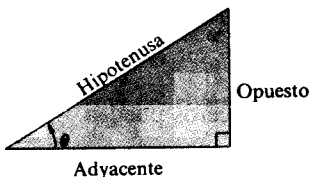


# TRIGONOMETRÍA

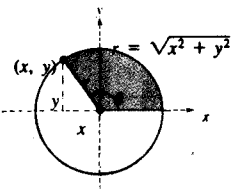
## Definición de las seis funciones trigonométricas

Definición por triángulos rectángulos, con  $0 < \theta < \pi/2$ .

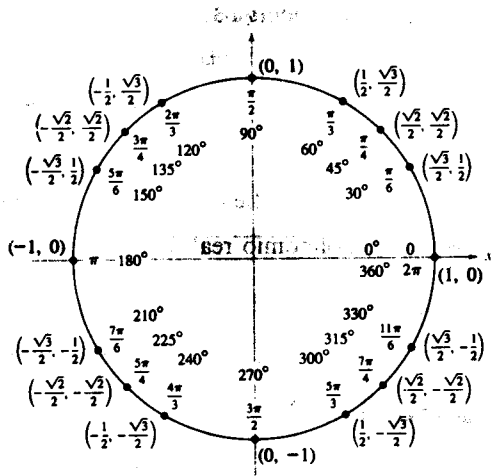


$$\begin{aligned} \text{sen } \theta &= \frac{\text{op.}}{\text{hip.}} & \text{cosec } \theta &= \frac{\text{hip.}}{\text{op.}} \\ \text{cos } \theta &= \frac{\text{ady.}}{\text{hip.}} & \text{sec } \theta &= \frac{\text{hip.}}{\text{ady.}} \\ \text{tg } \theta &= \frac{\text{op.}}{\text{ady.}} & \text{ctg } \theta &= \frac{\text{ady.}}{\text{op.}} \end{aligned}$$

Definición como funciones circulares, para ángulos  $\theta$  arbitrarios.



$$\begin{aligned} \text{sen } \theta &= \frac{y}{r} & \text{cosec } \theta &= \frac{r}{y} \\ \text{cos } \theta &= \frac{x}{r} & \text{sec } \theta &= \frac{r}{x} \\ \text{tg } \theta &= \frac{y}{x} & \text{ctg } \theta &= \frac{x}{y} \end{aligned}$$



## Identidades recíprocas

$$\begin{aligned} \text{sen } x &= \frac{1}{\text{cosec } x} & \text{sec } x &= \frac{1}{\text{cos } x} & \text{tg } x &= \frac{1}{\text{ctg } x} \\ \text{cosec } x &= \frac{1}{\text{sen } x} & \text{cos } x &= \frac{1}{\text{sec } x} & \text{ctg } x &= \frac{1}{\text{tg } x} \end{aligned}$$

## Identidades de tangente y cotangente

$$\text{tg } x = \frac{\text{sen } x}{\text{cos } x} \quad \text{ctg } x = \frac{\text{cos } x}{\text{sen } x}$$

## Identidades de Pitágoras

$$\begin{aligned} \text{sen}^2 x + \text{cos}^2 x &= 1 \\ 1 + \text{tg}^2 x &= \text{sec}^2 x & 1 + \text{ctg}^2 x &= \text{cosec}^2 x \end{aligned}$$

## Identidades de cofunciones

$$\begin{aligned} \text{sen} \left( \frac{\pi}{2} - x \right) &= \text{cos } x & \text{cos} \left( \frac{\pi}{2} - x \right) &= \text{sen } x \\ \text{cosec} \left( \frac{\pi}{2} - x \right) &= \text{sec } x & \text{tg} \left( \frac{\pi}{2} - x \right) &= \text{ctg } x \\ \text{sec} \left( \frac{\pi}{2} - x \right) &= \text{cosec } x & \text{ctg} \left( \frac{\pi}{2} - x \right) &= \text{tg } x \end{aligned}$$

## Fórmulas de reducción

$$\begin{aligned} \text{sen}(-x) &= -\text{sen } x & \text{cos}(-x) &= \text{cos } x \\ \text{cosec}(-x) &= -\text{cosec } x & \text{tg}(-x) &= -\text{tg } x \\ \text{sec}(-x) &= -\text{sec } x & \text{ctg}(-x) &= -\text{ctg } x \end{aligned}$$

## Fórmulas de suma y diferencia

$$\begin{aligned} \text{sen}(u \pm v) &= \text{sen } u \text{ cos } v \pm \text{cos } u \text{ sen } v \\ \text{cos}(u \pm v) &= \text{cos } u \text{ cos } v \mp \text{sen } u \text{ sen } v \\ \text{tg}(u \pm v) &= \frac{\text{tg } u \pm \text{tg } v}{1 \mp \text{tg } u \text{ tg } v} \end{aligned}$$

## Fórmulas del ángulo doble

$$\begin{aligned} \text{sen } 2u &= 2 \text{sen } u \text{ cos } u \\ \text{cos } 2u &= \text{cos}^2 u - \text{sen}^2 u = 2 \text{cos}^2 u - 1 = 1 - 2 \text{sen}^2 u \\ \text{tg } 2u &= \frac{2 \text{tg } u}{1 - \text{tg}^2 u} \end{aligned}$$

## Fórmulas de reducción de potencias

$$\begin{aligned} \text{sen}^2 u &= \frac{1 - \text{cos } 2u}{2} \\ \text{cos}^2 u &= \frac{1 + \text{cos } 2u}{2} \\ \text{tg}^2 u &= \frac{1 - \text{cos } 2u}{1 + \text{cos } 2u} \end{aligned}$$

## Fórmulas suma-producto

$$\begin{aligned} \text{sen } u + \text{sen } v &= 2 \text{sen} \left( \frac{u+v}{2} \right) \text{cos} \left( \frac{u-v}{2} \right) \\ \text{sen } u - \text{sen } v &= 2 \text{cos} \left( \frac{u+v}{2} \right) \text{sen} \left( \frac{u-v}{2} \right) \\ \text{cos } u + \text{cos } v &= 2 \text{cos} \left( \frac{u+v}{2} \right) \text{cos} \left( \frac{u-v}{2} \right) \\ \text{cos } u - \text{cos } v &= -2 \text{sen} \left( \frac{u+v}{2} \right) \text{sen} \left( \frac{u-v}{2} \right) \end{aligned}$$

## Fórmulas producto-suma

$$\begin{aligned} \text{sen } u \text{ sen } v &= \frac{1}{2} [\text{cos}(u-v) - \text{cos}(u+v)] \\ \text{cos } u \text{ cos } v &= \frac{1}{2} [\text{cos}(u-v) + \text{cos}(u+v)] \\ \text{sen } u \text{ cos } v &= \frac{1}{2} [\text{sen}(u+v) + \text{sen}(u-v)] \\ \text{cos } u \text{ sen } v &= \frac{1}{2} [\text{sen}(u+v) - \text{sen}(u-v)] \end{aligned}$$