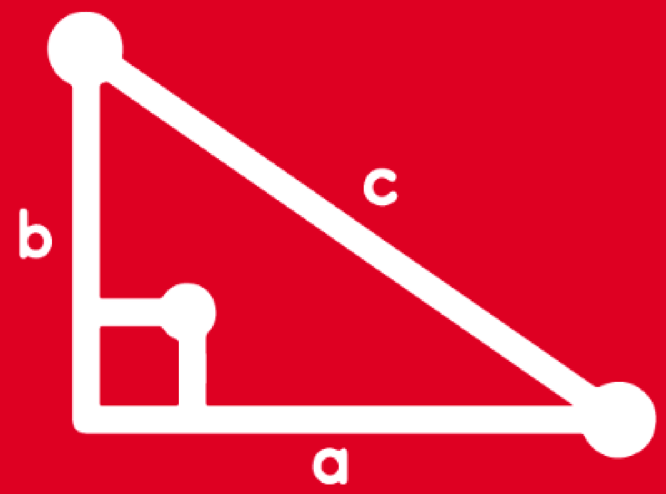
TRIGONOMETRY

Chapter 05



4th

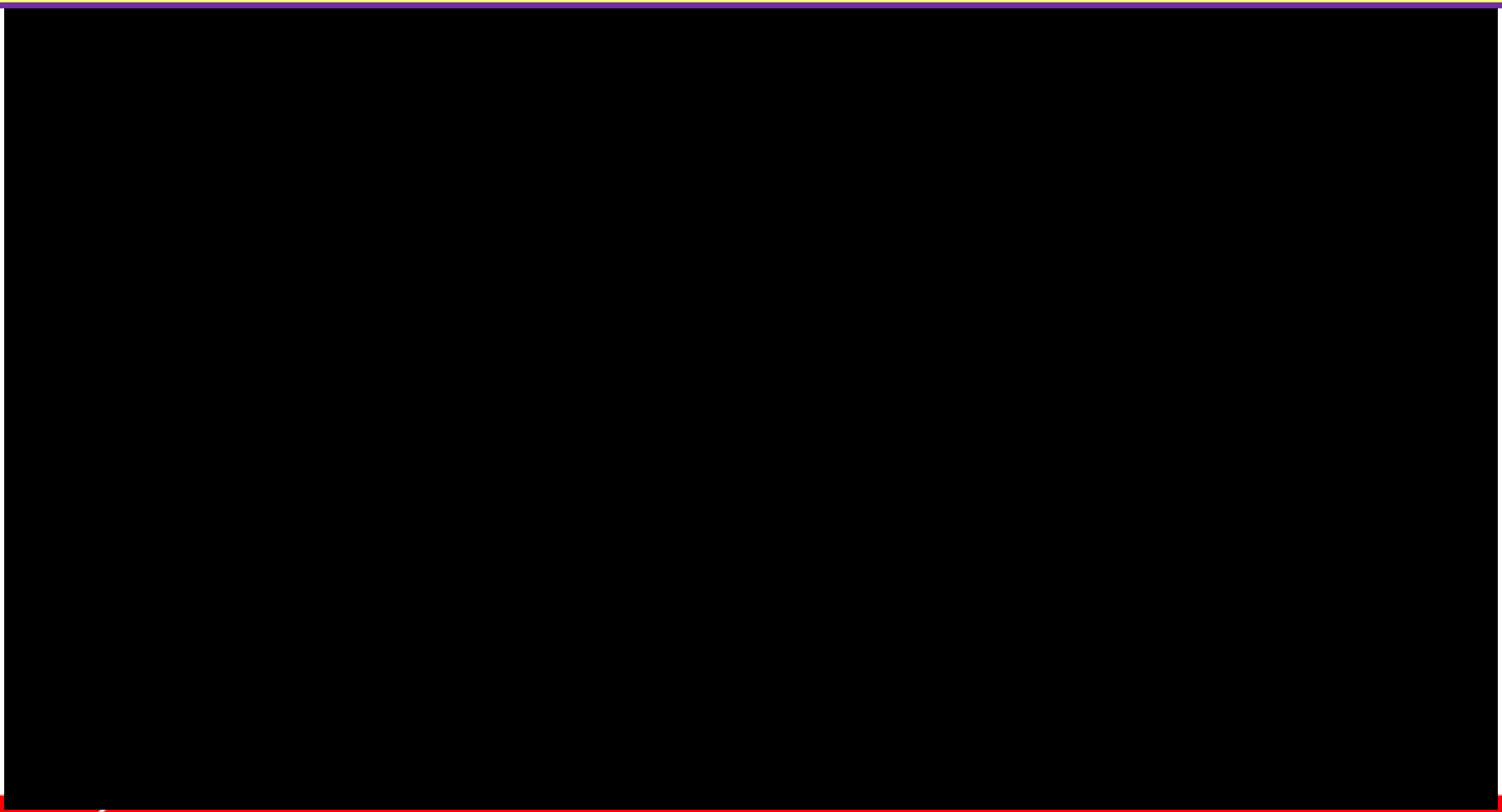
SECONDARY

RAZONES TRIGONOMÉTRICAS DE ÁNGULOS NOTABLES

SACO OLIVEROS

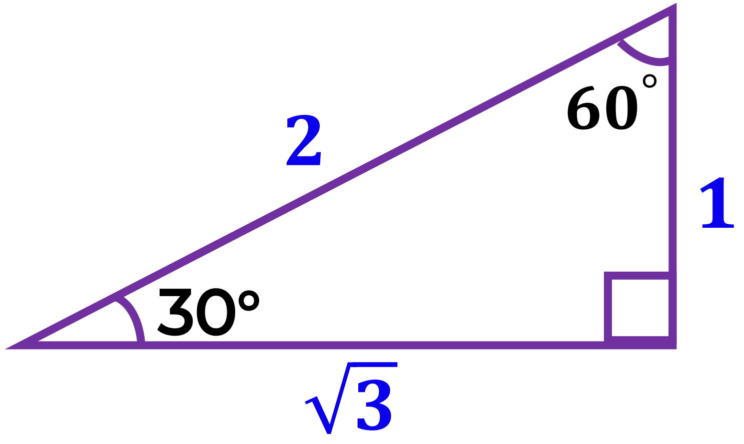
HELICO - MOTIVACIÓN

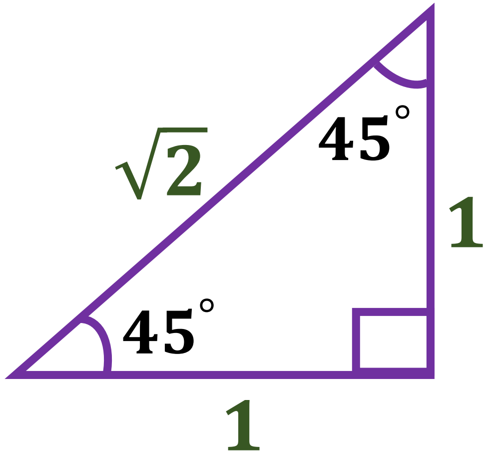
ARTIFICIO PARA CALCULAR SENO Y COSENO DE ÁNGULOS NOTABLES



