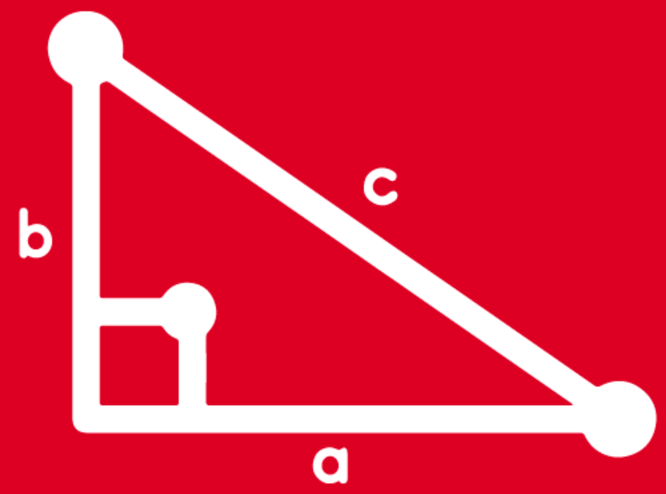
TRIGONOMETRY

Session 2



4th
SECONDARY

ADVISORY

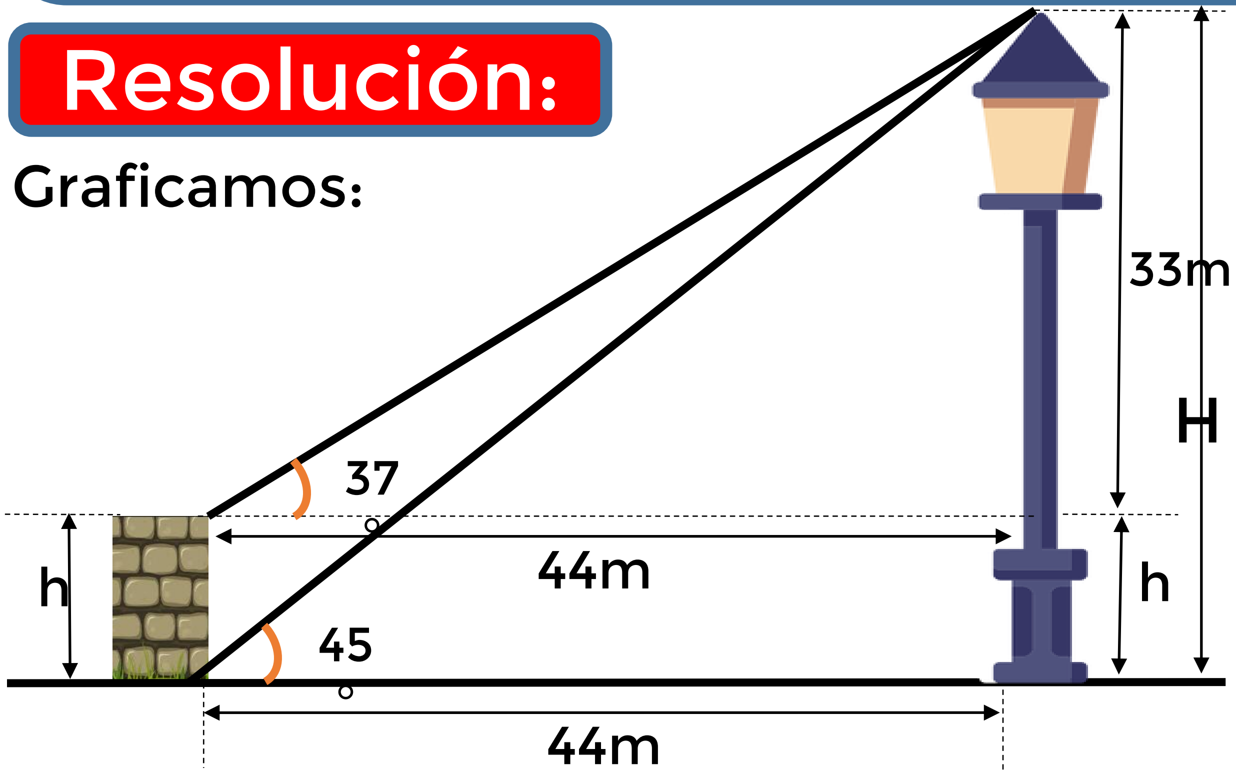
SACO OLIVEROS

PROBLEMA 1

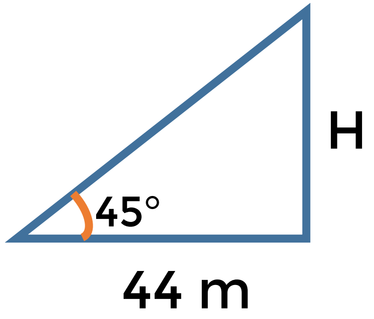
Desde lo alto y bajo de un muro se observa lo alto de un poste con ángulos de elevación de 37° y 45°, respectivamente. Si la distancia entre el muro y el poste es de 44 metros. Derterminar la altura del muro.

Resolución:

Graficamos:

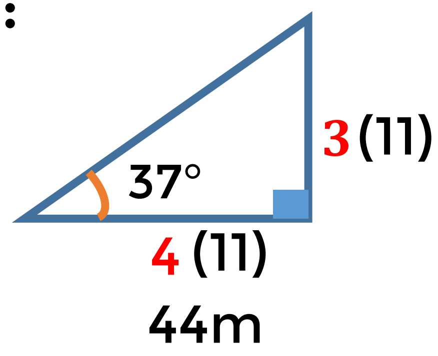


Del triángulo notable de 45°: obtenemos



H = 44 m

Observamos 37° :



Calculando "h"

