



TRIGONOMETRY

5th
SECONDARY

ADVISORY



 **SACO OLIVEROS**



1. Sean α y θ las medidas de dos ángulos cuadrantales positivos y menores a una vuelta, tal que se cumple $\text{sen}\alpha - \tan\theta = -1$
Efectué:

$$E = \frac{\tan\left(\frac{\alpha}{6}\right) + \cos\left(\frac{\theta}{3}\right)}{\text{sen}(\alpha - \theta)}$$

RESOLUCIÓN

Como $0^\circ < \alpha$ y $\theta < 360^\circ$ y

Reemplazando en E:

$$E = \frac{\tan 45^\circ + \cos 60^\circ}{\text{sen} 90^\circ}$$



$$E = \frac{1 + \frac{1}{2}}{1}$$

$$\therefore E = \frac{3}{2}$$

$$\underbrace{\text{sen}\alpha}_{-1} - \underbrace{\tan\theta}_0 = -1$$

$$\rightarrow \theta = 180^\circ$$

$$\rightarrow \alpha = 270^\circ$$





2. Si para un ángulo α en posición normal se cumple $\tan\alpha\sqrt{\sec\alpha} < 0$, indique el signo de $M = \sec\alpha + \csc\alpha$ y $N = \cos\alpha \cdot \cot\alpha$.

RESOLUCIÓN

$$\tan\alpha\sqrt{\sec\alpha} < 0$$

\downarrow
(-)

\downarrow
(+)

Si $\tan\alpha < 0 \Rightarrow \alpha \in \text{IIIC} \vee \alpha \in \text{IVC}$

Si $\sec\alpha > 0 \Rightarrow \alpha \in \text{IC} \vee \alpha \in \text{IIC}$

por lo tanto: $\alpha \in \text{IIC}$

Nos piden el signo:

$$M = \sec\alpha + \csc\alpha \Rightarrow M = (+)$$

(+)

$$N = \cos\alpha \cdot \cot\alpha \Rightarrow N = (+)$$

(-)

$\therefore (+); (+)$





3. Si $\text{sen}\phi = -5/13$, además $\phi \in \langle 270^\circ; 360^\circ \rangle$, halle el valor de $P = \text{csc}\phi + \cot\phi$

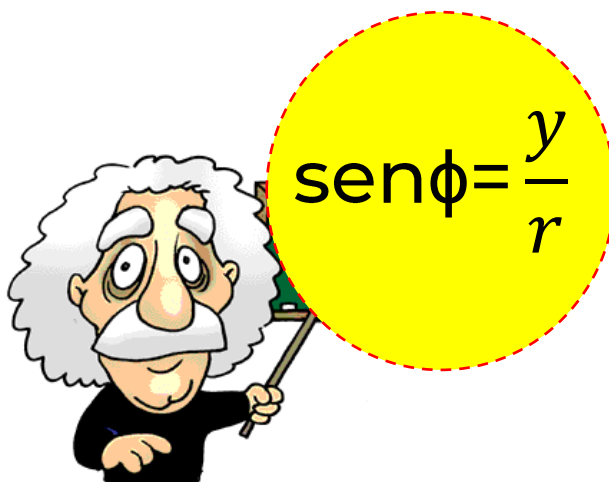
RESOLUCIÓN

$\phi \in \langle 270^\circ; 360^\circ \rangle$

$\phi \in \text{IVC} \Rightarrow x(+), y(-), r(+)$

Además:

$$\text{sen}\phi = \frac{-5}{13} = \frac{y}{r}$$



Luego: $y = -5$ y $r = 13$

Sabemos: $r = \sqrt{x^2 + y^2}$

$$13 = \sqrt{(x)^2 + (-5)^2} \Rightarrow x = 12$$

Piden: $P = \text{csc}\phi + \cot\phi$

$$P = \frac{13}{-5} + \frac{12}{-5}$$

$$\therefore P = -5$$



4. A Juan se le entregó S/x como incentivo por sus buenas calificaciones. Resolviendo la siguiente ecuación podrá averiguar con cuanto se le premió.

