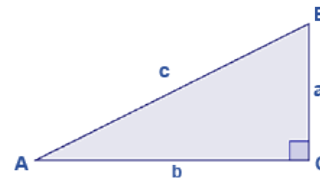


Trigonometría

Funciones trigonométricas

$$\begin{aligned} \operatorname{sen} A &= \frac{a}{c} & \operatorname{csc} A &= \frac{1}{\operatorname{sen} A} = \frac{c}{a} \\ \operatorname{cos} A &= \frac{b}{c} & \operatorname{sec} A &= \frac{1}{\operatorname{cos} A} = \frac{c}{b} \\ \operatorname{tan} A &= \frac{a}{b} & \operatorname{cot} A &= \frac{1}{\operatorname{tan} A} = \frac{b}{a} \end{aligned}$$



Otras relaciones trigonométricas

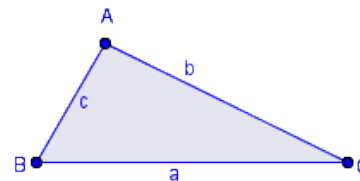
$$\operatorname{sen}^2 \alpha + \operatorname{cos}^2 \alpha = 1 \qquad 1 + \operatorname{cot}^2 \alpha = \operatorname{csc}^2 \alpha \qquad 1 + \operatorname{tan}^2 \alpha = \operatorname{sec}^2 \alpha$$

Teorema del seno

$$\frac{a}{\operatorname{sen} A} = \frac{b}{\operatorname{sen} B} = \frac{c}{\operatorname{sen} C}$$

Teorema del coseno

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \operatorname{cos} A \\ b^2 &= a^2 + c^2 - 2ac \operatorname{cos} B \\ c^2 &= a^2 + b^2 - 2ab \operatorname{cos} C \end{aligned}$$



Suma de ángulos

$$\hat{A} + \hat{B} + \hat{C} = 180^\circ$$

Suma y resta de ángulos

$$\begin{aligned} \operatorname{sen}(\alpha + \beta) &= \operatorname{sen} \alpha \operatorname{cos} \beta + \operatorname{cos} \alpha \operatorname{sen} \beta & \operatorname{sen}(\alpha - \beta) &= \operatorname{sen} \alpha \operatorname{cos} \beta - \operatorname{cos} \alpha \operatorname{sen} \beta \\ \operatorname{cos}(\alpha + \beta) &= \operatorname{cos} \alpha \operatorname{cos} \beta - \operatorname{sen} \alpha \operatorname{sen} \beta & \operatorname{cos}(\alpha - \beta) &= \operatorname{cos} \alpha \operatorname{cos} \beta + \operatorname{sen} \alpha \operatorname{sen} \beta \\ \operatorname{tan}(\alpha + \beta) &= \frac{\operatorname{tan} \alpha + \operatorname{tan} \beta}{1 - \operatorname{tan} \alpha \operatorname{tan} \beta} & \operatorname{tan}(\alpha - \beta) &= \frac{\operatorname{tan} \alpha - \operatorname{tan} \beta}{1 + \operatorname{tan} \alpha \operatorname{tan} \beta} \end{aligned}$$

Ángulo doble

$$\begin{aligned} \operatorname{sen}(2\alpha) &= 2\operatorname{sen} \alpha \operatorname{cos} \alpha \\ \operatorname{cos}(2\alpha) &= \operatorname{cos}^2 \alpha - \operatorname{sen}^2 \alpha = 2\operatorname{cos}^2 \alpha - 1 = 1 - 2\operatorname{sen}^2 \alpha \\ \operatorname{tan}(2\alpha) &= \frac{2 \operatorname{tan} \alpha}{1 - \operatorname{tan}^2 \alpha} \end{aligned}$$

Ángulo triple

$$\begin{aligned} \operatorname{sen}(3\alpha) &= 3\operatorname{sen} \alpha - 4\operatorname{sen}^3 \alpha \\ \operatorname{cos}(3\alpha) &= 4\operatorname{cos}^3 \alpha - 3\operatorname{cos} \alpha \\ \operatorname{tan}(3\alpha) &= \frac{3 \operatorname{tan} \alpha - \operatorname{tan}^3 \alpha}{1 - 3 \operatorname{tan}^2 \alpha} \end{aligned}$$

Ángulo mitad

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

Transformaciones de sumas y diferencias en productos

$$\begin{aligned} \operatorname{sen} A + \operatorname{sen} B &= 2\operatorname{sen} \frac{1}{2}(A+B) \cdot \operatorname{cos} \frac{1}{2}(A-B) \\ \operatorname{sen} A - \operatorname{sen} B &= 2\operatorname{cos} \frac{1}{2}(A+B) \cdot \operatorname{sen} \frac{1}{2}(A-B) \\ \operatorname{cos} A + \operatorname{cos} B &= 2\operatorname{cos} \frac{1}{2}(A+B) \cdot \operatorname{cos} \frac{1}{2}(A-B) \\ \operatorname{cos} A - \operatorname{cos} B &= -2\operatorname{sen} \frac{1}{2}(A+B) \cdot \operatorname{sen} \frac{1}{2}(A-B) \end{aligned}$$