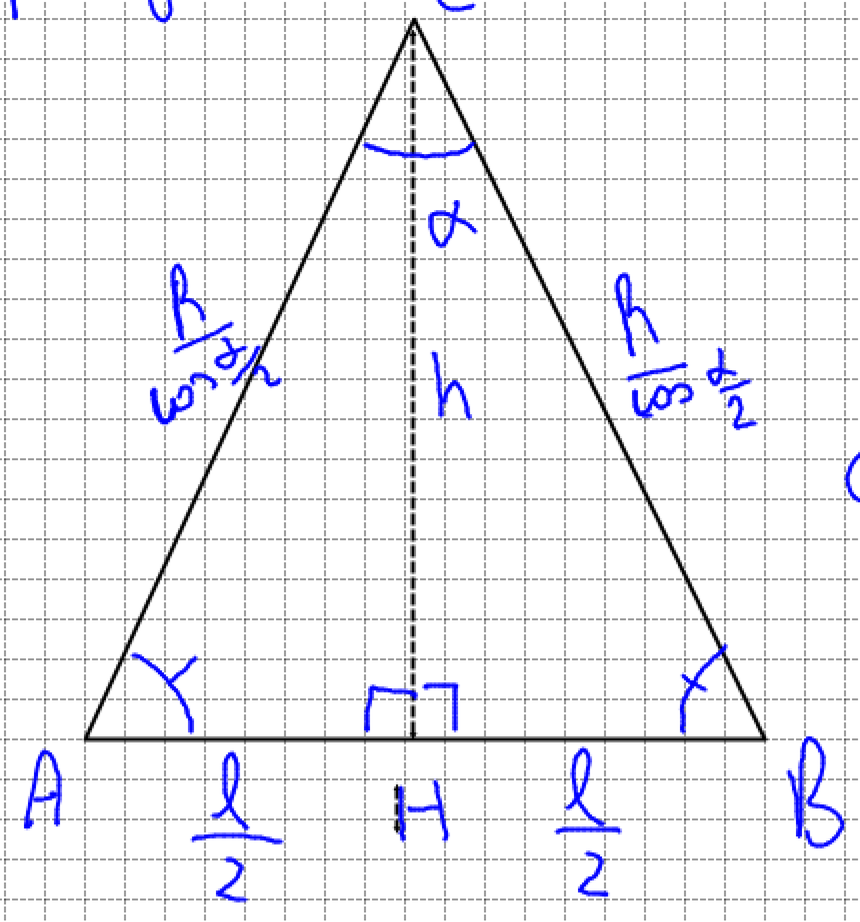


$AB = l$

$CH = h$

$\cos\alpha = ?$

Consideriamo il triangolo $C\hat{H}B$ rettangolo in H

L'angolo $H\hat{B}C = \frac{180-\alpha}{2} = 90 - \frac{\alpha}{2}$

$HC = BC \cos\frac{\alpha}{2}$ $\quad CB = \frac{h}{\cos\frac{\alpha}{2}}$

$$CB^2 = HB^2 + HC^2 \Rightarrow \frac{h^2}{\cos^2\frac{\alpha}{2}} = \frac{l^2}{4} + h^2$$

$$\frac{h^2}{\cos^2\frac{\alpha}{2}} = \frac{l^2}{4} + h^2$$

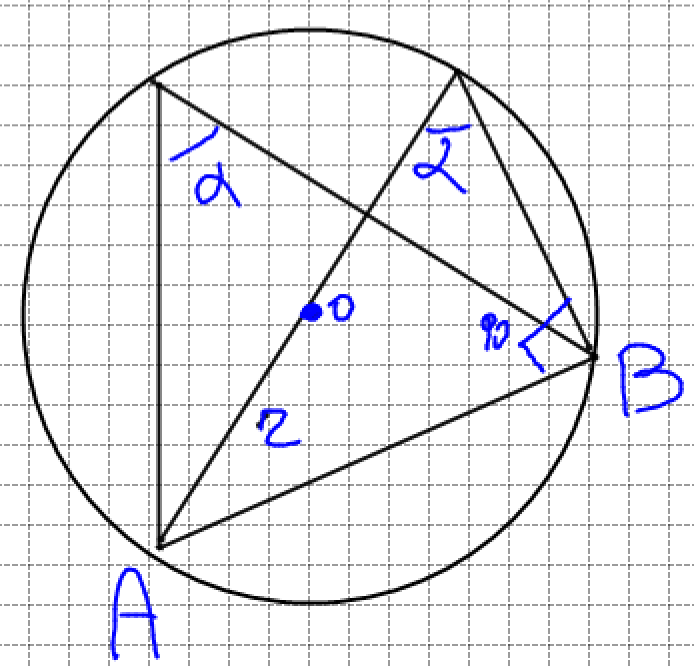
$$\frac{h^3}{\cos^2\frac{\alpha}{2}} = \frac{l^2+4h^2}{4} \longrightarrow \frac{\cos^2\frac{\alpha}{2}}{h^2} = \frac{4}{l^2+4h^2}$$

$$\frac{1+\cos\alpha}{2} = h^2 \cdot \frac{4}{l^2+4h^2} \Rightarrow 1+\cos\alpha = \frac{8h^2}{l^2+4h^2}$$

$$\cos\alpha = \frac{8h^2}{l^2+4h^2} - 1 \Rightarrow \cos\alpha = \frac{8h^2 - l^2 - 4h^2}{l^2+4h^2}$$