$$8\csc(-30^\circ) - x \cdot \cot(-45^\circ) = 15\cos(-37^\circ)$$

RESOLUCIÓN

Resolviendo la ecuación:

$$\underbrace{8(-\csc 30^\circ)}_{-2} - x \underbrace{(-\cot 45^\circ)}_{-1} = 15 \underbrace{(\cos 37^\circ)}_{4/5}$$

$$-16 + x = 12 \quad \Rightarrow \quad x = 28$$

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

$$\cot(-\alpha) = -\cot \alpha$$

$$\csc(-\alpha) = -\csc \alpha$$

α

∴ Juan recibió S/ 28 de incentivo





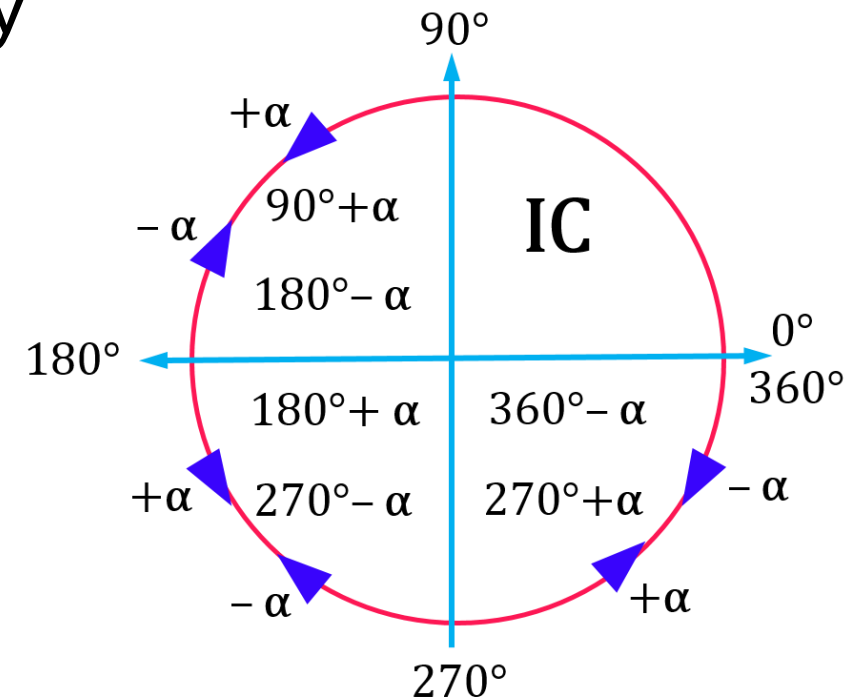
5. Si: $x - y = \pi / 2$, reduzca: $E = \frac{3\cos x}{\sen y} - \frac{\cot x}{\tan y}$

RESOLUCIÓN

Despejamos x , luego reemplazar en E :

$$E = \frac{3\cos\left(\overbrace{\frac{\pi}{2} + y}^{IIC}\right)}{\sen y} - \frac{\cot\left(\overbrace{\frac{\pi}{2} + y}^{IIC}\right)}{\tan y}$$

$$E = \frac{3(-\cancel{\sen y})}{\cancel{\sen y}} - \frac{-\cancel{\tan y}}{\cancel{\tan y}} \rightarrow E = -3 + 1$$



$$E = -2$$





6. Si $\theta \in \text{IIC}$, además, $\cos\theta = -\frac{\sqrt{5}}{3}$, reduzca: $Q = \frac{\sqrt{5}\cot(270^\circ + \theta)}{\csc(180^\circ - \theta)}$

