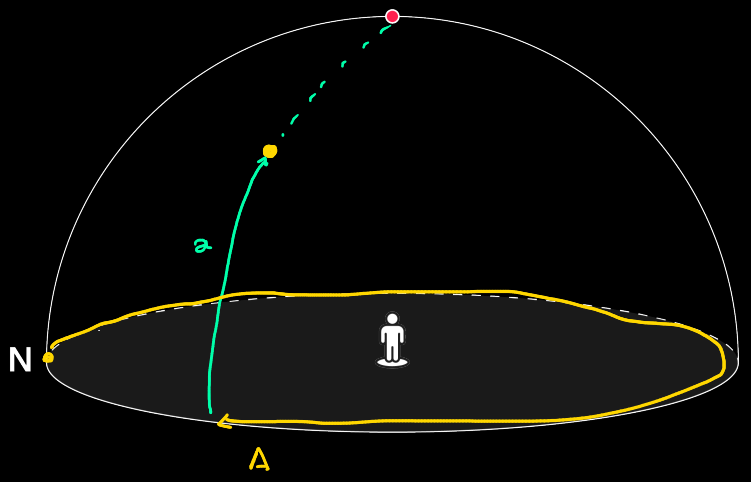
Astronomía de Posición 2



Coordenadas horizontales

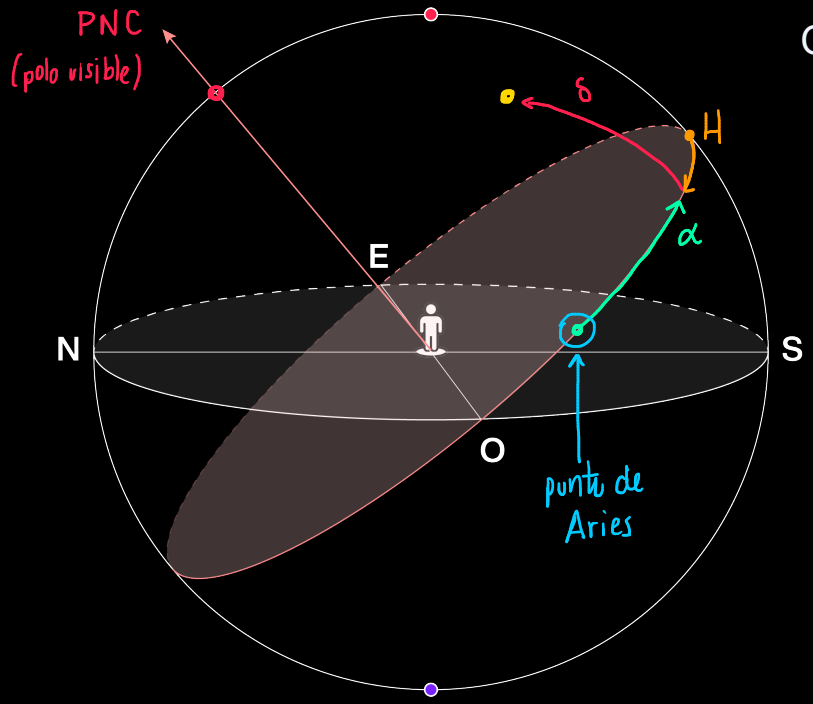
→ Azimuth (A) → variable

Medida en el horizonte en sentido horario desde el punto cardinal Norte*.

* NESO ↑ * SONE ↑

180° → Altitud (a) → variable

Medida desde el horizonte hacia el objeto.



Coordenadas ecuatoriales/horarias

→ Ascensión Recta (α) → fija

Medida en el ecuador celeste desde el punto de Aries, hacia el este.

