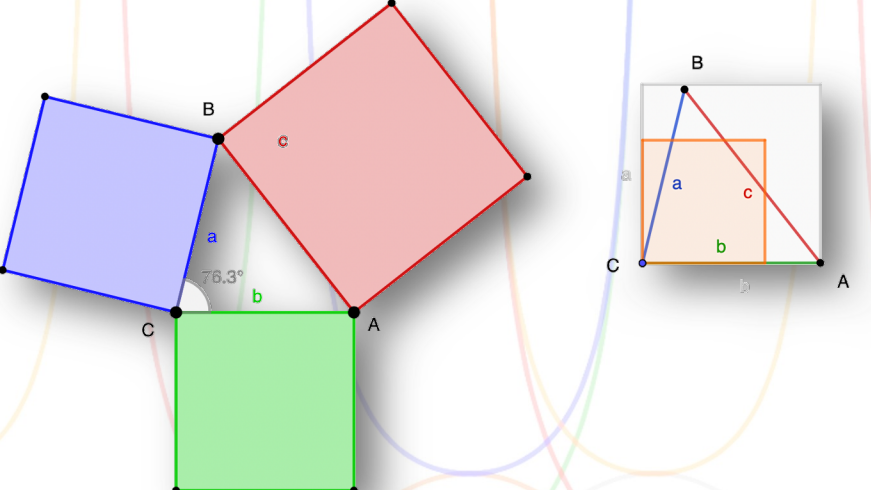


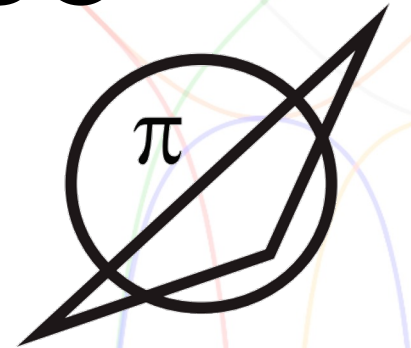


EL PENSAMIENTO TRIGONOMÉTRICO

DR. JOSÉ LORENZO SÁNCHEZ ALAVEZ

NOTAS DIDÁCTICAS SOBRE LA ENSEÑANZA DE:

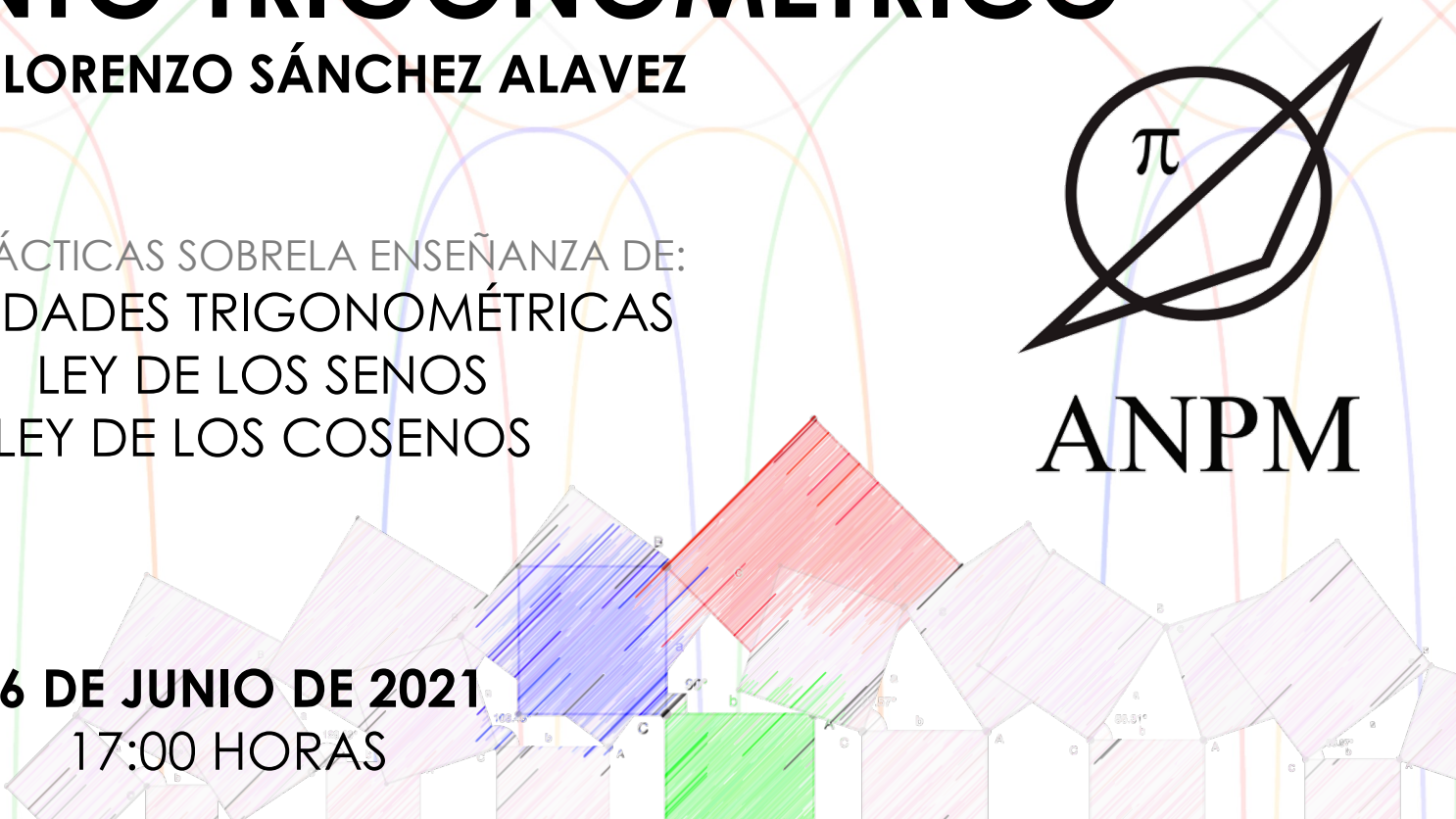
- IDENTIDADES TRIGONOMÉTRICAS
 - LEY DE LOS SENOS
 - LEY DE LOS COSENOS



ANPM

16 DE JUNIO DE 2021

17:00 HORAS

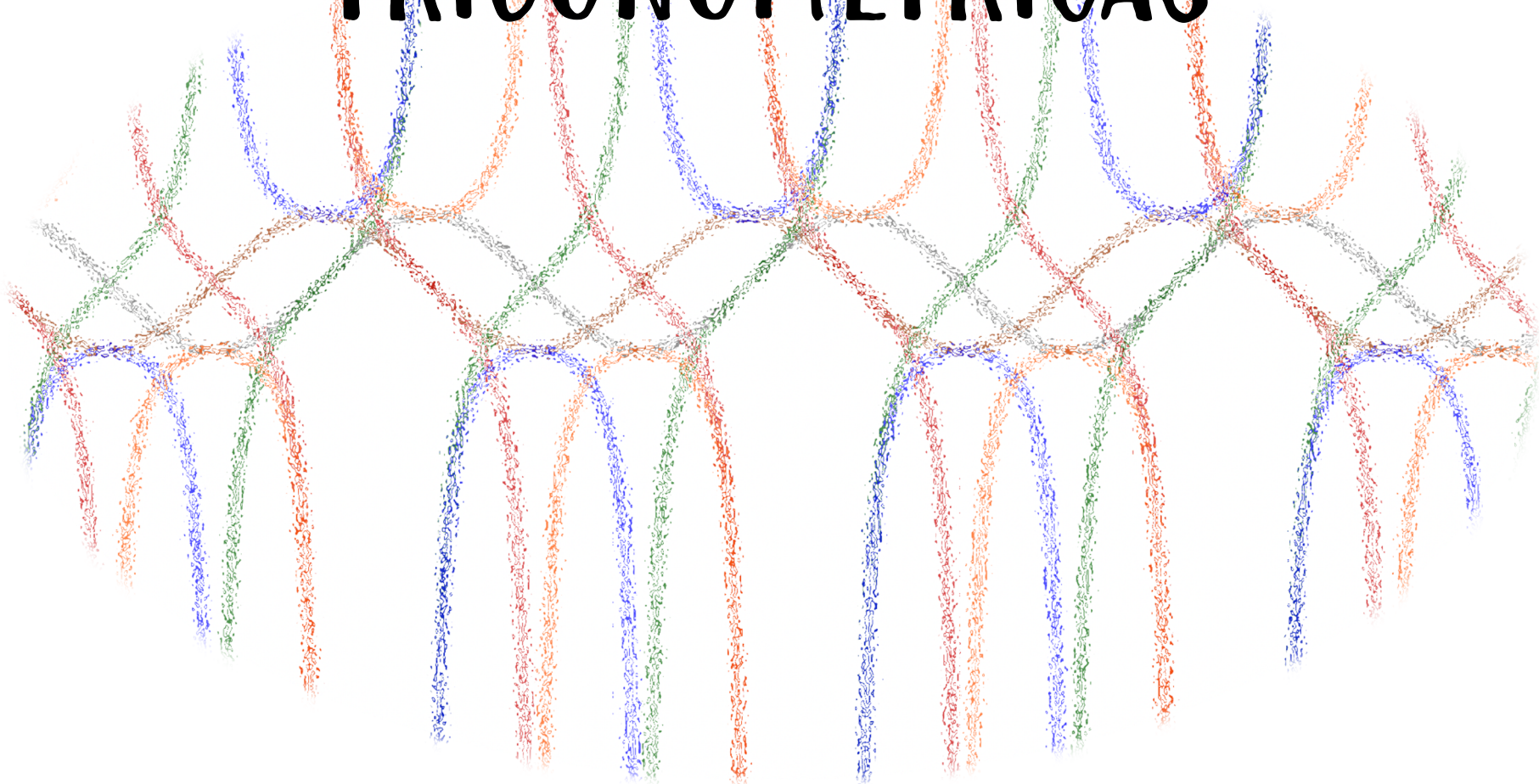




LAS FUNCIONES TRIGONOMÉTRICAS