RESOLUCIÓN

$$Q = \frac{\overbrace{\sqrt{5}\cot(270^\circ + \theta)}^{\text{IVC}}}{\underbrace{\csc(180^\circ - \theta)}_{\text{IIC}}}$$

$$Q = \frac{\sqrt{5}(-\tan\theta)}{\csc\theta}$$

$$Q = -\frac{\sqrt{5}\tan\theta}{\csc\theta} \dots (*)$$

Dato:

$$\cos\theta = \frac{-\sqrt{5}}{3} = \frac{x}{r}$$

$$r = \sqrt{x^2 + y^2}$$

$$3 = \sqrt{(-\sqrt{5})^2 + y^2} \rightarrow y = 2$$

Reemplazando en (*):

$$Q = -\frac{\sqrt{5}\tan\theta}{\csc\theta} = -\sqrt{5} \frac{\frac{y}{x}}{\frac{r}{y}} = -\sqrt{5} \frac{\frac{2}{-\sqrt{5}}}{\frac{3}{2}}$$

$$Q = \sqrt{5} \left(\frac{4}{3\sqrt{5}} \right)$$

$$\therefore Q = \frac{4}{3}$$





7. Simplifique la expresión: $E = \frac{\cos(3\pi + x) \cdot \text{sen}(4\pi - x)}{\text{sen}\left(\frac{9\pi}{2} + x\right)}$

RESOLUCIÓN

$$E = \frac{\overbrace{\cos(3\pi + x)}^{\text{impar}} \cdot \overbrace{\text{sen}(4\pi - x)}^{\text{par}}}{\text{sen}\left(\underbrace{\frac{9\pi}{2}}_{4+1} + x\right)}$$

$$E = \frac{\overbrace{\cos(3\pi + x)}^{\text{IIIC}} \cdot \overbrace{\text{sen}(4\pi - x)}^{\text{IVC}}}{\underbrace{\text{sen}\left(\frac{9\pi}{2} + x\right)}_{\text{IIC}}}$$

$$E = \frac{(-\cancel{\cos x}) \cdot (-\text{sen} x)}{\cancel{\cos x}}$$

$$\therefore E = \text{sen} x$$



8. Siendo $y - x = 1350^\circ$; reduzca: $M = \frac{\text{sen } y}{\text{cos } x} + \tan x \cdot \tan y$

RESOLUCIÓN

Reemplazando "y" en términos de "x": $y = 1350^\circ + x$

$$M = \frac{\text{sen}(1350^\circ + x)}{\text{cos } x} + \tan x \cdot \tan(1350^\circ + x)$$

$\overset{\circ}{4}+3$

$\overset{\circ}{4}+3$

$$M = \frac{\text{sen}(15(90^\circ) + x)}{\text{cos } x} + \tan x \cdot \tan(15(90^\circ) + x)$$

