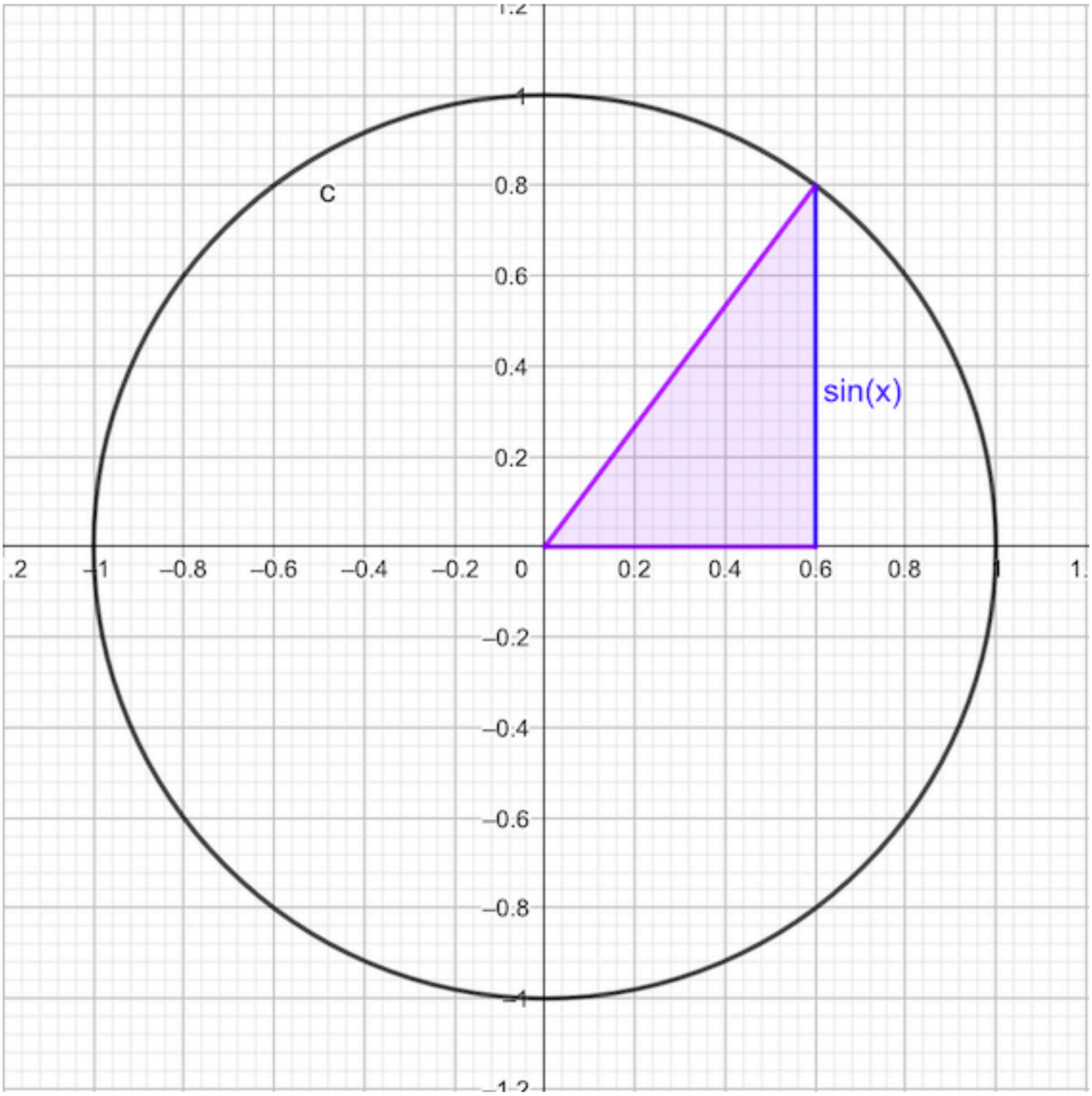
# Trigonometría - Resumen de Fórmulas

Curso Álgebra Lineal

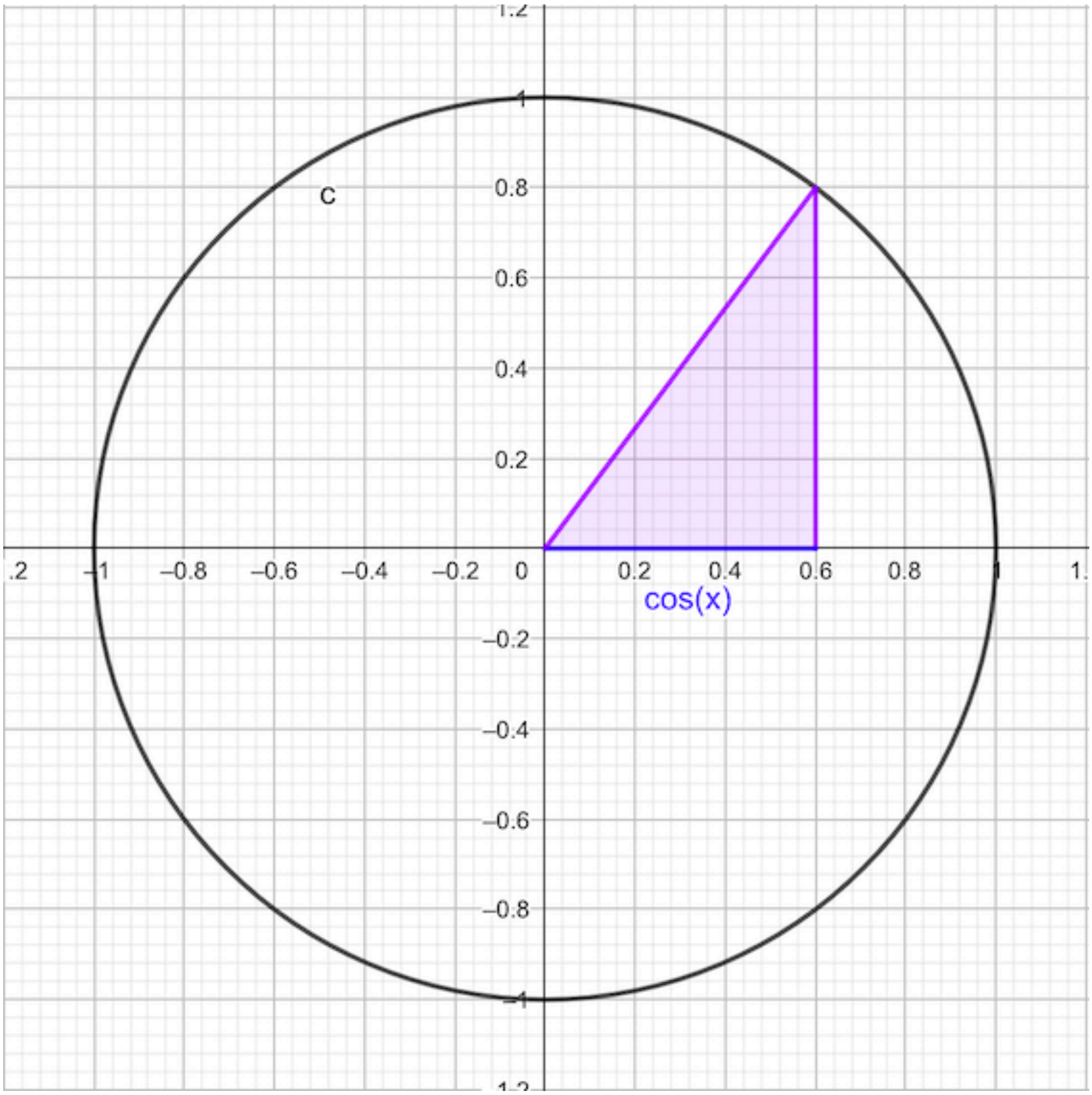
# Razones trigonométricas

$$\sin(x) = \frac{\text{cateto opuesto}}{\text{hipotenusa}}$$



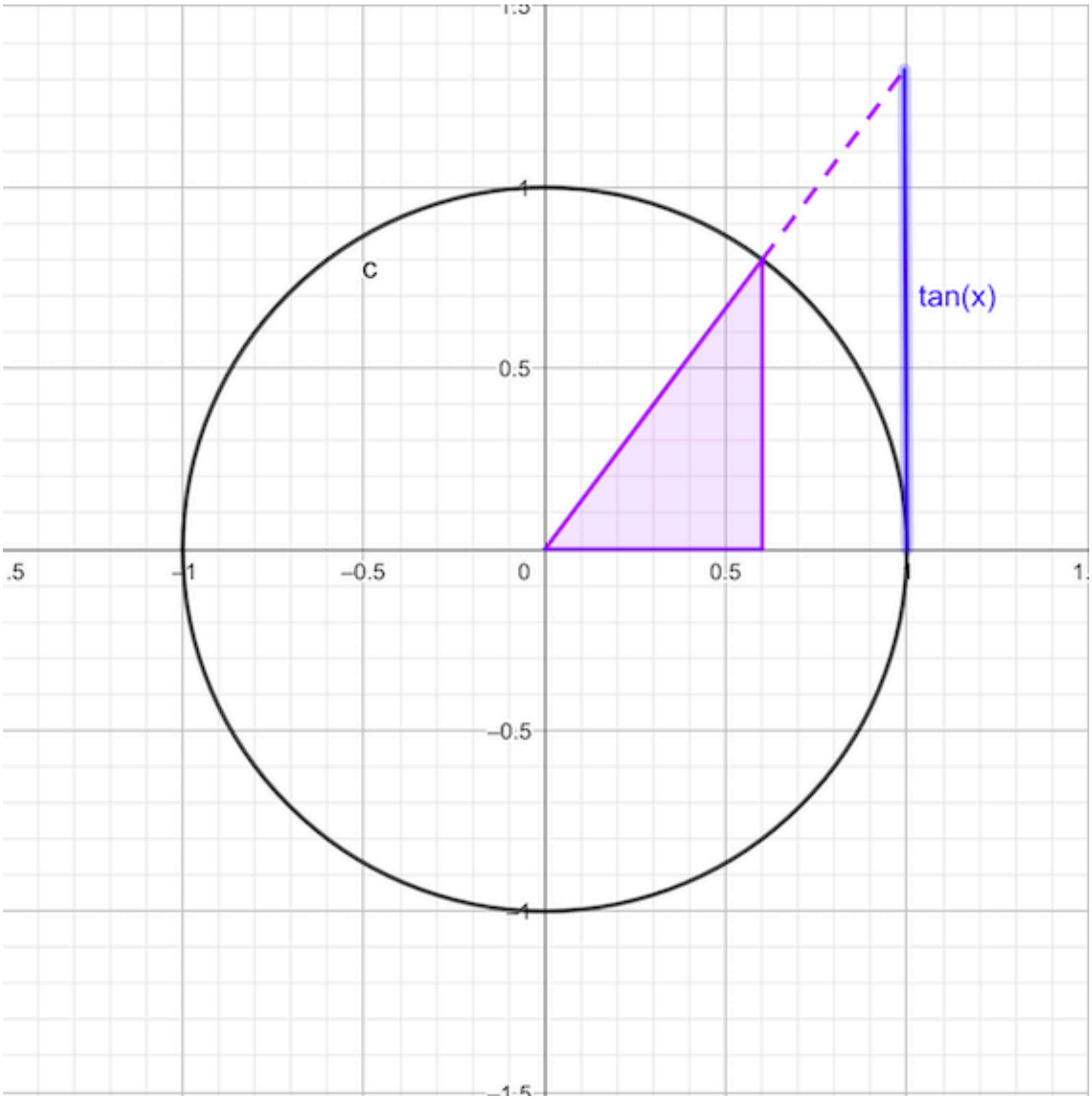