$1^h = 15°$

→ Declinación (δ) → fija

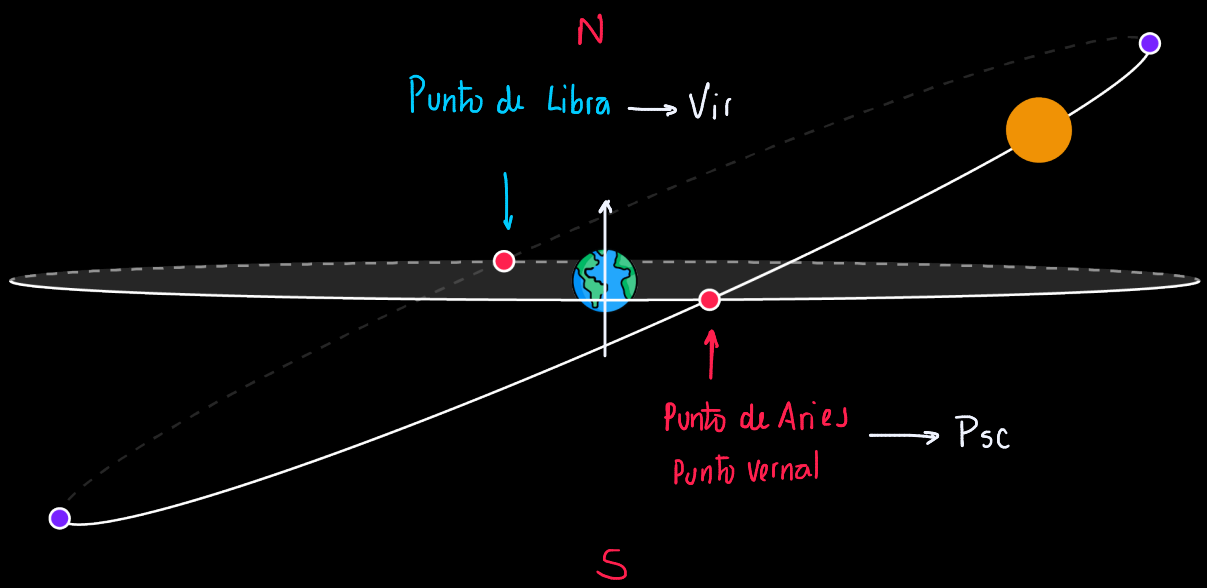
Medida desde el ecuador celeste al objeto.

→ Ángulo Horario (H) → variable

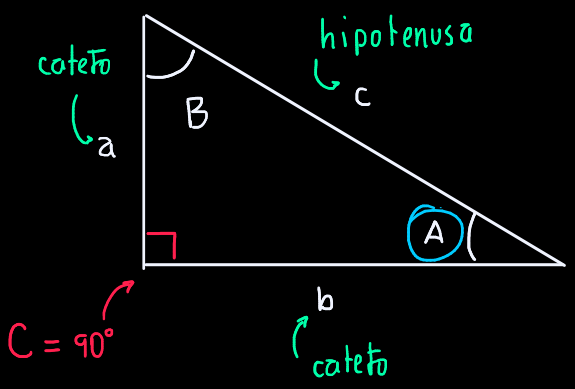
Medida en el ecuador celeste desde el meridiano local hacia el oeste.

- Tiempo sidéreo local (TSL)
  → ángulo horario del Punto de Aries

$$TSL = H + \alpha$$



Trigonometría y triángulos rectángulos planos



- Suma de ángulos internos

$$A + B + C = 180°$$

- Teorema de Pitágoras

$$c^2 = a^2 + b^2$$

- Funciones trigonométricas

$$\sin A = \frac{CO}{H} = \frac{a}{c} \qquad \csc A = \frac{1}{\sin A} = \frac{H}{CO} = \frac{c}{a}$$

$$\cos A = \frac{CA}{H} = \frac{b}{c} \qquad \sec A = \frac{1}{\cos A} = \frac{H}{CA} = \frac{c}{b}$$

$$\tan A = \frac{CO}{CA} = \frac{a}{b} \qquad \cot A = \frac{1}{\tan A} = \frac{CA}{CO} = \frac{b}{a}$$

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

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

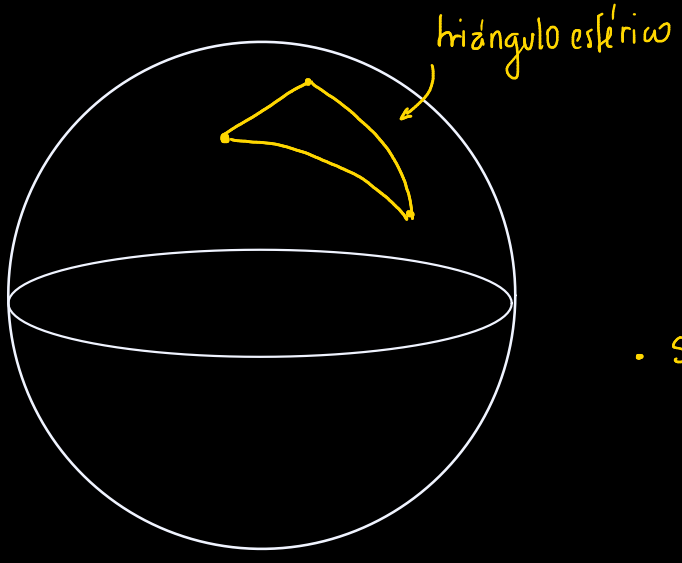
$$\sin(x+y) = \sin x \cos y + \sin y \cos x$$

