# Tabelle riassuntive delle FORMULE GONIOMETRICHE

| x misura in radianti | x misura in gradi | sin(x) | cos(x) | tg(x) | ctg(x) |
|---|---|---|---|---|---|
| **0** | **0 °** | **0** | **1** | **0** | **non esiste** |
| π/12 | 15° | $\frac{\sqrt{6}-\sqrt{2}}{4}$ | $\frac{\sqrt{6}+\sqrt{2}}{4}$ | $2-\sqrt{3}$ | $2+\sqrt{3}$ |
| π/8 | 22°30’ | $\frac{\sqrt{2-\sqrt{2}}}{2}$ | $\frac{\sqrt{2+\sqrt{2}}}{2}$ | $\sqrt{2}-1$ | $\sqrt{2}+1$ |
| **π/6** | **30°** | $\frac{1}{2}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{3}}{3}$ | $\sqrt{3}$ |
| **π/4** | **45°** | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{2}}{2}$ | **1** | **1** |
| **π/3** | **60°** | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$ | $\sqrt{3}$ | $\frac{\sqrt{3}}{3}$ |
| 3/8π | 67°30’ | $\frac{\sqrt{2+\sqrt{2}}}{2}$ | $\frac{\sqrt{2-\sqrt{2}}}{2}$ | $\sqrt{2}+1$ | $\sqrt{2}-1$ |
| 5/12π | 75° | $\frac{\sqrt{6}+\sqrt{2}}{4}$ | $\frac{\sqrt{6}-\sqrt{2}}{4}$ | $2+\sqrt{3}$ | $2-\sqrt{3}$ |
| **π/2** | **90°** | **1** | **0** | **non esiste** | **0** |

## ARCHI ASSOCIATI

| misura dell’arco | sin( ) | cos() | tg() | ctg() |
|---|---|---|---|---|
| x | sinx | cosx | tgx | ctgx |
| π-x | sinx | -cosx | -tgx | -ctgx |
| π+x | -sinx | -cosx | tgx | ctgx |
| -x | -sinx | cosx | -tgx | -ctgx |
| 2π-x | -sinx | cosx | -tgx | -ctgx |
| π/2-x | cosx | sinx | ctgx | tgx |
| π/2+x | cosx | -sinx | -ctgx | -tgx |
| 3/2π+x | -cosx | sinx | -ctgx | -tgx |
| 3/2π-x | -cosx | -sinx | ctgx | tgx |

## ADDIZIONE E SOTTRAZIONE

$$sin(\alpha+\beta)=sin(\alpha)\cos(\beta)+\cos(\alpha)sin(\beta)$$
$$sin(\alpha-\beta)=sin(\alpha)\cos(\beta)-\cos(\alpha)sin(\beta)$$
$$\cos(\alpha+\beta)=\cos(\alpha)\cos(\beta)-sin(\alpha)sin(\beta)$$
$$\cos(\alpha-\beta)=\cos(\alpha)\cos(\beta)+sin(\alpha)sin(\beta)$$
$$tg(\alpha+\beta)=\frac{tg(\alpha)+tg(\beta)}{1-tg(\alpha)tg(\beta)}$$
$$tg(\alpha-\beta)=\frac{tg(\alpha)-tg(\beta)}{1+tg(\alpha)tg(\beta)}$$
$$ctg(\alpha+\beta)=\frac{ctg(\alpha)ctg(\beta)-1}{ctg(\alpha)+ctg(\beta)}$$
$$ctg(\alpha-\beta)=\frac{ctg(\alpha)ctg(\beta)+1}{ctg(\alpha)-ctg(\beta)}$$

## DUPLICAZIONE

$$sin(2\alpha)=2sin(\alpha)\cos(\alpha)$$
$$\cos(2\alpha)=\cos^2(\alpha)-sin^2(\alpha)$$
$$tg(2\alpha)=\frac{2tg(\alpha)}{1-tg^2(\alpha)}$$
$$ctg(2\alpha)=\frac{ctg^2(\alpha)-1}{2ctg(\alpha)}$$

## BISEZIONE

$$sin\left(\frac{\alpha}{2}\right)=\pm\sqrt{\frac{1-\cos(\alpha)}{2}} \qquad tg\left(\frac{\alpha}{2}\right)=\begin{cases}\frac{\sin(\alpha)}{1+\cos(\alpha)} & (\alpha\neq\pi+2k\pi)\\ \frac{1-\cos(\alpha)}{\sin(\alpha)} & (\alpha\neq k\pi)\end{cases}$$

$$\cos\left(\frac{\alpha}{2}\right)=\pm\sqrt{\frac{1+\cos(\alpha)}{2}} \qquad ctg\left(\frac{\alpha}{2}\right)=\begin{cases}\frac{1+\cos(\alpha)}{\sin(\alpha)} & (\alpha\neq k\pi)\\ \frac{\sin(\alpha)}{1-\cos(\alpha)} & (\alpha\neq\pi+2k\pi)\end{cases}$$

## Prostaferesi

$$sin(\alpha)+sin(\beta)=2sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$
$$sin(\alpha)-sin(\beta)=2\cos\left(\frac{\alpha+\beta}{2}\right)sin\left(\frac{\alpha-\beta}{2}\right)$$
$$\cos(\alpha)+\cos(\beta)=2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$
$$os(\alpha)-\cos(\beta)=-2sin\left(\frac{\alpha+\beta}{2}\right)sin\left(\frac{\alpha-\beta}{2}\right)$$

## Werner

$$sin(\alpha)sin(\beta)=\frac{1}{2}(\cos(\alpha-\beta)-\cos(\alpha+\beta)]$$
$$\cos(\alpha)sin(\beta)=\frac{1}{2}[sin(\alpha+\beta)-sin(\alpha-\beta)]$$
$$\cos(\alpha)\cos(\beta)=\frac{1}{2}[\cos(\alpha+\beta)+\cos(\alpha-\beta)]$$

## Parametriche

$$sin(\alpha)=\frac{2t}{1+t^2} \qquad t=tg(\frac{\alpha}{2})$$
$$\cos(\alpha)=\frac{1-t^2}{1+t^2}$$
$$tg(\alpha)=\frac{2t}{1-t^2}$$
$$ctg(\alpha)=\frac{1-t^2}{2t}$$

## Relazioni fondamentali

$$sin^2 x+\cos^2 x=1 \qquad tgx=\frac{sinx}{\cos x} \quad \forall x\neq\frac{\pi}{2}+k\pi$$
$$ctgx=\frac{\cos x}{sinx} \quad \forall x\neq k\pi \qquad ctgx=\frac{1}{tgx} \quad \forall x\neq k\frac{\pi}{2}$$