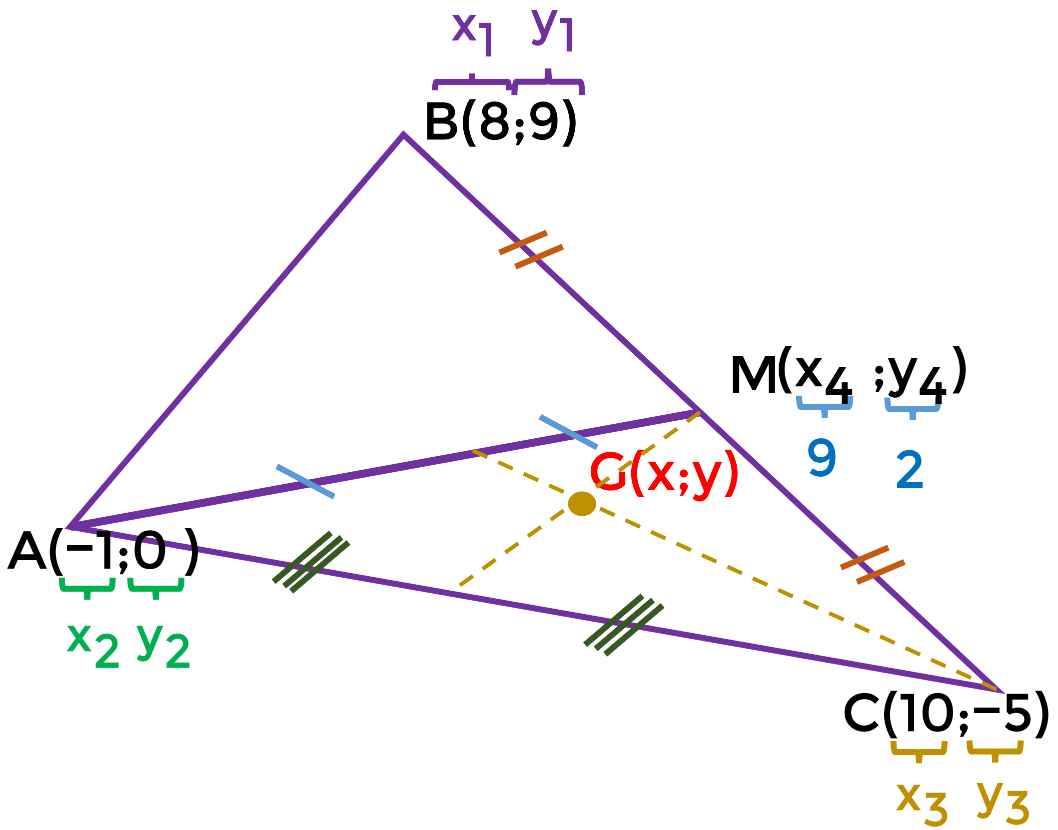
$$33 + h = H$$

$$33 + h = 44$$

$$\therefore \ h = 11 \text{ m}$$

PROBLEMA 2

Del gráfico, calcule las coordenadas del baricentro del triángulo MAC.



Resolución:

Determinamos las coordenadas de M:

$$x_4 = \frac{x_1 + x_3}{2} = \frac{8 + 10}{2} \Rightarrow x_4 = 9$$

$$y_4 = \frac{y_1 + y_3}{2} = \frac{9 + (-5)}{2} \Rightarrow y_4 = 2$$

