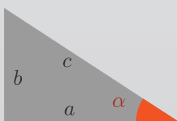


# trigonometria



$$\sin(\alpha) = \frac{b}{c}$$

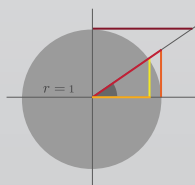
$$\cos(\alpha) = \frac{a}{c}$$

$$\tan(\alpha) = \frac{\sin(\alpha)}{\cos(\alpha)} = \frac{b}{a}$$

$$\cot(\alpha) = \frac{\cos(\alpha)}{\sin(\alpha)}$$

$$\sec(\alpha) = \frac{1}{\cos(\alpha)}$$

$$\csc(\alpha) = \frac{1}{\sin(\alpha)}$$



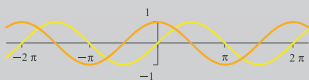
■  $\sin(\alpha)$

■  $\cos(\alpha)$

■  $\tan(\alpha)$

■  $\sec(\alpha)$

■  $\cot(\alpha)$



## Teorema de Pitàgores

$$\sin^2(\alpha) + \cos^2(\alpha) = 1$$

$$1 + \tan^2(\alpha) = \frac{1}{\cos^2(\alpha)}$$

## Signe del sinus i cosinus



$$\sin(\alpha) > 0$$

$$\cos(\alpha) > 0$$



$$\sin(\alpha) > 0$$

$$\cos(\alpha) < 0$$



$$\sin(\alpha) < 0$$

$$\cos(\alpha) < 0$$



$$\sin(\alpha) < 0$$

$$\cos(\alpha) > 0$$

## Sinus i cosinus d'alguns angles

| $\alpha$       | $0^\circ$ | $30^\circ$   | $45^\circ$   | $60^\circ$   | $90^\circ$ |
|----------------|-----------|--------------|--------------|--------------|------------|
| $\sin(\alpha)$ | 0         | $1/2$        | $\sqrt{2}/2$ | $\sqrt{3}/2$ | 1          |
| $\cos(\alpha)$ | 1         | $\sqrt{3}/2$ | $\sqrt{2}/2$ | $1/2$        | 0          |



$$\sin(90^\circ - \alpha) = \cos(\alpha)$$

$$\cos(90^\circ - \alpha) = \sin(\alpha)$$

## Reducció al primer quadrant



$$\sin(180^\circ + \alpha) = -\sin(\alpha)$$

$$\cos(180^\circ + \alpha) = -\cos(\alpha)$$

$$\sin(180^\circ - \alpha) = \sin(\alpha)$$

$$\cos(180^\circ - \alpha) = -\cos(\alpha)$$

$$\sin(-\alpha) = -\sin(\alpha) \quad \cos(-\alpha) = \cos(\alpha)$$

## Suma d'angles

$$\sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \cos(\alpha) \sin(\beta)$$

$$\cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$$

$$\tan(\alpha \pm \beta) = \frac{\tan(\alpha) \pm \tan(\beta)}{1 \mp \tan(\alpha) \tan(\beta)}$$

## Angle doble

$$\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$$

$$\cos(2\alpha) = 2 \cos^2(\alpha) - 1 = 1 - 2 \sin^2(\alpha)$$

$$\tan(2\alpha) = \frac{2 \tan(\alpha)}{1 - \tan^2(\alpha)}$$

## Fórmules útils per a integració

$$\cos^2(\alpha/2) = \frac{1 + \cos(\alpha)}{2}$$

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

$$\tan(\alpha) = \frac{2 \tan(\alpha/2)}{1 - \tan^2(\alpha/2)}$$

$$\sin(\alpha) = \frac{2 \tan(\alpha/2)}{1 + \tan^2(\alpha/2)}$$

$$\cos(\alpha) = \frac{1 - \tan^2(\alpha/2)}{1 + \tan^2(\alpha/2)}$$



## Teorema del sinus

$$\frac{\sin(\alpha)}{a} = \frac{\sin(\beta)}{b} = \frac{\sin(\gamma)}{c}$$

## Teorema del cosinus

$$a^2 = b^2 + c^2 - 2bc \cos(\alpha)$$

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