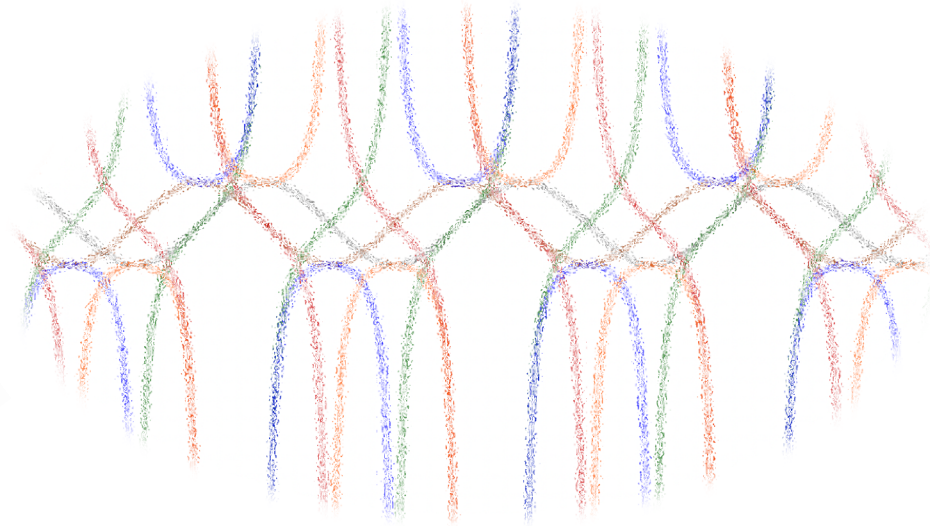


FUNCIONES TRIGONOMÉTRICAS



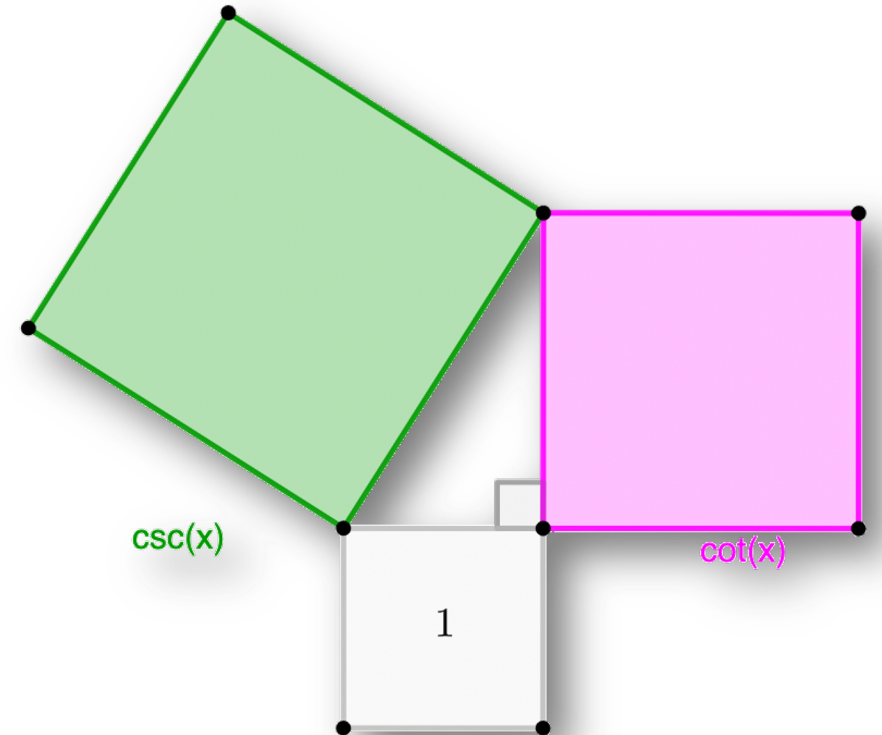
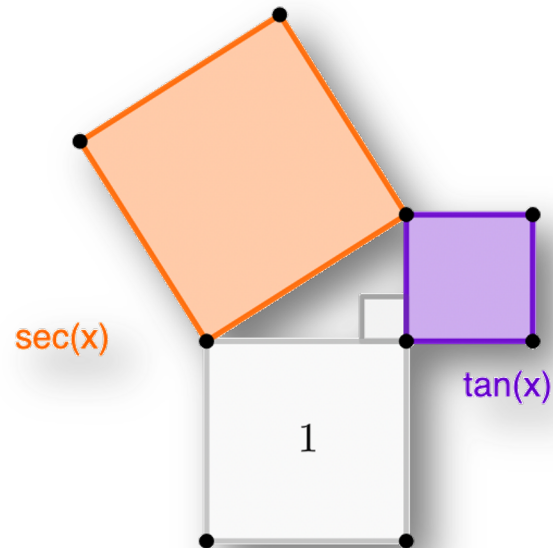
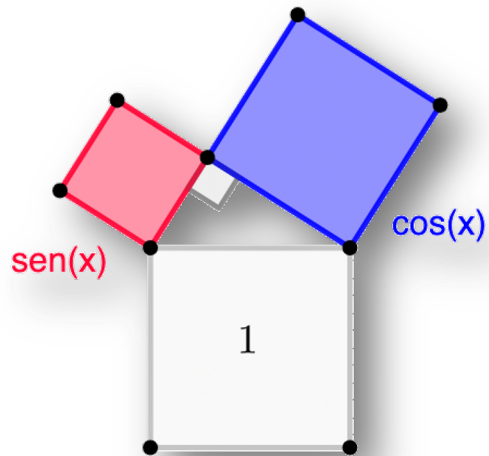
PROPIEDADES