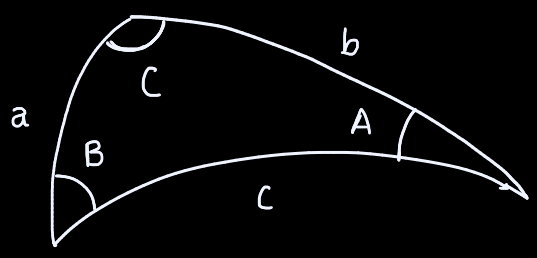
$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$

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

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

Geometría esférica





- Suma de ángulos internos

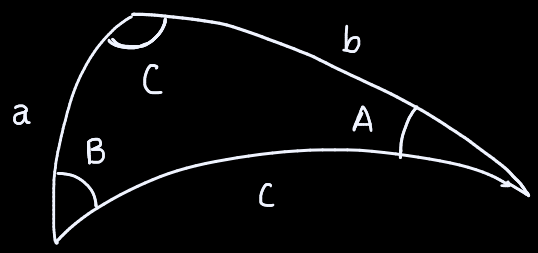
$$A + B + C > 180°$$

- Pitágoras ✗

1. Ley de senos esférica

$$\frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c}$$

$$\frac{\sin a}{\sin A} = \frac{\sin b}{\sin B} = \frac{\sin c}{\sin C}$$

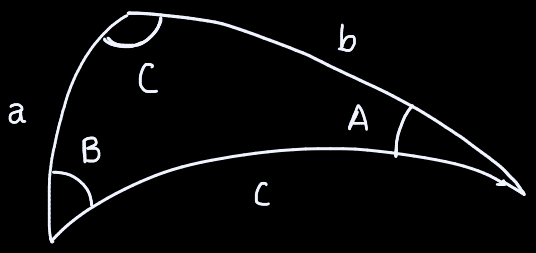


2. Ley de cosenos esférica (lados)

$$\cos a = \cos b \cos c + \sin b \sin c \cos A$$

$$\cos b = \cos a \cos c + \sin a \sin c \cos B$$

$$\cos c = \cos a \cos b + \sin a \sin b \cos C$$



3. Ley de cosenos esférica (ángulos)

$$\cos A = -\cos B \cos C + \sin B \sin C \cos a$$

$$\cos B = -\cos A \cos C + \sin A \sin C \cos b$$

$$\cos C = -\cos A \cos B + \sin A \sin B \cos c$$

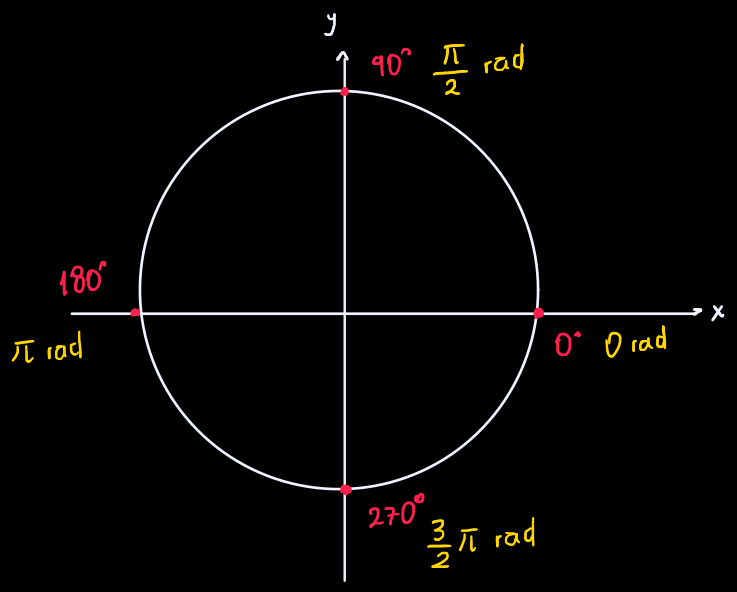
4. Identidades triángulo rectángulo esférico $(C = 90^\circ)$