Representación gráfica del $\sin(x)$

$$\cos(x) = \frac{\text{cateto contiguo}}{\text{hipotenusa}}$$



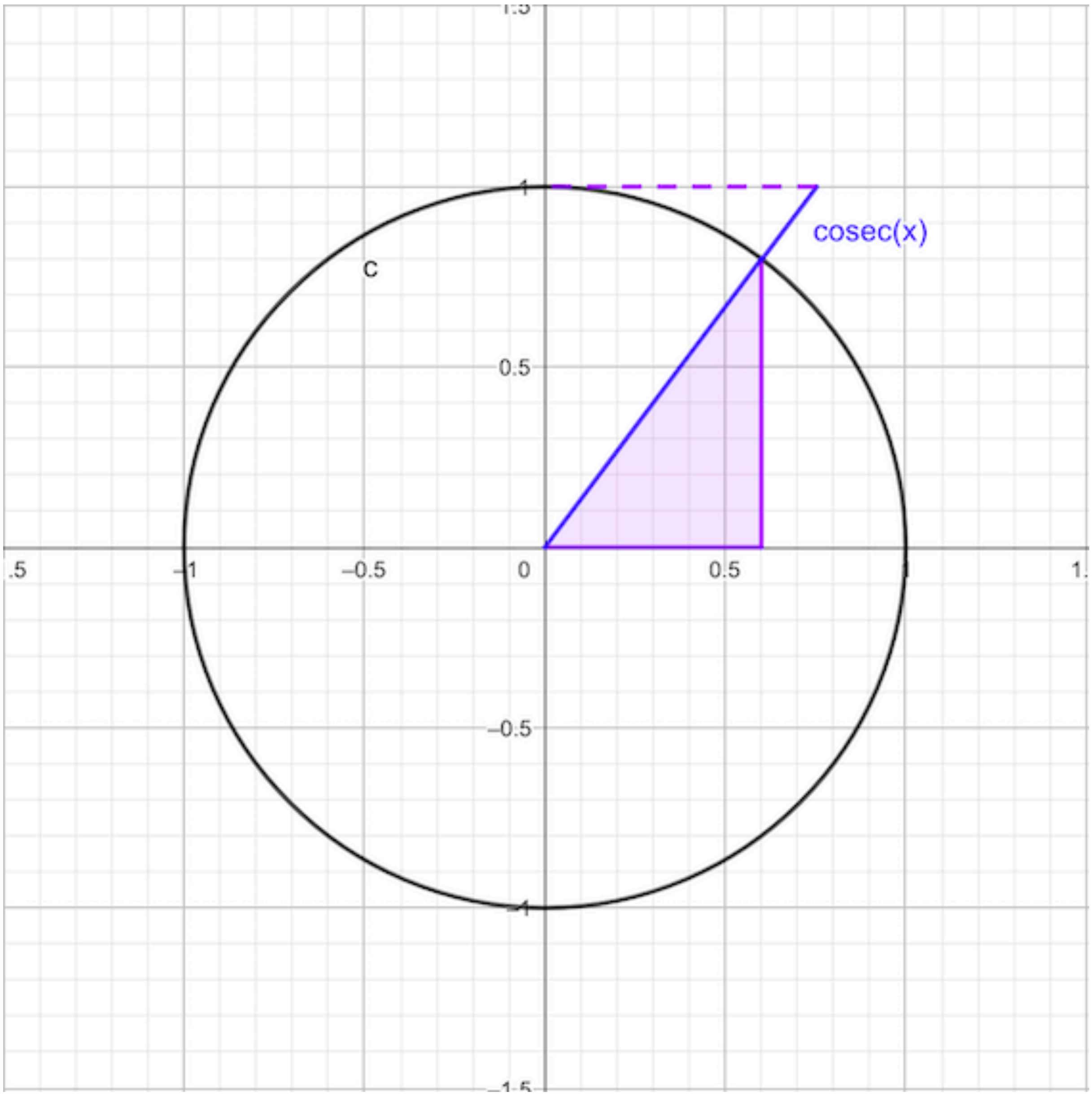

Representación gráfica del $\cos(x)$

$$\tan(x) = \frac{\text{cateto opuesto}}{\text{cateto contiguo}} = \frac{\sin(x)}{\cos(x)}$$