Determinamos las coordenadas del baricentro:

$$x = \frac{x_2 + x_3 + x_4}{3} = \frac{-1 + 10 + 9}{3} \Rightarrow x = 6$$

$$y = \frac{y_2 + y_3 + y_4}{3} = \frac{0 + (-5) + 2}{3} \Rightarrow y = -1$$

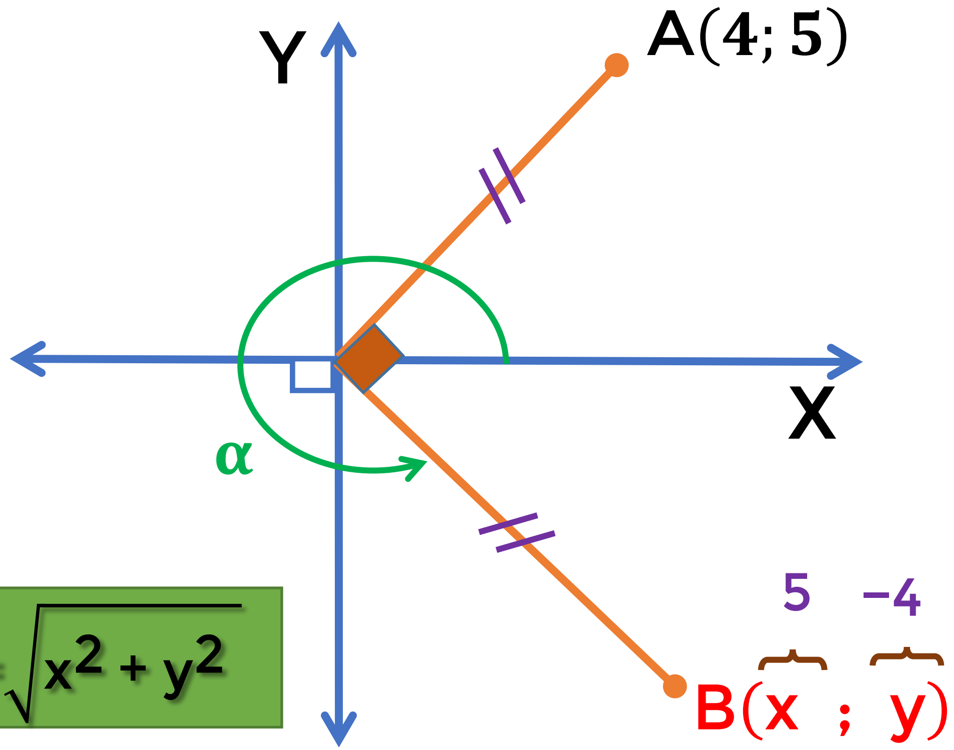
$\boxed{G(6;-1)}$

PROBLEMA 3

A partir del gráfico, efectúe

$$P = \sqrt{41}(cos\alpha - sen\alpha)$$

Resolución:



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

El punto A y B son ortogonales, entonces: $\boxed{x = 5}$ $\boxed{y = -4}$

Calculamos el radio vector:

$$r = \sqrt{5^2 + (-4)^2}$$

$$\boxed{r = \sqrt{41}}$$

$$sen\alpha = \frac{y}{r} \qquad cos\alpha = \frac{x}{r}$$

Piden: $P = \sqrt{41}(cos\alpha - sen\alpha)$

$$P = \cancel{\sqrt{41}}\left(\left(\frac{5}{\cancel{\sqrt{41}}}\right) - \left(\frac{-4}{\cancel{\sqrt{41}}}\right)\right)$$

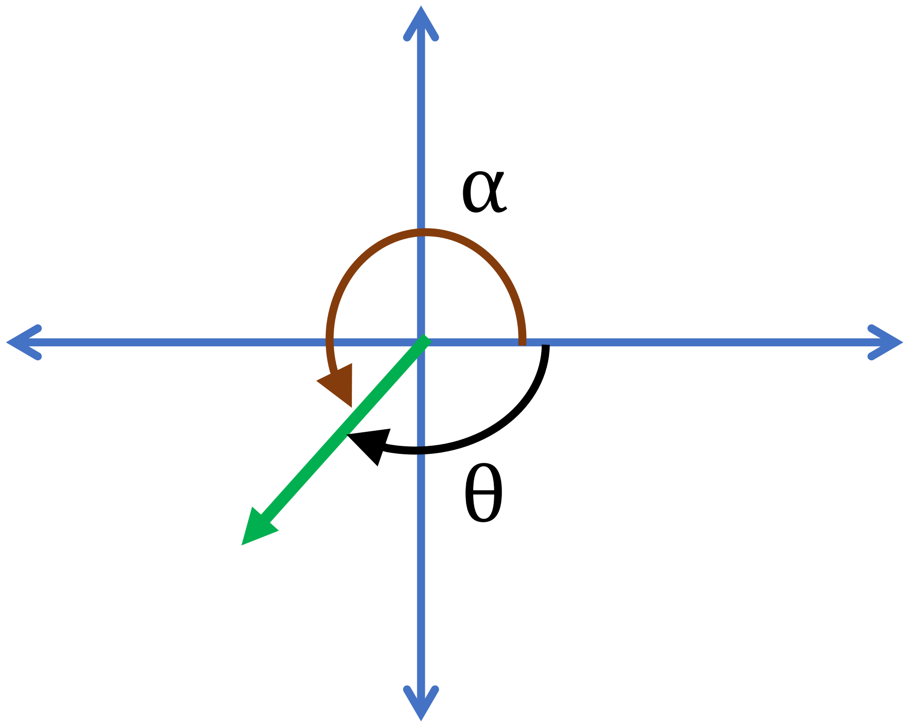
$$P = 5 - (-4)$$

$$\boxed{\therefore P = 9}$$

PROBLEMA 4

De acuerdo al gráfico reduzca:

$$E = \frac{8\tan\alpha.\cot\theta + 4\sec^2\alpha}{2\csc\theta\,\text{sen}\,\alpha + \sec^2\theta}$$



Resolución:

Si α y θ son ángulos coterminales

$\tan\alpha = \tan\theta$

$\text{sen}\,\alpha = \text{sen}\,\theta$

$\sec\alpha = \sec\theta$

Piden:

$$E = \frac{8\tan\alpha.\cot\theta + 4\sec^2\alpha}{2\csc\theta.\text{sen}\,\alpha + \sec^2\theta}$$

$$E = \frac{8\cancel{\tan\theta.\cot\theta} + 4\sec^2\theta}{2\cancel{\csc\theta.\text{sen}\,\theta} + \sec^2\theta}$$

$$E = \frac{8 + 4\sec^2\theta}{2 + \sec^2\theta} = \frac{4\cancel{(2 + \sec^2\theta)}}{\cancel{2 + \sec^2\theta}}$$

$$\therefore E = 4$$

PROBLEMA 5

Determine el valor de θ coterminal a 170°, donde $\theta \in \langle 4500°; 5000° \rangle$