$$\cos c = \cos a \cos b$$

$$\sin a = \sin c \sin A$$

$$\sin b = \sin c \sin B$$

$\sin(0^\circ) = 0$
$\sin(90^\circ) = 1$

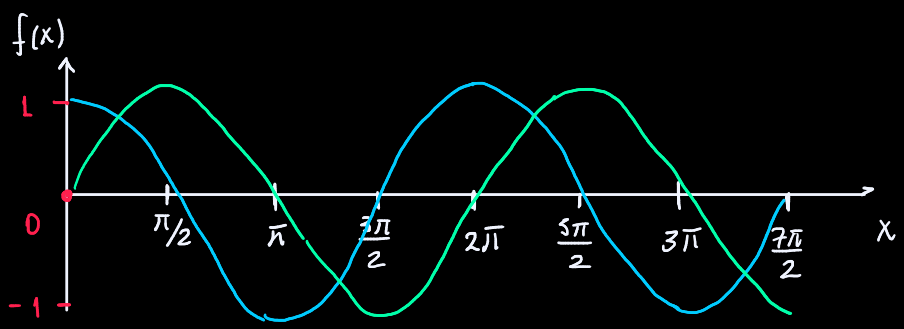


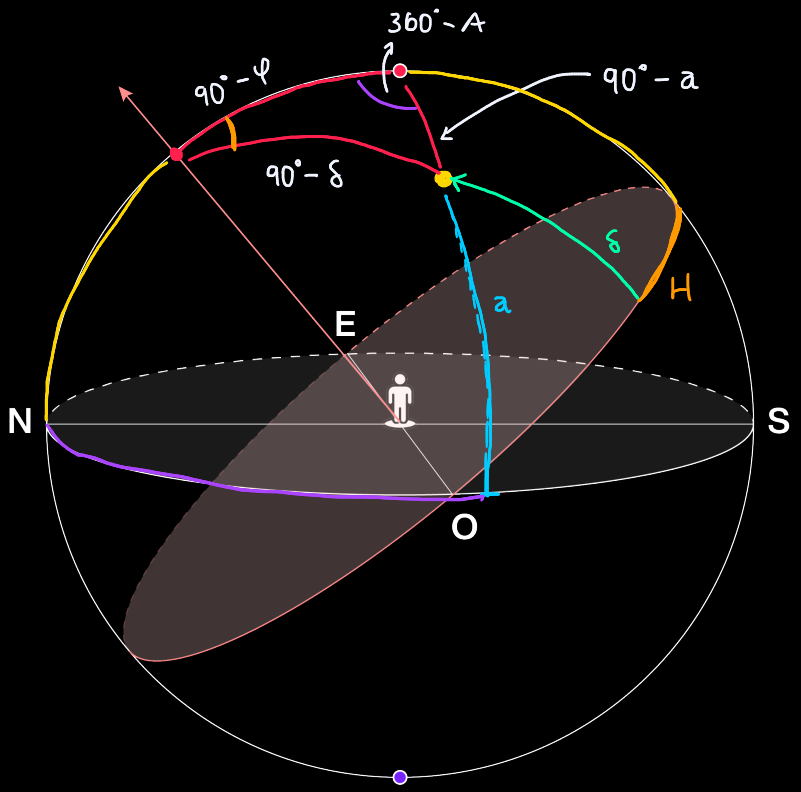
$\cos 0^\circ = 1$ $\quad \sin 0^\circ = 0$

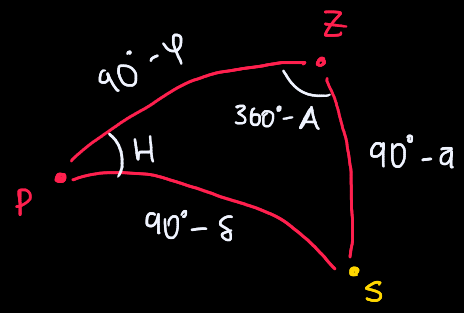
$\cos 90^\circ = 0$ $\quad \sin 90^\circ = 1$