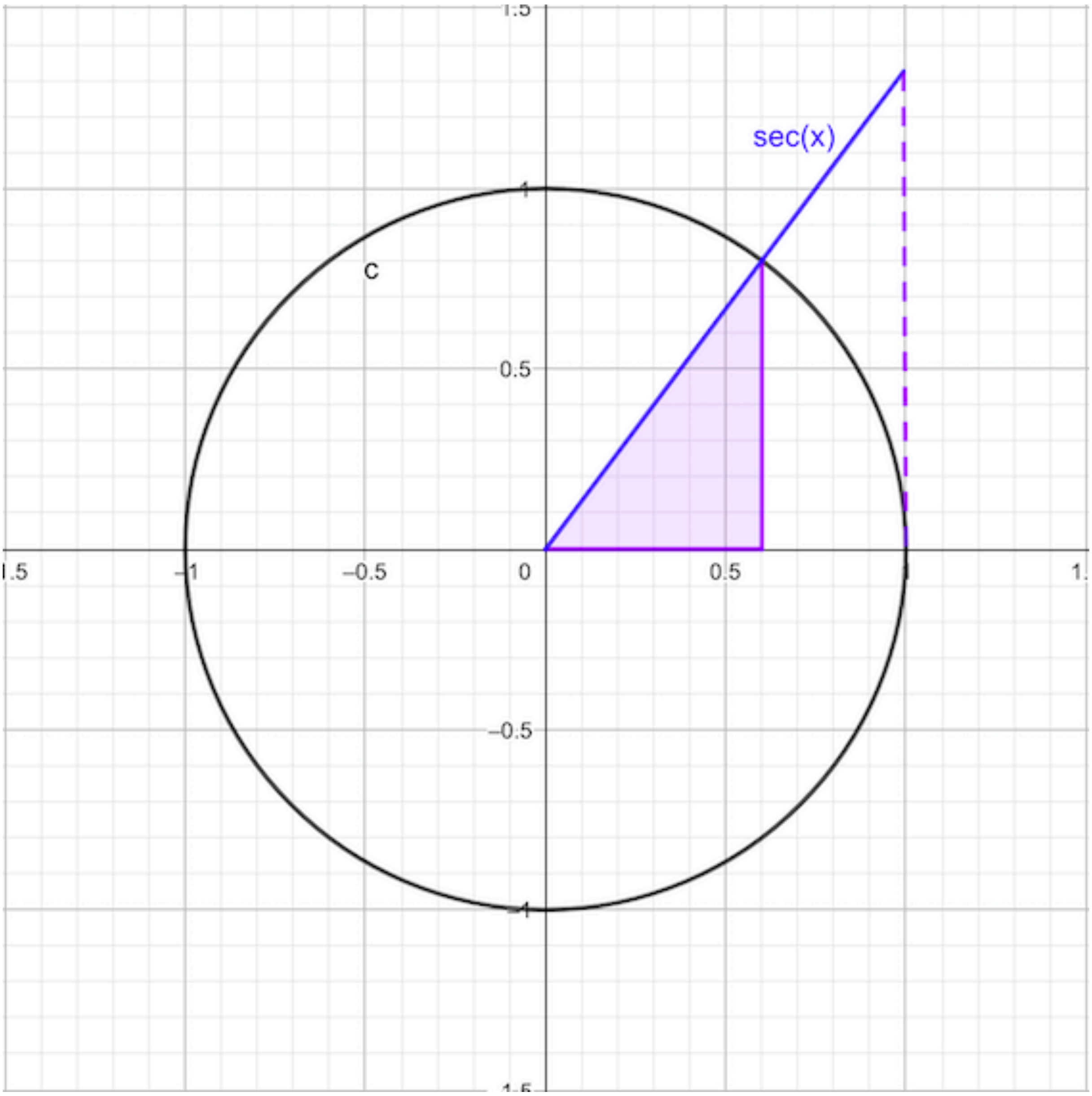

Representación gráfica de la $\tan(x)$

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



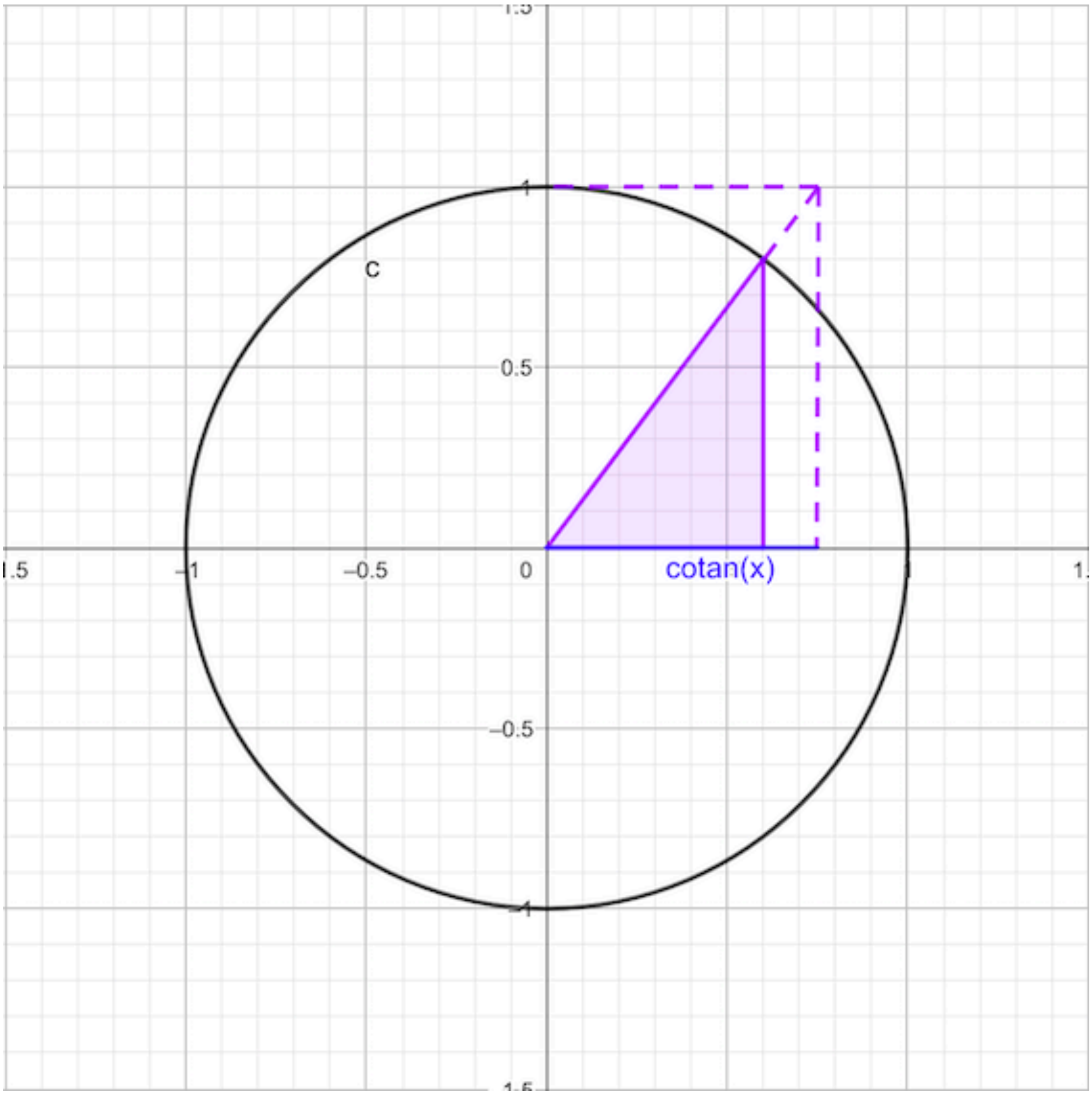

Representación gráfica de la $\csc(x)$

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




Representación gráfica de la $\sec(x)$

$$\cot(x) = \frac{1}{\tan(x)}$$




Representación gráfica de la $\cot(x)$

# Relaciones fundamentales

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