FUNCIONES TRIGONOMÉTRICAS

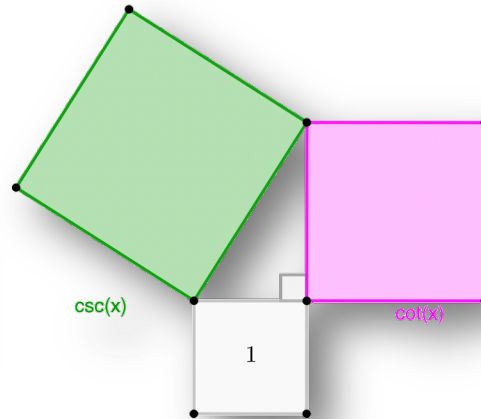
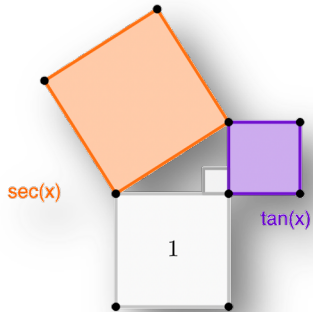
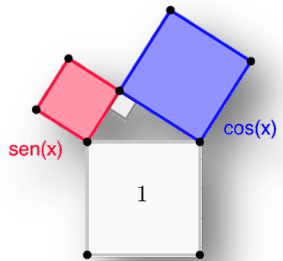