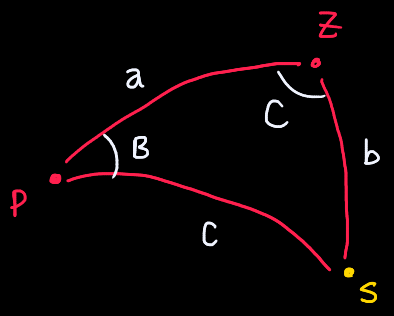
$\cos 180^\circ = -1$ $\quad \sin 180^\circ = 0$

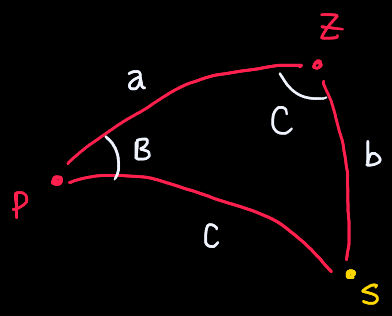
$\cos 270^\circ = 0$ $\quad \sin 270^\circ = -1$

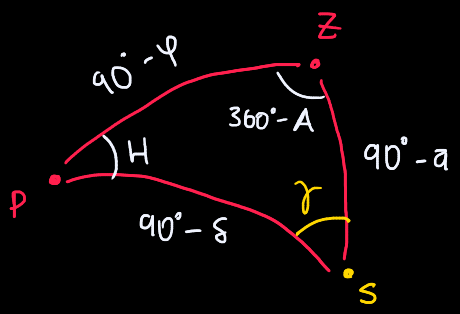












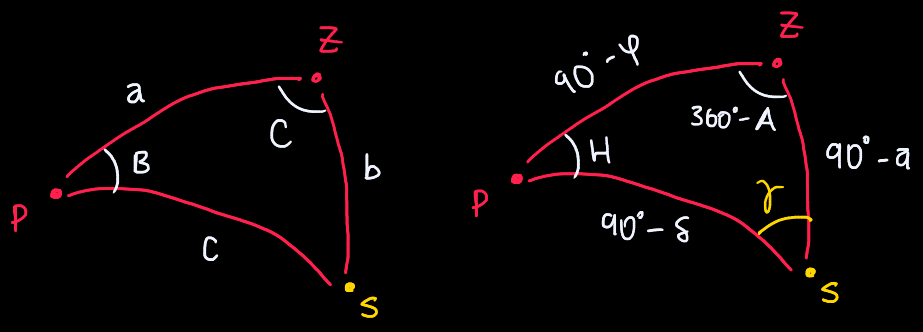
ley de senos $\quad \frac{\sin a}{\sin A} = \frac{\sin b}{\sin c} = \frac{\sin c}{\sin C}$

$$\frac{\sin(90^\circ-\delta)}{\sin(360^\circ-A)} = \frac{\sin(90^\circ-a)}{\sin H} = \frac{\sin(90^\circ-\varphi)}{\sin\gamma}$$

- $\sin(90^\circ - x) = \cos x$
- $\cos(90^\circ - x) = \sin x$
- $\sin(x - 90^\circ) = -\cos x$
- $\cos(x - 90^\circ) = \sin x$
- $\sin(360^\circ - x) = -\sin x$

$$\frac{\sin(90^\circ-\delta)}{\sin(360^\circ-A)} = \frac{\sin(90^\circ-a)}{\sin H} = \frac{\sin(90^\circ-\varphi)}{\sin\gamma}$$ ← ángulo desconocido

$$\frac{\cos\delta}{-\sin A} = \frac{\cos a}{\sin H} = \frac{\cos\varphi}{\sin\gamma}$$



ley de cosenos $\cos b = \cos a \cos c + \sin a \sin c \cos B$

$\cos(90°-a) = \cos(90°-\varphi)\cos(90°-\delta) + \sin(90°-\varphi)\sin(90°-\delta)\cos H$

- $\sin(90°-x) = \cos x$
- $\cos(90°-x) = \sin x$
- $\sin(x-90°) = -\cos x$
- $\cos(x-90°) = \sin x$
- $\sin(360°-x) = -\sin x$

$\cos(90°-a) = \cos(90°-\varphi)\cos(90°-\delta) + \sin(90°-\varphi)\sin(90°-\delta)\cos H$

$\sin a = \sin\varphi \sin\delta + \cos\varphi \cos\delta \cos H$