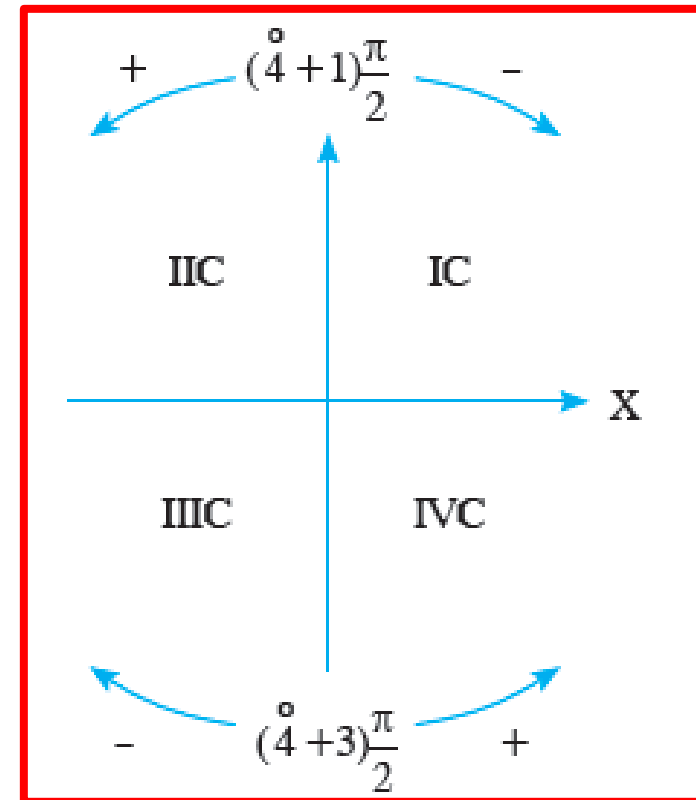
IVC

IVC

$$M = \frac{\text{sen}(\overbrace{15(90^\circ) + x}^{\text{IVC}})}{\text{cos } x} + \tan x \cdot \tan(\overbrace{15(90^\circ) + x}^{\text{IVC}})$$

$$M = \frac{-\cancel{\text{cos } x}}{\cancel{\text{cos } x}} + \tan x \cdot \underbrace{(-\cancel{\text{cot } x})}_{-1}$$

$$M = -1 - 1$$



$$\therefore M = -2$$



9. Se cumple que $\cot(8\pi + x) = 3$.

Efectúe: $K = \sin\left(\frac{15\pi}{2} + x\right) \cdot \csc(21\pi - x)$

si x es un ángulo agudo.

RESOLUCIÓN

$$K = \sin\left(\overset{\text{impar}}{\overset{4+3}{15\frac{\pi}{2}}} + x\right) \cdot \csc(21\pi - x)$$

$$K = \underbrace{\sin\left(15\frac{\pi}{2} + x\right)}_{\text{IVC}, -\cos x} \cdot \underbrace{\csc(21\pi - x)}_{\text{IIC}, \csc x}$$

$$K = -\cos x \cdot \csc x \dots (*)$$

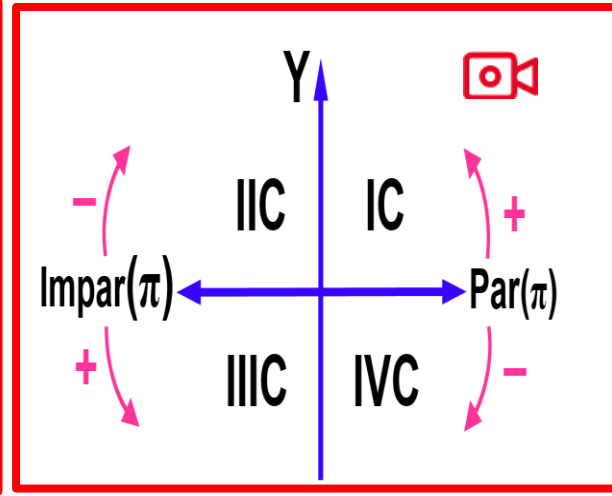
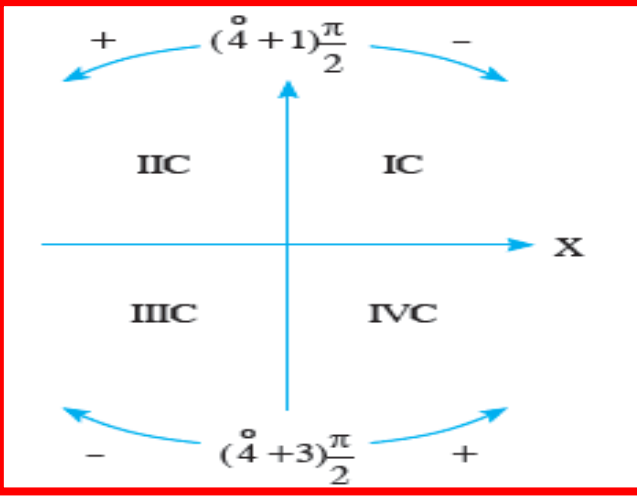
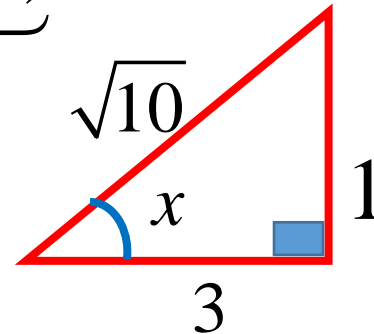
Del dato:
par