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

# Relaciones pitagóricas

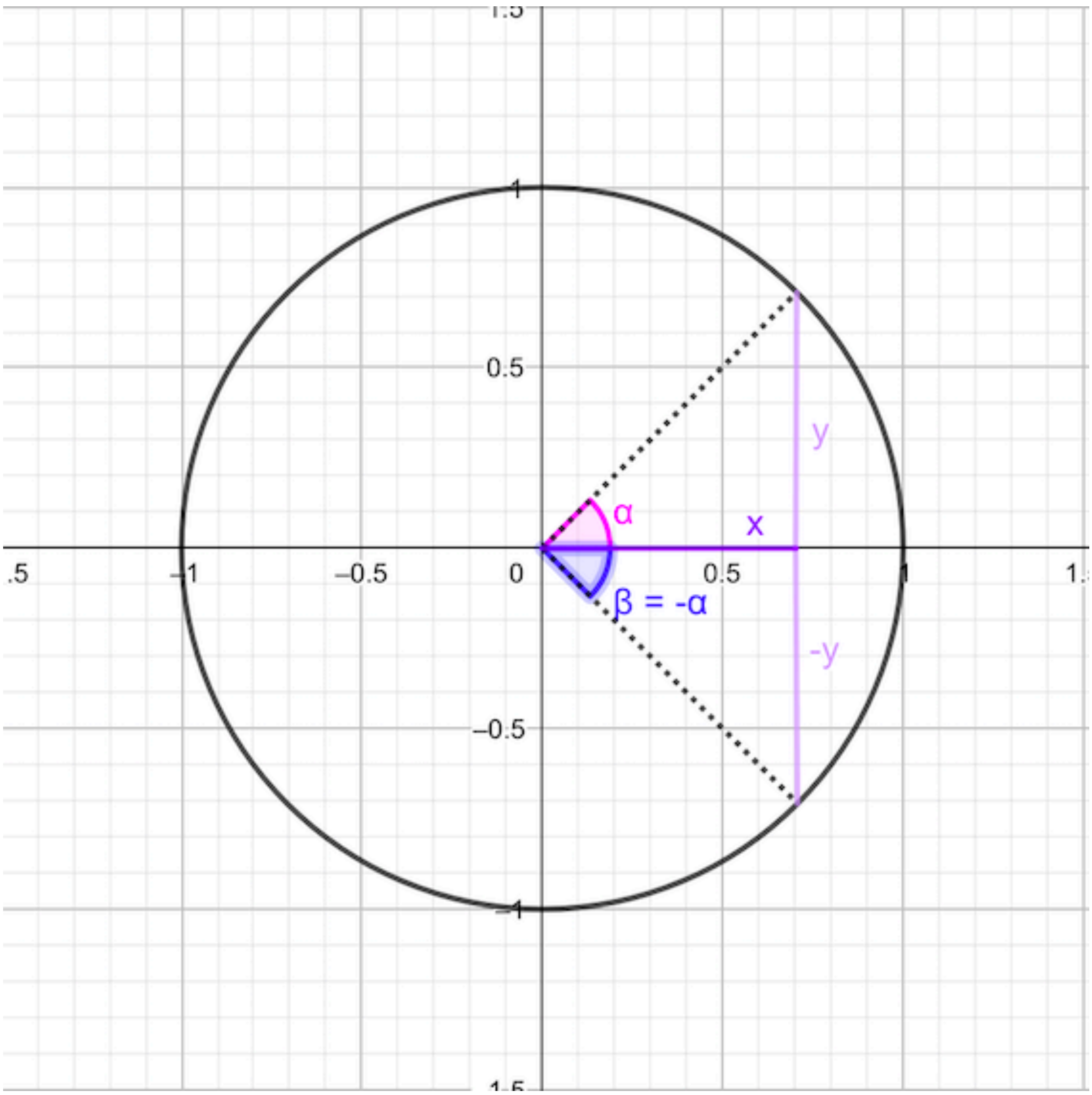
$$1 + \cot^2(\alpha) = \csc^2(\alpha)$$

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

# Relaciones entre las razones trigonométricas

## Ángulos opuestos

$$\sin(-\alpha) = -\sin(\alpha) \qquad \cos(-\alpha) = \cos(\alpha) \qquad \tan(-\alpha) = -\tan(\alpha)$$
$$\sin(2\pi - \alpha) = -\sin(\alpha) \qquad \cos(2\pi - \alpha) = \cos(\alpha) \qquad \tan(2\pi - \alpha) = -\tan(\alpha)$$