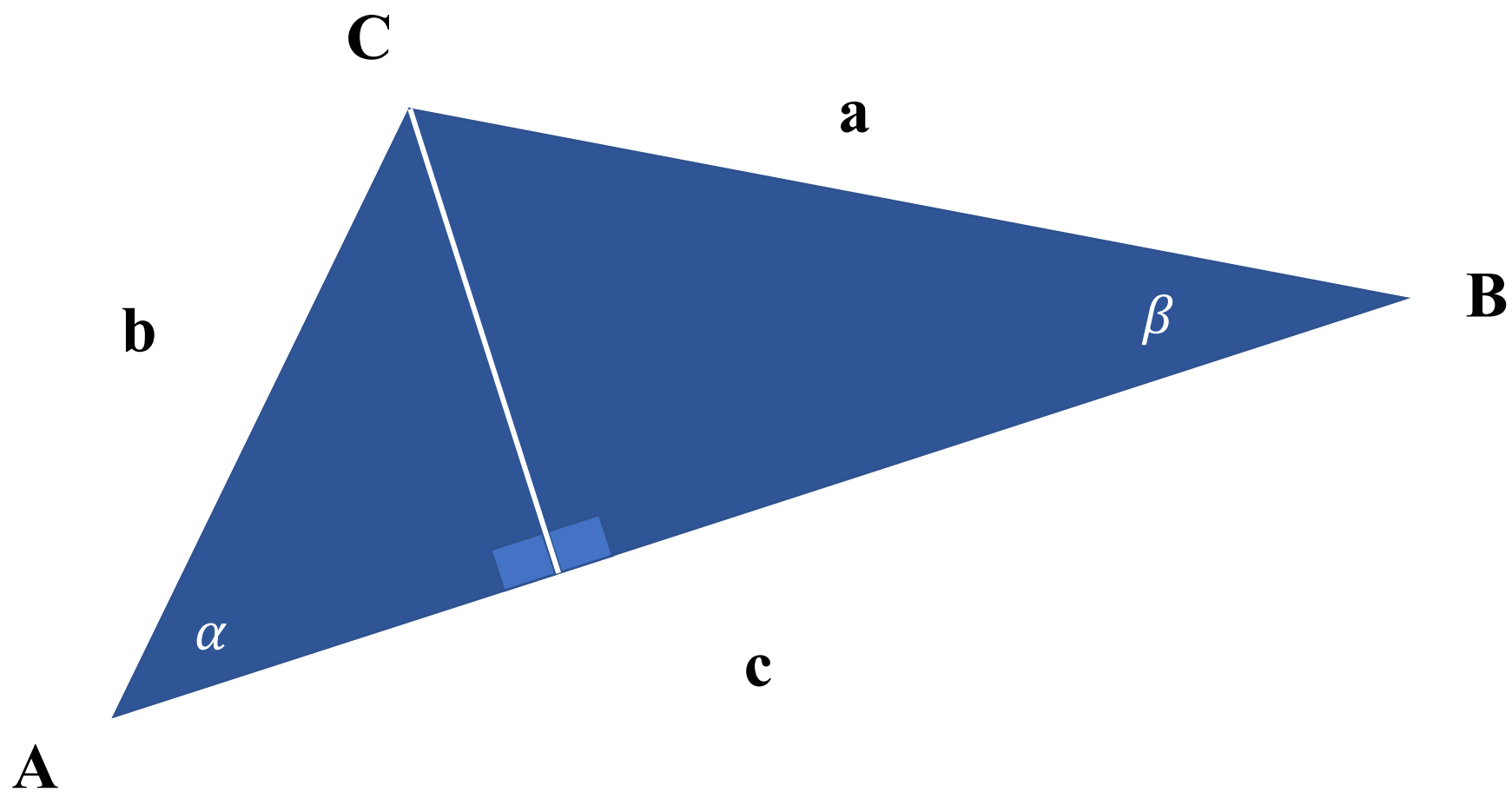
PROPIEDADES

IDENTIDADES TRIGONOMÉTRICAS PITAGÓRICAS



IDENTIDADES TRIGONOMÉTRICAS PITAGÓRICAS



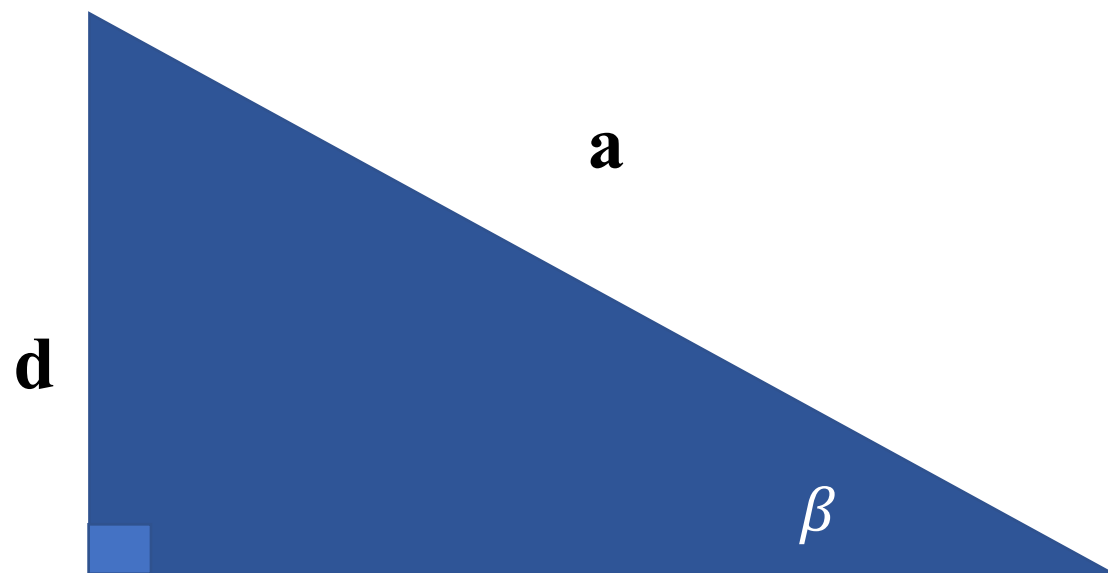
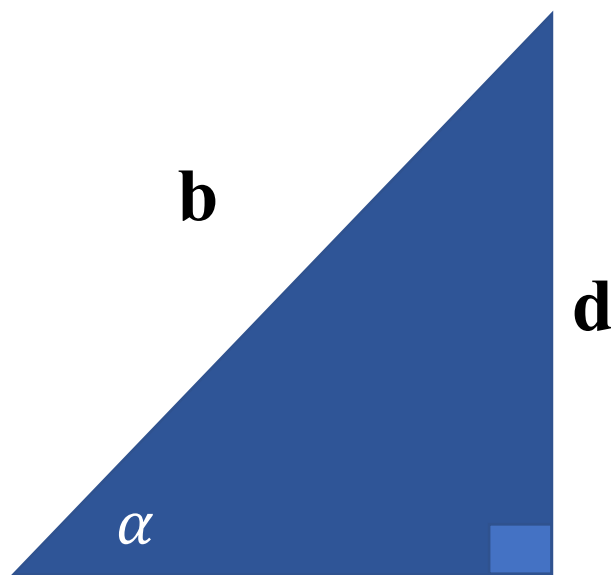