TEOREMA

$AB = 2r \operatorname{sen} \alpha$



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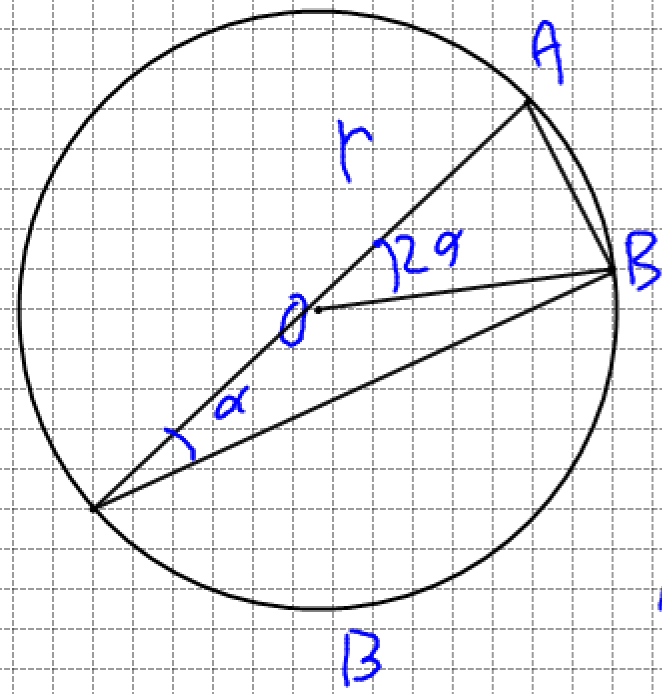

$AB = \frac{4}{5} r$

$AB = 2r \operatorname{sen} \alpha$

$\operatorname{sen} \alpha = \frac{\cancel{2}4}{5} \cancel{r} \cdot \frac{1}{\cancel{2}\cancel{r}} = \frac{2}{5}$

$\cos \alpha = \pm\sqrt{1 - \frac{4}{25}}$

$\cos \alpha = \pm \frac{\sqrt{21}}{5}$

$\cos \alpha = \frac{\sqrt{21}}{5}$

$\operatorname{sen} 2\alpha = 2 \operatorname{sen} \alpha \cos \alpha$

$\operatorname{sen} 2\alpha = 2\left(\frac{2}{5} \cdot \frac{\sqrt{21}}{5}\right) \Rightarrow \operatorname{sen} 2\alpha = \frac{4\sqrt{21}}{25}$

$\cos 2\alpha = \cos^2 \alpha - \operatorname{sen}^2 \alpha$

$\cos 2\alpha = \frac{21}{25} - \frac{4}{25} \Rightarrow \cos 2\alpha = \frac{17}{25}$

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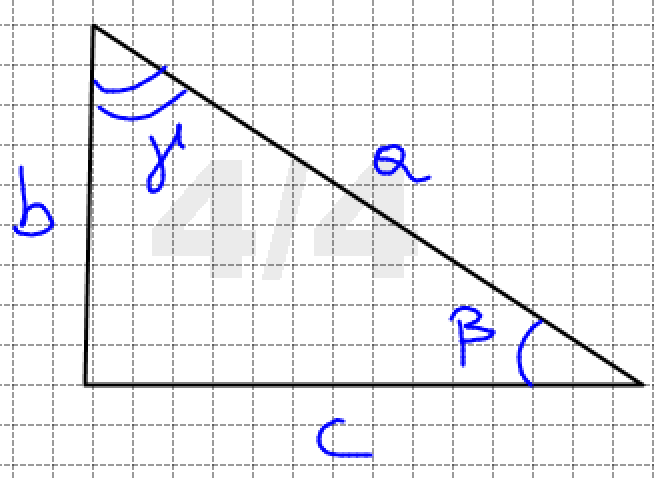
$$\cos 2\beta = \frac{c^2-b^2}{a^2}$$