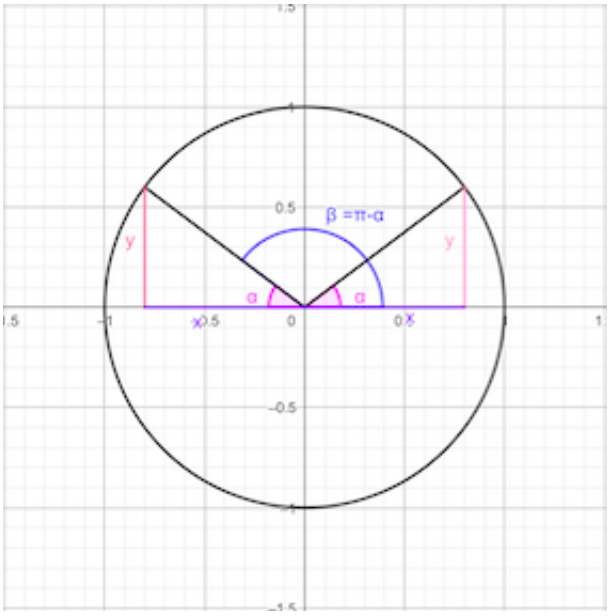


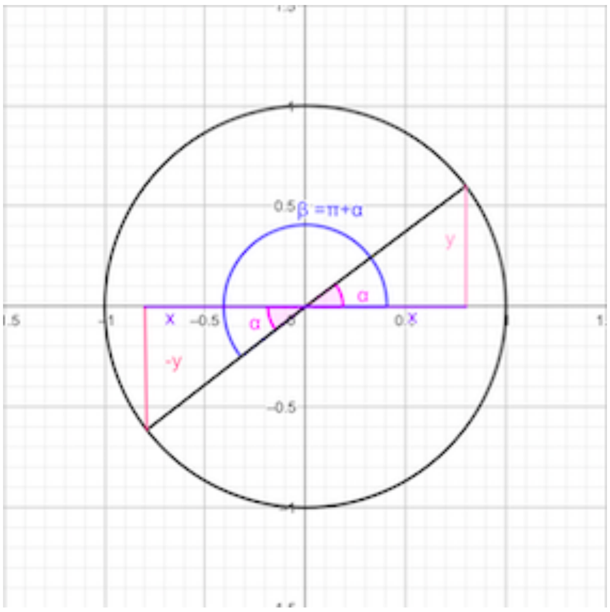

## Ángulos suplementarios

$$\sin(\pi \pm \alpha) = \mp \sin(\alpha)$$

$$\cos(\pi \pm \alpha) = -\cos(\alpha)$$

$$\tan(\pi \pm \alpha) = \mp \tan(\alpha)$$



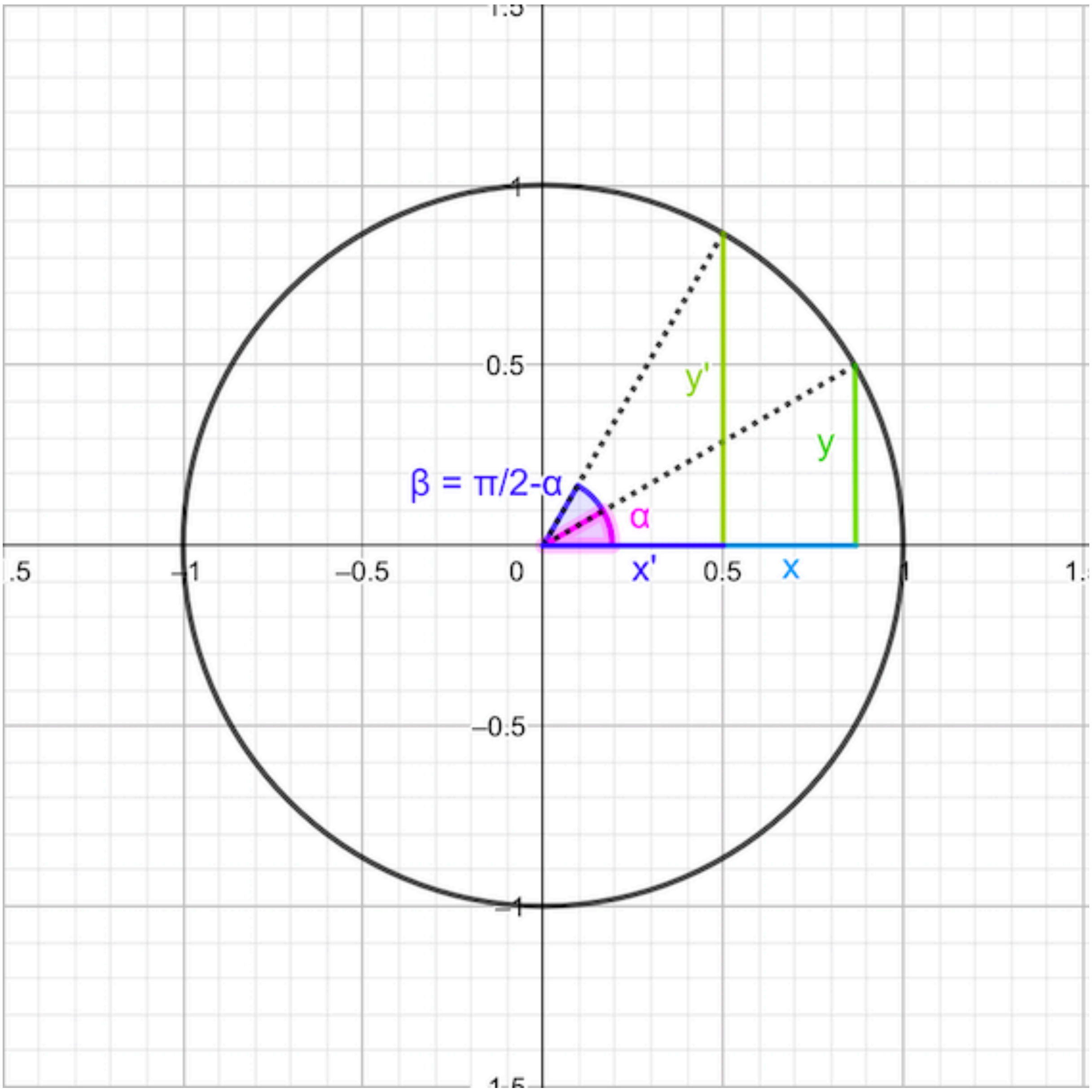




# Ángulos complementarios

$$\sin\left(\frac{\pi}{2} \pm \alpha\right) = \cos(\alpha)$$

$$\cos\left(\frac{\pi}{2} \pm \alpha\right) = \mp \sin(\alpha)$$

$$\tan\left(\frac{\pi}{2} \pm \alpha\right) = \mp \frac{1}{\tan(\alpha)}$$




# Suma o resta de ángulos

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

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

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

# Ángulo doble

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

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

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

# Ángulo mitad

$$\sin\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1-\cos(\alpha)}{2}}$$

$$\cos\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1+\cos(\alpha)}{2}}$$

$$\tan\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1-\cos(\alpha)}{1+\cos(\alpha)}}$$

# Sumas y Restas de senos y cosenos

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

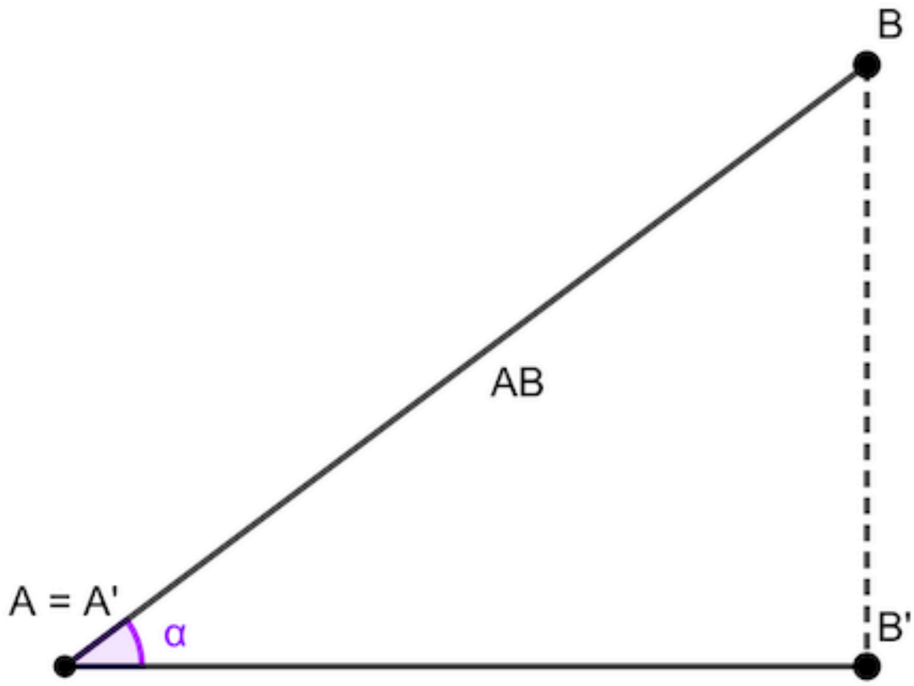
$$\cos(\alpha) + \cos(\beta) = 2\cos\left(\tfrac{\alpha+\beta}{2}\right)\cos\left(\tfrac{\alpha-\beta}{2}\right) \qquad \cos(\alpha) - \cos(\beta) = -2\sin\left(\tfrac{\alpha+\beta}{2}\right)\sin\left(\tfrac{\alpha-\beta}{2}\right)$$

# Valores del seno, coseno y tangente usuales

| **Radianes** | $0$ | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ |
|---|---|---|---|---|---|
| **Grados** | $0º$ | $30º$ | $45º$ | $60º$ | $90º$ |
| **sin** | $0$ | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | $1$ |
| **cos** | $1$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | $0$ |
| **tan** | $0$ | $\frac{\sqrt{3}}{3}$ | $1$ | $\frac{3}{\sqrt{3}}$ | $\infty$ |