Resolución:

Como θ y 170°son coterminales entonces: θ − 170° = 360°k

$$\boxed{\theta = 360°k + 170°}$$

Pero: 4500° < θ < 5000°

4500° < 360°k + 170° <5000°

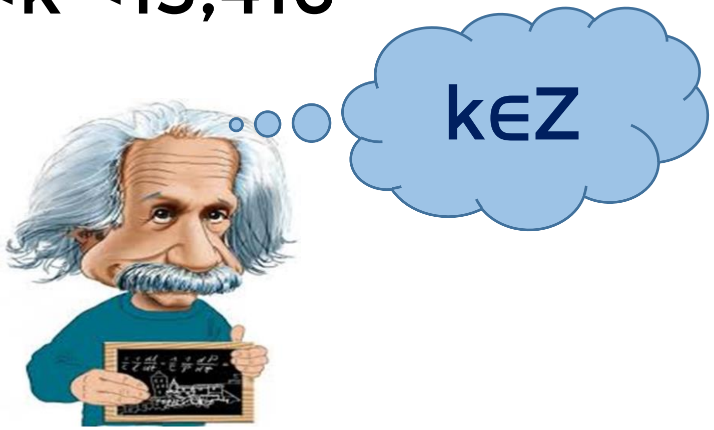
(Restar 170°)

4330°< 360°k <4830°

(Dividir entre 360°)

12,027 <k <13,416

k = 13



θ = 360°(13) + 170°

$$\boxed{\theta = 4850°}$$

PROBLEMA 6

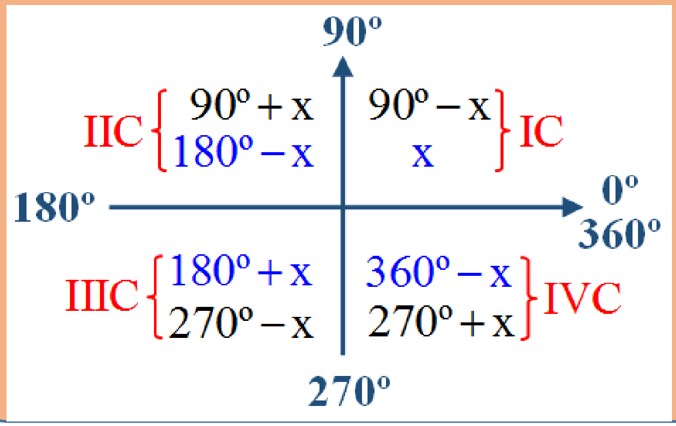
Reduzca

$$M=\frac{\sec(\frac{3\pi}{2}+x)}{\csc(\pi-x)}+\frac{\operatorname{sen}(360°-x)}{\cos(90°-x)}$$

Resolución:

$$M=\frac{\sec(\overbrace{\frac{3\pi}{2}+x}^{\text{IVC}})}{\csc(\underbrace{\pi-x}_{\text{IIC}})}+\frac{\operatorname{sen}(\overbrace{360°-x}^{\text{IVC}})}{\cos(\underbrace{90°-x}_{\text{IC}})}$$

Recordar:



$$M=\frac{\csc x}{\csc x}+\frac{-\operatorname{sen}x}{\operatorname{sen}x}$$

$$M = 1 + (-1)$$

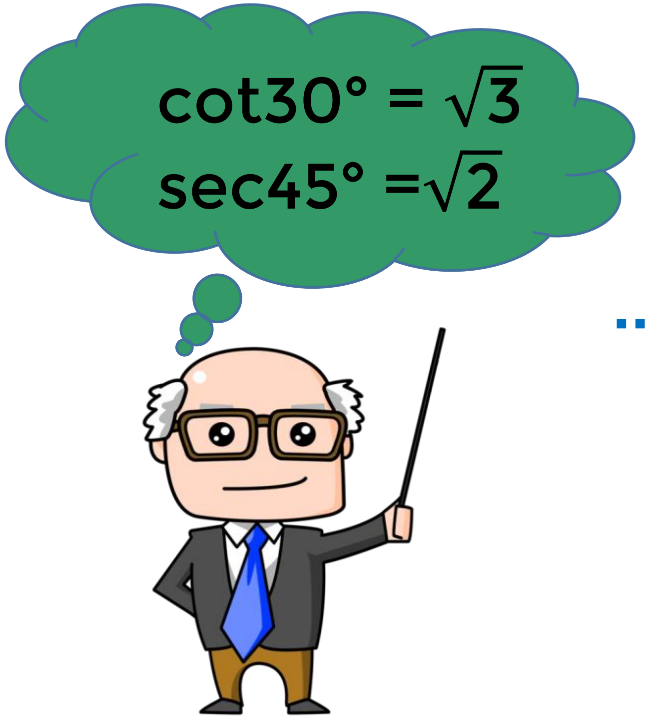
$$\therefore M = 0$$

PROBLEMA 7

Efectúe

$G = \cot 2130° . \csc 2745°$

Resolución:



$$\begin{array}{r|l} 2130° & 360° \\ \hline 1800° & 5 \\ \hline 330° & \end{array}$$

$$\begin{array}{r|l} 2745° & 360° \\ \hline 2520° & 7 \\ \hline 225° & \end{array}$$

Nos piden:

$G = \cot 2130° . \csc 2745°$

$G = \cot 330° . \csc 225°$

$G = \cot(\underbrace{360° - 30°}_{IVC}) . \csc(\underbrace{180° + 45°}_{IIIC})$

$G = (-\cot 30°)(-\csc 45°)$

$G = (-\sqrt{3})(-\sqrt{2})$

$$\boxed{\therefore\ G = \sqrt{6}}$$

PROBLEMA 8

En un triángulo ABC, reduzca:

$$K = \frac{5sec(5A + 5B + 6C)}{sec(A + B)}$$

Resolución:

Del dato: $A + B + C = 180°$

$\boxed{A + B = 180° - C}$

$5A + 5B + 5C = 5(180°)$

$\boxed{5A + 5B + 5C = 720° + 180°}$

Nos piden

$$K = \frac{5sec(5A + 5B + 6C)}{sec(A + B)}$$

$$K = \frac{5sec(5A + 5B + 5C + C)}{sec(A + B)}$$

$$K = \frac{5sec(\overbrace{180° + C}^{IIIC})}{sec(\underbrace{180° - C}_{IIC})} = \frac{-5\cancel{secC}}{\cancel{-secC}}$$

$\boxed{\therefore\ K = 5}$

PROBLEMA 9

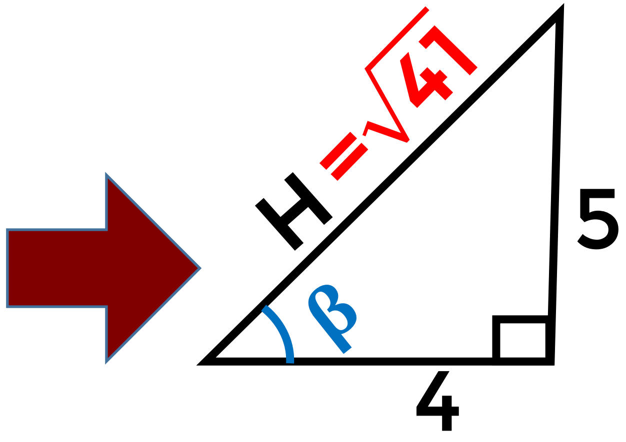
Si $\cot\beta = \frac{4}{5}$, donde β es un ángulo agudo, reduzca:

$$K = \cos(81\pi - \beta).\cos\left(161\frac{\pi}{2} + \beta\right)$$

Resolución:

Del dato:

$$\cot\beta = \frac{4}{5}$$



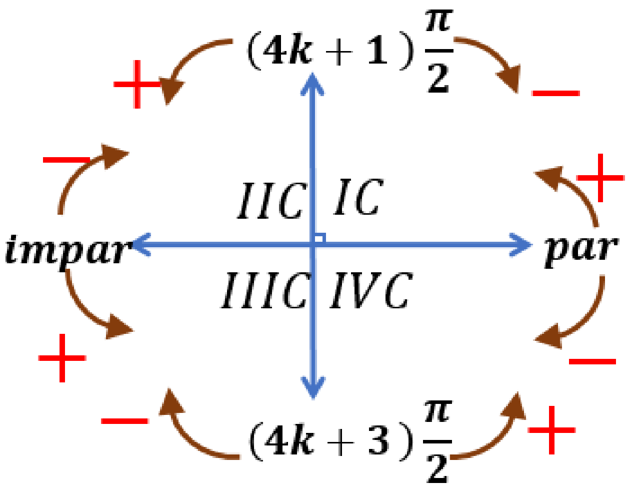
Nos piden:

$$K = \cos(\underbrace{81\overset{\text{IMPAR}}{\pi}-\beta}_{\text{IIC}}).\cos\underbrace{\left(\overset{4k+1}{161}\frac{\pi}{2}+\beta\right)}_{\text{IIC}}$$

$$K = (-\cos\beta)(-\operatorname{sen}\beta)$$

Del triángulo reemplazamos:

K)

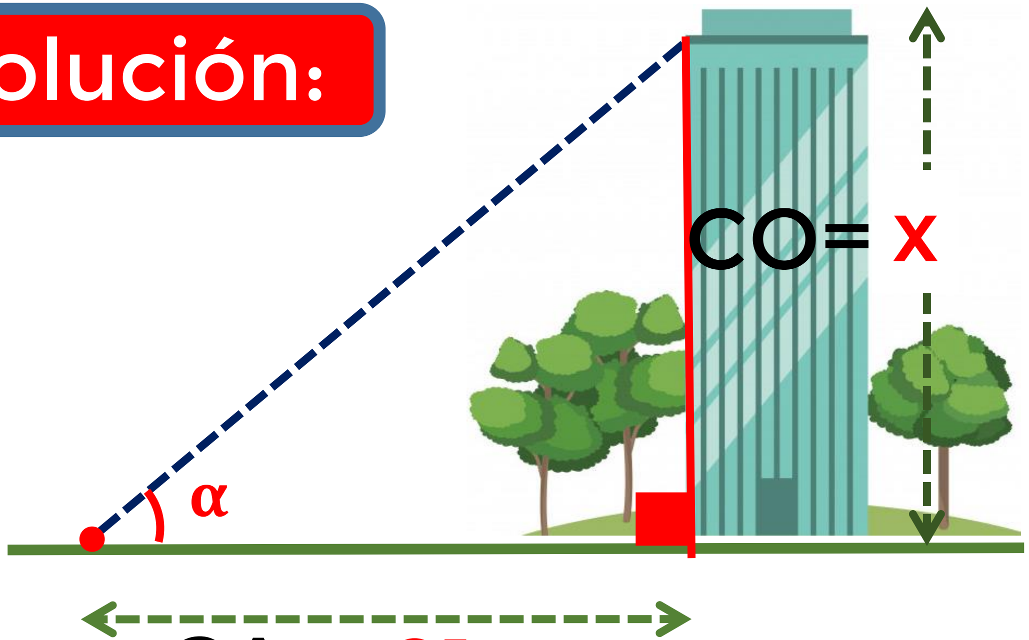


$$\therefore K = \frac{20}{41}$$

PROBLEMA 10

Desde un punto en tierra ubicado a 81 m de una torre se ve su parte más alta con un ángulo de elevación α. Si $tan\alpha = \frac{2}{3}$, ¿cuánto mide la torre?

Resolución:



Del dato: $\tan\alpha = \frac{2}{3}$

Del gráfico: $\frac{x}{81} = \frac{2}{3}$

$3x = 162$

luego:

$x = 54$

$\therefore\ x = 54m$