

### Para cualquier triángulo

$$\alpha + \beta + \gamma = 180^\circ$$

Ley de senos

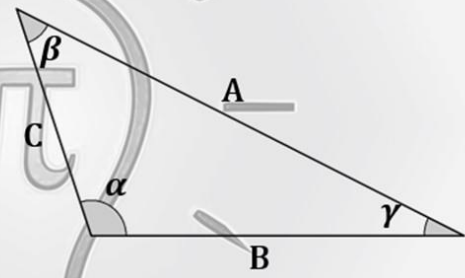
$$\frac{\sin \alpha}{A} = \frac{\sin \beta}{B} = \frac{\sin \gamma}{C}$$

Ley de cosenos

$$A^2 = B^2 + C^2 - 2BC \cos \alpha$$

$$B^2 = A^2 + C^2 - 2AC \cos \beta$$

$$C^2 = A^2 + B^2 - 2AB \cos \gamma$$



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### Para triángulos rectángulos

$$\alpha + \beta = 90^\circ$$

Teorema de Pitágoras

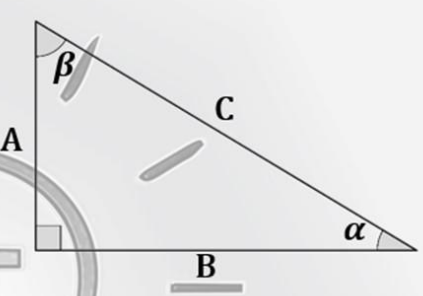
$$C^2 = A^2 + B^2$$

Identidades trigonométricas

$$\sin \alpha = \frac{A}{C} \quad \csc \alpha = \frac{C}{A} \quad \sin \beta = \frac{B}{C} \quad \csc \beta = \frac{C}{B}$$

$$\cos \alpha = \frac{B}{C} \quad \sec \alpha = \frac{C}{B} \quad \cos \beta = \frac{A}{C} \quad \sec \beta = \frac{C}{A}$$

$$\tan \alpha = \frac{A}{B} \quad \cot \alpha = \frac{B}{A} \quad \tan \beta = \frac{B}{A} \quad \cot \beta = \frac{A}{B}$$



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## Identidades trigonométricas fundamentales

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

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

$$\tan \alpha = \frac{1 - \cos 2\alpha}{\sin 2\alpha}$$

$$\cot \alpha = \frac{1 + \cos 2\alpha}{\sin 2\alpha}$$

$$\sin \alpha \csc \alpha = 1$$

$$\cos \alpha \sec \alpha = 1$$

$$\tan \alpha \cot \alpha = 1$$

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

$$\tan^2 \alpha + 1 = \sec^2 \alpha$$

$$\cot^2 \alpha + 1 = \csc^2 \alpha$$

$$\sin(-x) = -\sin(x) \quad \cos(-x) = \cos(x) \quad \tan(-x) = -\tan(x)$$

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

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

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

## Funciones del ángulo doble

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

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

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

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## Productos de senos y cosenos

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

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

$$(\cos x)(\cos y) = \frac{1}{2} [\cos(x + y) + \cos(x - y)]$$

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

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## Transformaciones de sumas o restas de funciones trigonométricas a producto

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

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

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

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

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