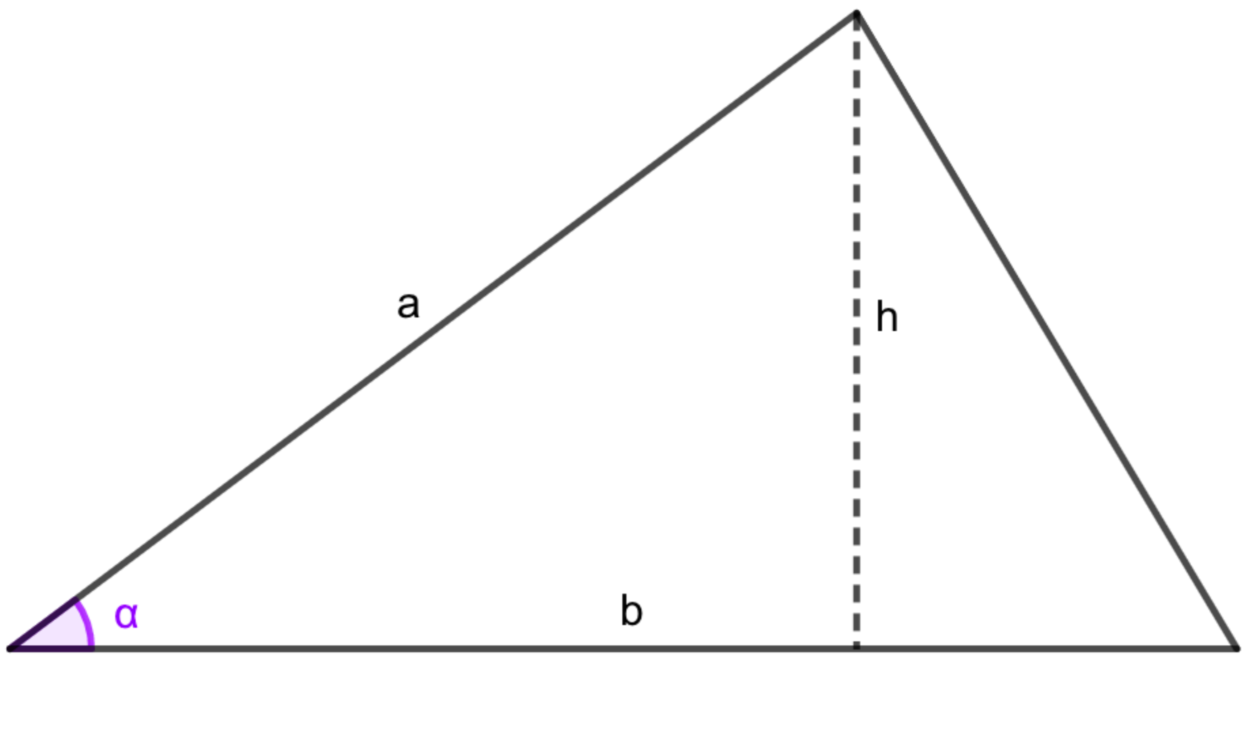
# Proyección del segmento $\bar{AB}$ sobre una recta $r$