$$\textit{sen}(\alpha) = \frac{d}{b}$$

$$b \cdot \textit{sen}(\alpha) = d$$

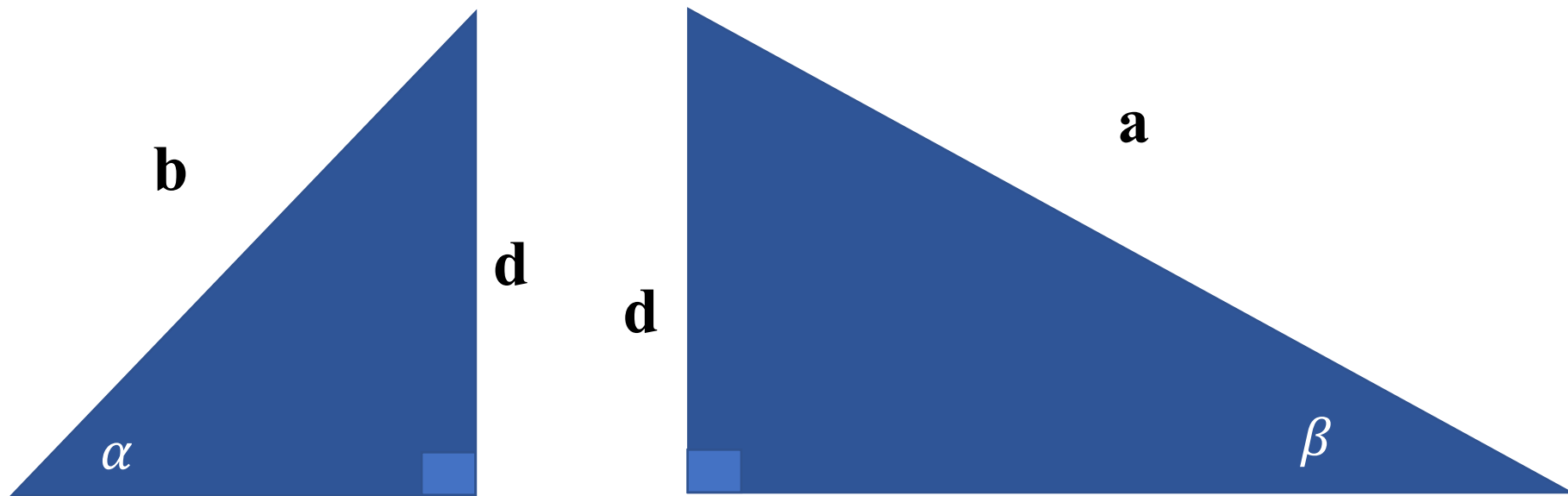
$$\textit{sen}(\beta) = \frac{d}{a}$$

$$a \cdot \textit{sen}(\beta) = d$$

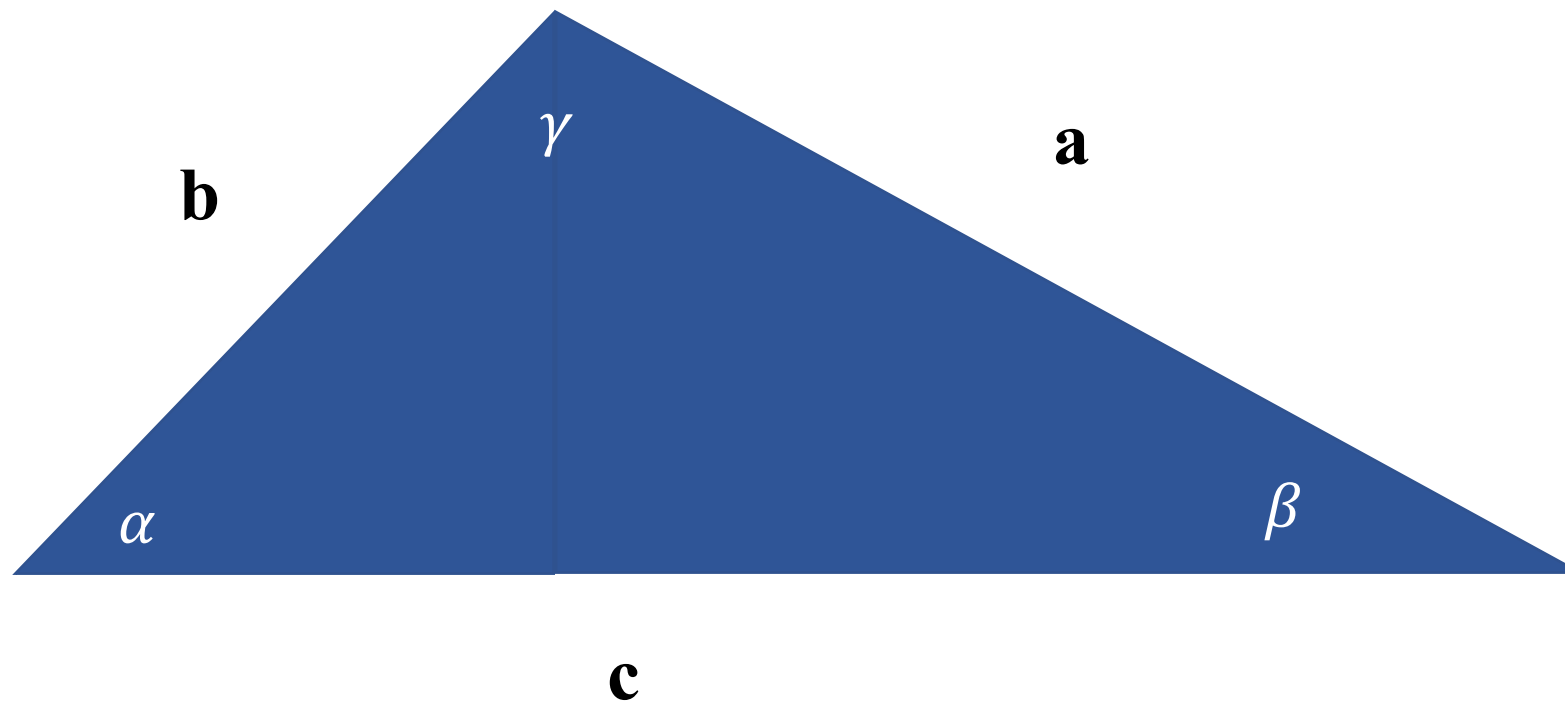


$$\frac{b}{\text{sen}(\beta)} = \frac{a}{\text{sen}(\alpha)}$$

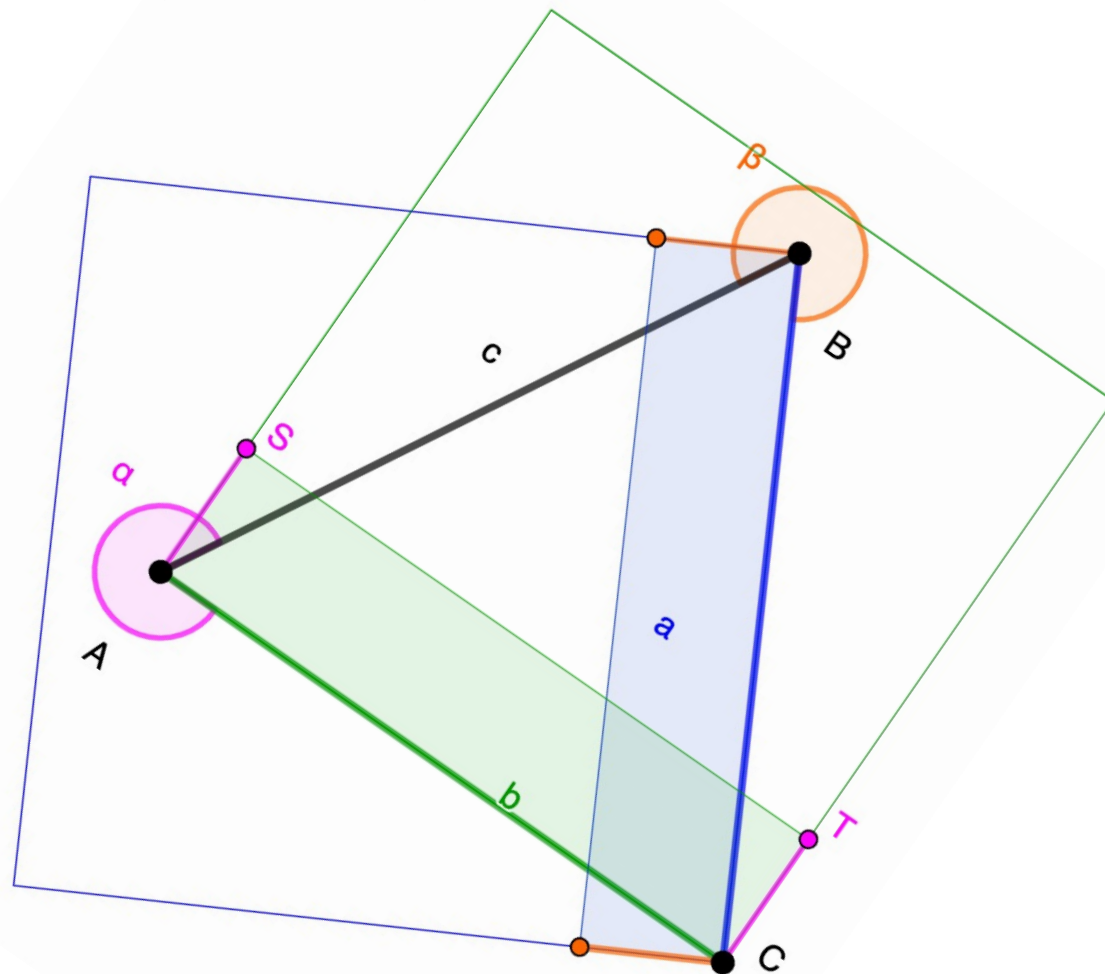