$$\cot(8\pi + x) = 3$$

$$\underbrace{\cot(8\pi + x)}_{\text{IC}, \cot x} = 3$$

$$\cot x = 3$$

$$\cot x = \frac{3}{1}$$



Reemplazando

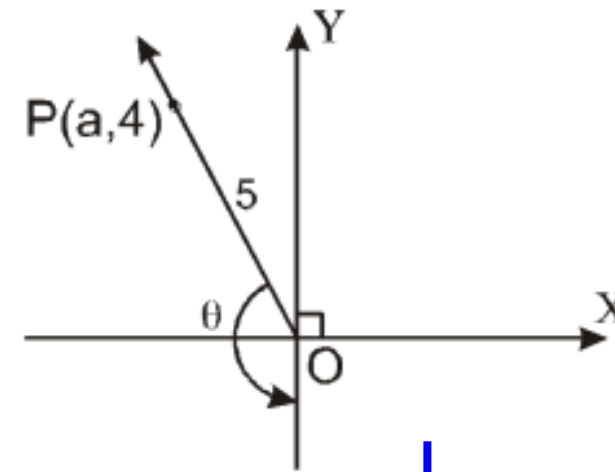
$$K = -\cos x \cdot \csc x$$

$$K = -\frac{3}{\cancel{\sqrt{10}}} \cdot \frac{\cancel{\sqrt{10}}}{1}$$

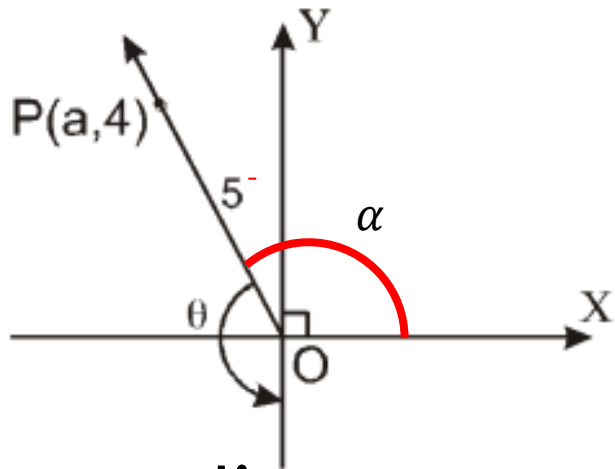
$$\therefore K = -3$$



10. Con la información dada en la figura, calcule el valor de $M = \sec\theta + \tan\theta - 2$



RESOLUCIÓN



Por radio vector:

$$r = \sqrt{x^2 + y^2}$$

Del dato:

$$5 = \sqrt{a^2 + 4^2}$$

Como: $P \in IIC$

$$\rightarrow a = -3$$

Del grafico:

$$\alpha + \theta = 270^\circ$$

$$\theta = 270^\circ - \alpha$$

IIC

$$\sec\theta = \sec(270^\circ - \alpha)$$

$$\sec\theta = -\csc\alpha$$

$$\sec\theta = -\frac{5}{4}$$

IIC

$$\tan\theta = \tan(270^\circ - \alpha)$$

$$\tan\theta = \cot\alpha$$

$$\tan\theta = -\frac{3}{4}$$

Reemplazando:

$$M = \sec\theta + \tan\theta - 2$$

$$M = \left(-\frac{5}{4}\right) + \left(-\frac{3}{4}\right) - 2$$

$$\therefore M = -4$$