$$A'\bar{B}' = \bar{AB}\cos(\alpha)$$



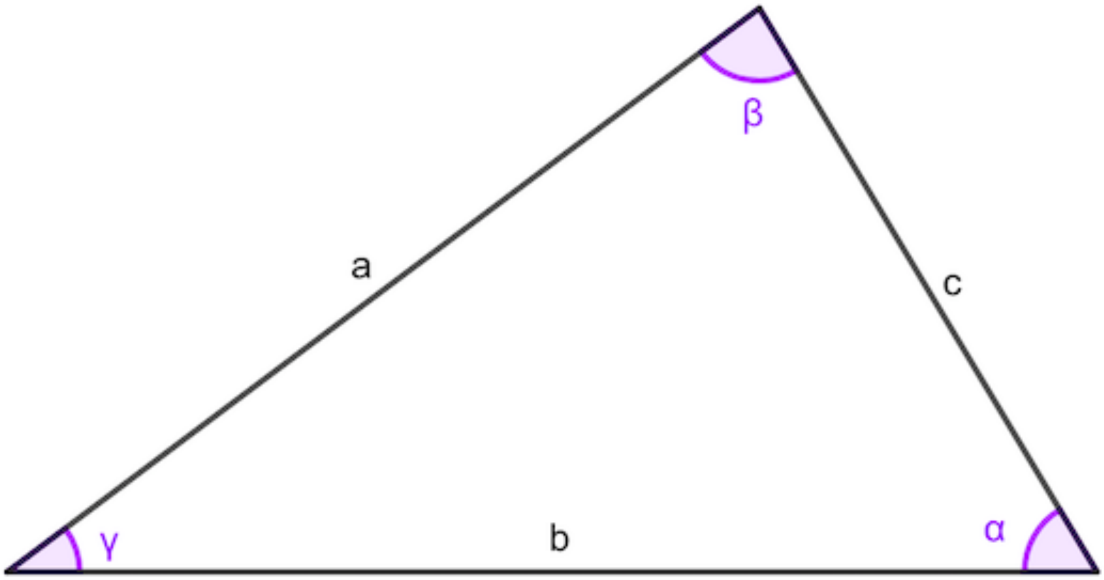

# Área de un triángulo

$$A = \frac{1}{2}ab\sin(\alpha) = \frac{bh}{2}$$



# Teorema de los senos

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

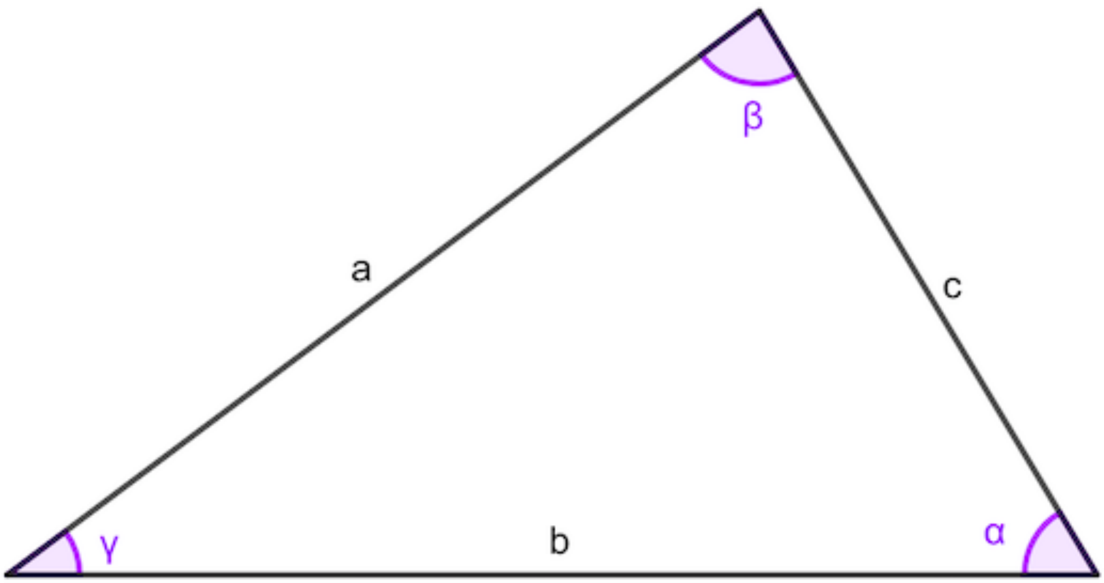