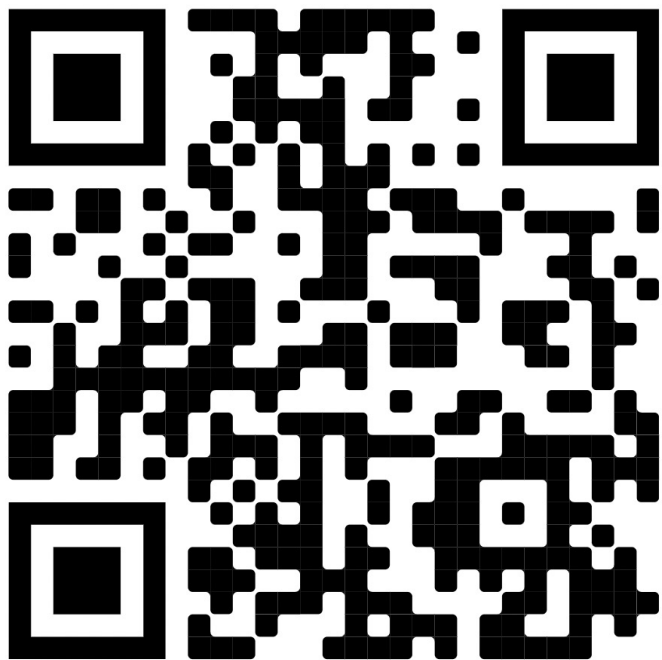
$$b \cdot \text{sen}(\alpha) = a \cdot \text{sen}(\beta)$$



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



LEY DE SENOS



UNA APLICACIÓN...



Luna



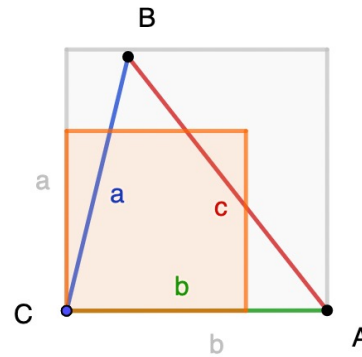
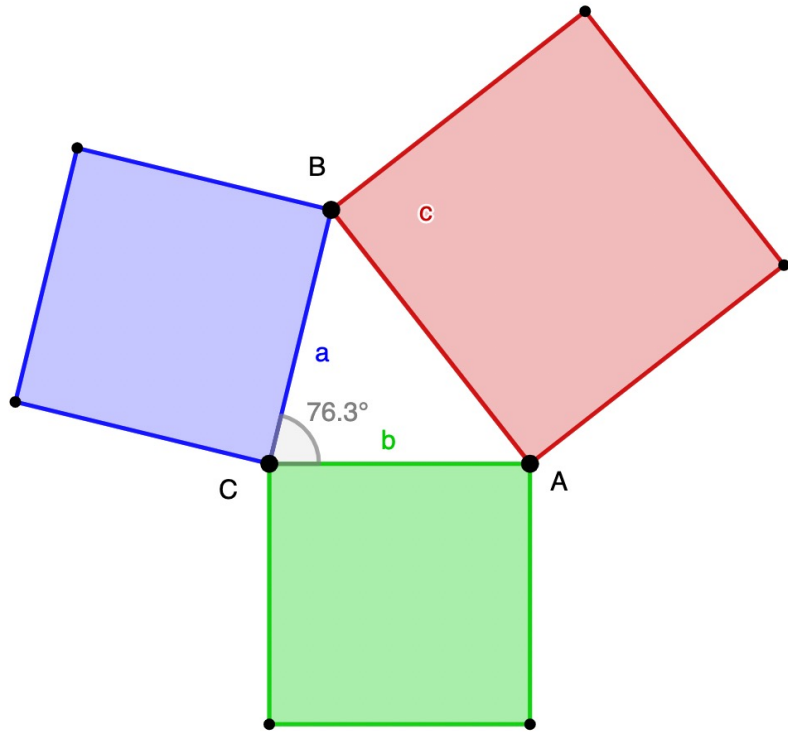
Observatorio