$\cos 2\beta = \cos^2\beta - \sin^2\beta$

$c = a\cos\beta$

$\cos\beta = \frac{c}{a}$ $\qquad \cos^2\beta = \frac{c^2}{a^2}$

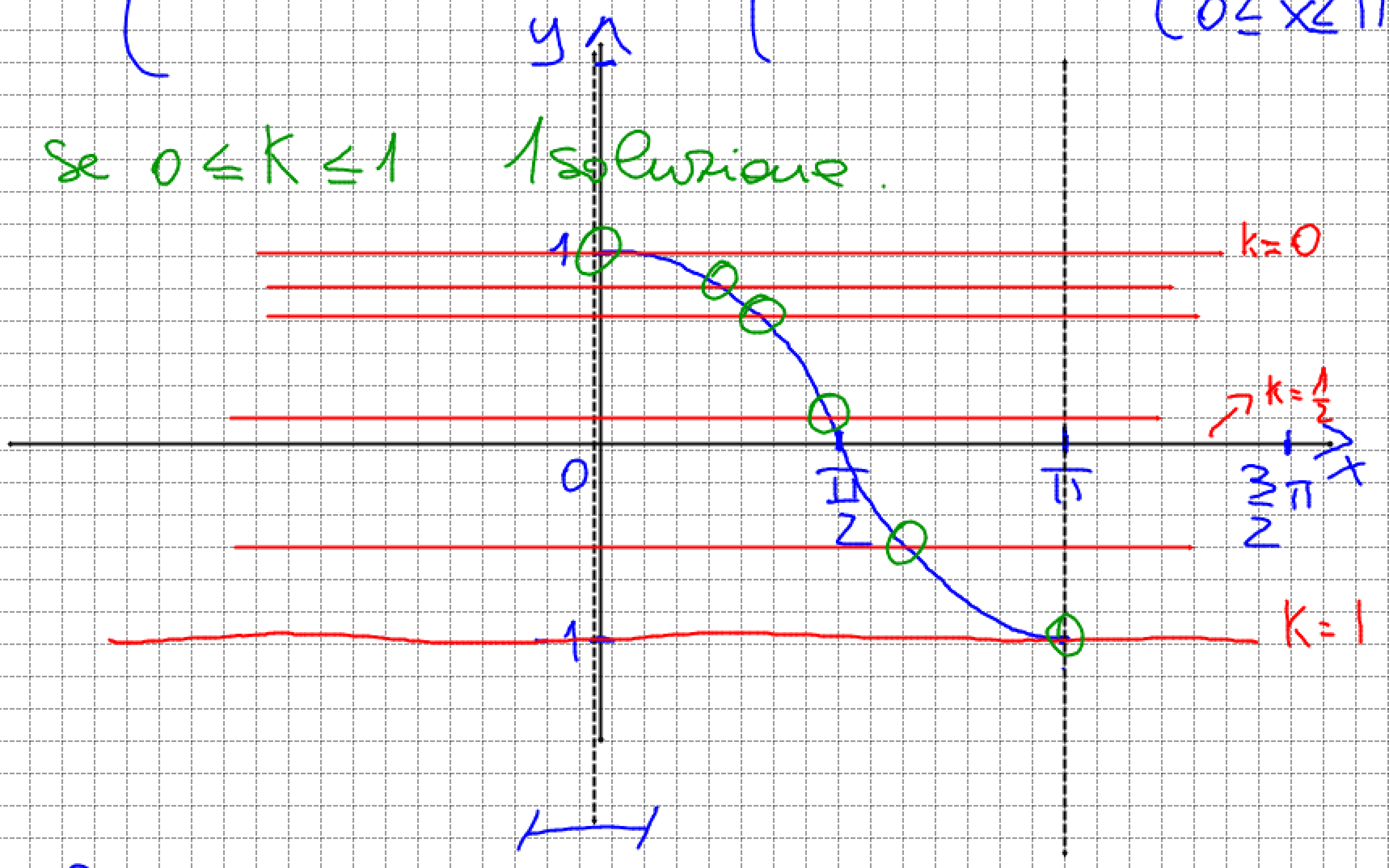
$b = a \sin\beta$

$\sin\beta = \frac{b}{a}$ $\qquad \sin^2\beta = \frac{b^2}{a^2}$

$$\cos 2\beta = \cos^2\beta - \sin^2\beta = \frac{c^2}{a^2} - \frac{b^2}{a^2} = \frac{c^2-b^2}{a^2}$$

$\begin{cases} \cos x - 1 + 2k = 0 \\ 0 \le x \le \pi \end{cases}$ $\quad \begin{cases} \cos x = 1 - 2k \\ 0 \le x \le \pi \end{cases}$ $\quad \begin{cases} y = \cos x \\ y = 1-2k \\ 0 \le x \le \pi \end{cases}$

S: se $0 \le k \le 1$ 1 soluzione.



$\begin{cases} (\cos x + \sin x)^2 - k = 0 \\ 0 \le x \le \frac{\pi}{2} \\ k \ge -1 \end{cases}$ $\quad \begin{cases} 1 + 2\sin x\cos x = k \\ 0 \le x \le \frac{\pi}{2} \\ k \ge -1 \end{cases}$

$\begin{cases} y = 2\sin x \cos x \\ y = k-1 \\ 0 \le x \le \frac{\pi}{2} \\ k \ge -1 \end{cases}$ $\quad \begin{cases} y = \sin 2x \\ y = k-1 \\ 0 \le x \le \frac{\pi}{2} \\ k \ge -1 \end{cases}$