# Teorema del coseno

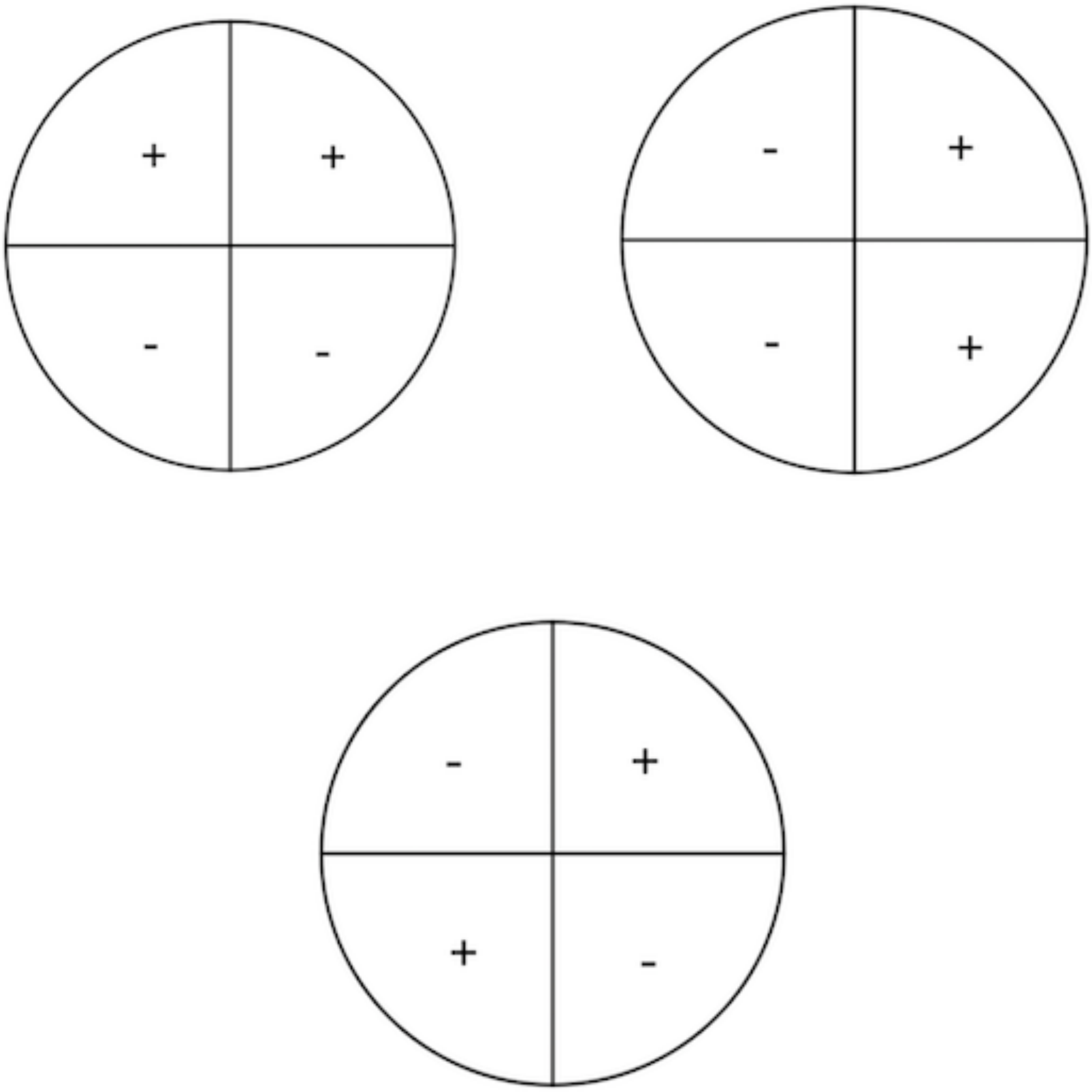
$$a^2 = b^2 + c^2 - 2bc\cos(\alpha)$$

$$b^2 = a^2 + c^2 - abc\cos(\beta)$$

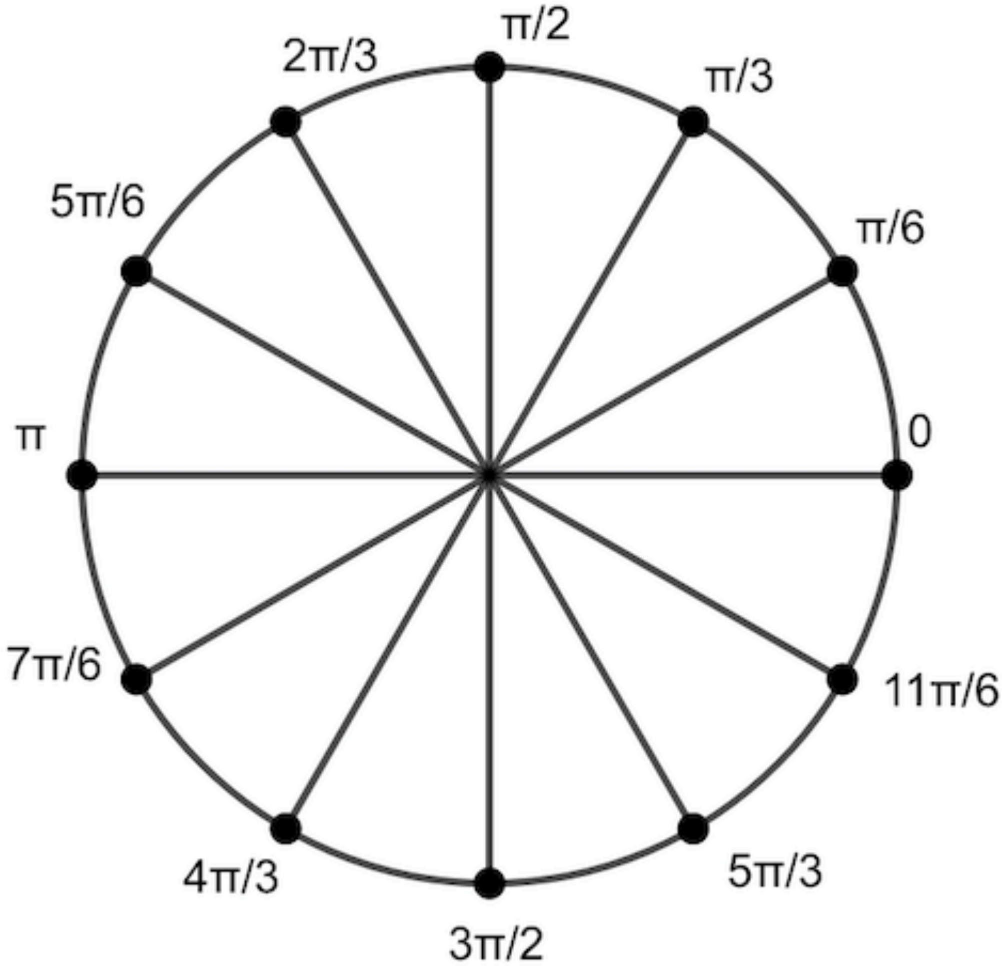
$$c^2 = a^2 + b^2 - 2ab\cos(\gamma)$$



# Más sobre seno, coseno y tangente



sin cos tan


π/2
2π/3
π/3
5π/6
π/6
π
0
7π/6
11π/6
4π/3
5π/3
3π/2