Satélite



LA LEY DE COSENOS



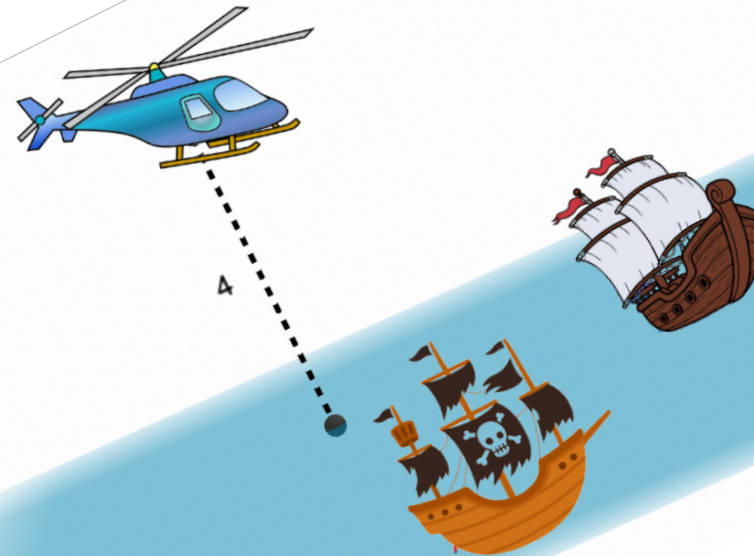
$$\omega = 2\cos(\gamma)$$

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

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

$$c^2 = a^2 + b^2 \pm \omega \cdot ab$$

OTRO PROBLEMA...



LA LEY DE SENOS

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

$$a \cdot \text{sen}(\beta) = b \cdot \text{sen}(\alpha)$$

LA LEY DE COSENOS

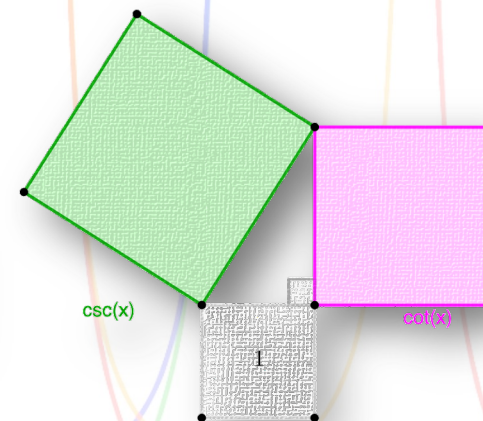
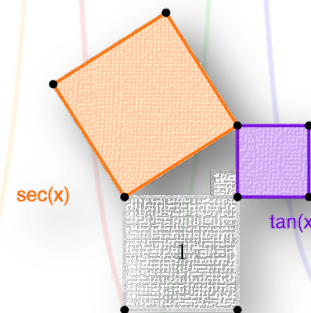
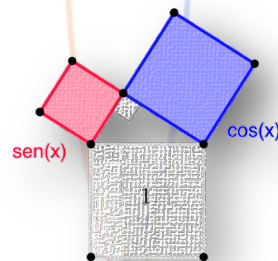
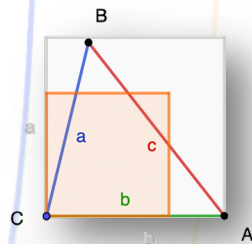
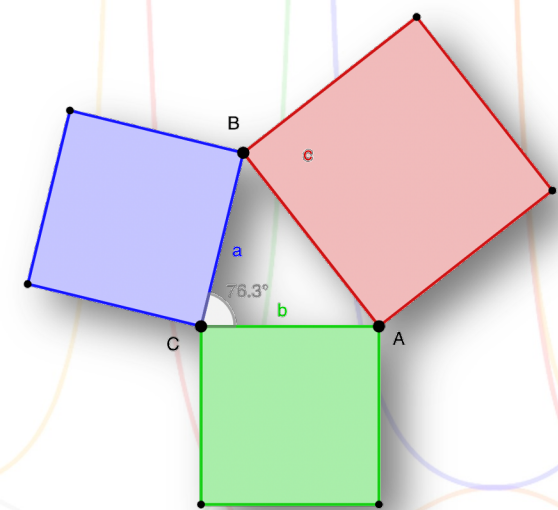
$$c^2 = a^2 + b^2 - 2ab \cdot \cos(\gamma)$$

$$c^2 = a^2 + b^2 - r \cdot ab$$

LA LEY DE TANGENTES

$$\frac{a+b}{a-b} = \frac{\tan\left(\frac{\alpha+\beta}{2}\right)}{\tan\left(\frac{\alpha-\beta}{2}\right)}$$

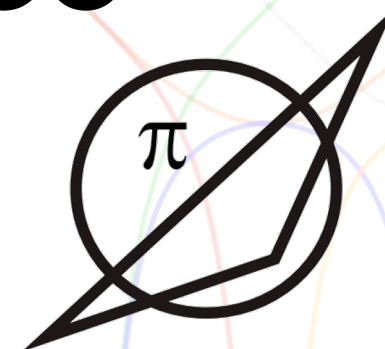
$$(a+b) \cdot \tan\left(\frac{\alpha-\beta}{2}\right) = (a-b) \cdot \tan\left(\frac{\alpha+\beta}{2}\right)$$



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