

## Formule Goniometriche

$$\operatorname{sen}^2 \alpha + \operatorname{cos}^2 \alpha = 1$$

$$\operatorname{sen}^2 \alpha = 1 - \operatorname{cos}^2 \alpha$$

$$\operatorname{cos}^2 \alpha = 1 - \operatorname{sen}^2 \alpha$$

$$\operatorname{tg} x = \frac{\operatorname{sen} x}{\operatorname{cos} x}$$

$$\operatorname{cotg} x = \frac{\operatorname{cos} x}{\operatorname{sen} x}$$

$$\operatorname{tg} x = \frac{1}{\operatorname{cotg} x}$$

$$\operatorname{sen}(\alpha + \beta) = \operatorname{sen} \alpha \operatorname{cos} \beta + \operatorname{sen} \beta \operatorname{cos} \alpha$$

$$\operatorname{cos}(\alpha + \beta) = \operatorname{cos} \alpha \operatorname{cos} \beta - \operatorname{sen} \alpha \operatorname{sen} \beta$$

$$\operatorname{sen}(\alpha - \beta) = \operatorname{sen} \alpha \operatorname{cos} \beta - \operatorname{sen} \beta \operatorname{cos} \alpha$$

$$\operatorname{cos}(\alpha - \beta) = \operatorname{cos} \alpha \operatorname{cos} \beta + \operatorname{sen} \alpha \operatorname{sen} \beta$$

$$\operatorname{tg}(\alpha + \beta) = \frac{\operatorname{tg} \alpha + \operatorname{tg} \beta}{1 - \operatorname{tg} \alpha \cdot \operatorname{tg} \beta}$$

$$\operatorname{cotg}(\alpha + \beta) = \frac{\operatorname{cotg} \alpha \cdot \operatorname{cotg} \beta - 1}{\operatorname{cotg} \alpha + \operatorname{cotg} \beta}$$

$$\operatorname{tg}(\alpha - \beta) = \frac{\operatorname{tg} \alpha - \operatorname{tg} \beta}{1 + \operatorname{tg} \alpha \cdot \operatorname{tg} \beta}$$

$$\operatorname{cotg}(\alpha - \beta) = \frac{\operatorname{cotg} \alpha \cdot \operatorname{cotg} \beta + 1}{\operatorname{cotg} \beta - \operatorname{cotg} \alpha}$$

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

$$\operatorname{cos} 2\alpha = \frac{\operatorname{cos}^2 \alpha - \operatorname{sen}^2 \alpha}{2 \operatorname{cos}^2 \alpha - 1}$$

$$\operatorname{tg} 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}$$

$$\operatorname{cotg} 2\alpha = \frac{\operatorname{cotg}^2 \alpha - 1}{2 \operatorname{cotg} \alpha}$$

$$\operatorname{sen} \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \operatorname{cos} \alpha}{2}}$$

$$\operatorname{cos} \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \operatorname{cos} \alpha}{2}}$$

$$\operatorname{tg} \frac{\alpha}{2} = \frac{\frac{\operatorname{sen} \alpha}{1 + \operatorname{cos} \alpha}}{\frac{1 - \operatorname{cos} \alpha}{\operatorname{sen} \alpha}}$$

$$\operatorname{cotg} \frac{\alpha}{2} = \frac{\frac{1 + \operatorname{cos} \alpha}{\operatorname{sen} \alpha}}{\frac{\operatorname{sen} \alpha}{1 - \operatorname{cos} \alpha}}$$

$$\operatorname{sen} \alpha = \frac{2 \operatorname{tg} \frac{\alpha}{2}}{1 + \operatorname{tg}^2 \frac{\alpha}{2}}$$

$$\operatorname{cos} \alpha = \frac{1 - \operatorname{tg}^2 \frac{\alpha}{2}}{1 + \operatorname{tg}^2 \frac{\alpha}{2}}$$

$$\operatorname{tg} \alpha = \frac{2 \operatorname{tg} \frac{\alpha}{2}}{1 - \operatorname{tg}^2 \frac{\alpha}{2}}$$

$$\operatorname{cotg} \alpha = \frac{1 - \operatorname{tg}^2 \frac{\alpha}{2}}{2 \operatorname{tg} \frac{\alpha}{2}}$$

$$\operatorname{sen} p + \operatorname{sen} q = 2 \operatorname{sen} \frac{p+q}{2} \cdot \operatorname{cos} \frac{p-q}{2}$$

$$\operatorname{sen} p - \operatorname{sen} q = 2 \operatorname{cos} \frac{p+q}{2} \cdot \operatorname{sen} \frac{p-q}{2}$$

$$\operatorname{cos} p + \operatorname{cos} q = 2 \operatorname{cos} \frac{p+q}{2} \cdot \operatorname{cos} \frac{p-q}{2}$$

$$\operatorname{cos} p - \operatorname{cos} q = -2 \operatorname{sen} \frac{p+q}{2} \cdot \operatorname{sen} \frac{p-q}{2}$$

$$\operatorname{tg} \alpha \pm \operatorname{tg} \beta = \frac{\operatorname{sen}(\alpha \pm \beta)}{\operatorname{cos} \alpha \cdot \operatorname{cos} \beta}$$

$$\operatorname{cotg} \alpha \pm \operatorname{cotg} \beta = \frac{\operatorname{sen}(\beta \pm \alpha)}{\operatorname{sen} \alpha \cdot \operatorname{sen} \beta}$$