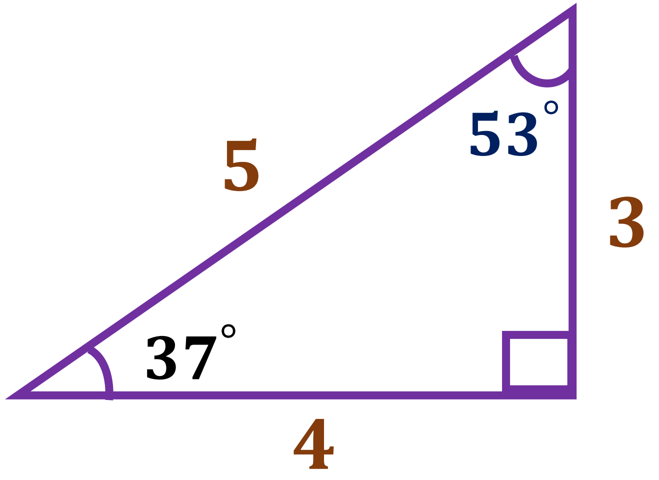
TRIÁNGULOS RECTÁNGULOS NOTABLES Y APROXIMADOS

TRIÁNGULOS NOTABLES





TRIÁNGULO APROXIMADO (PITAGÓRICO)



Luego aplicamos las definiciones de las razones trigonométricas del ángulo agudo.

$$\frac{a}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

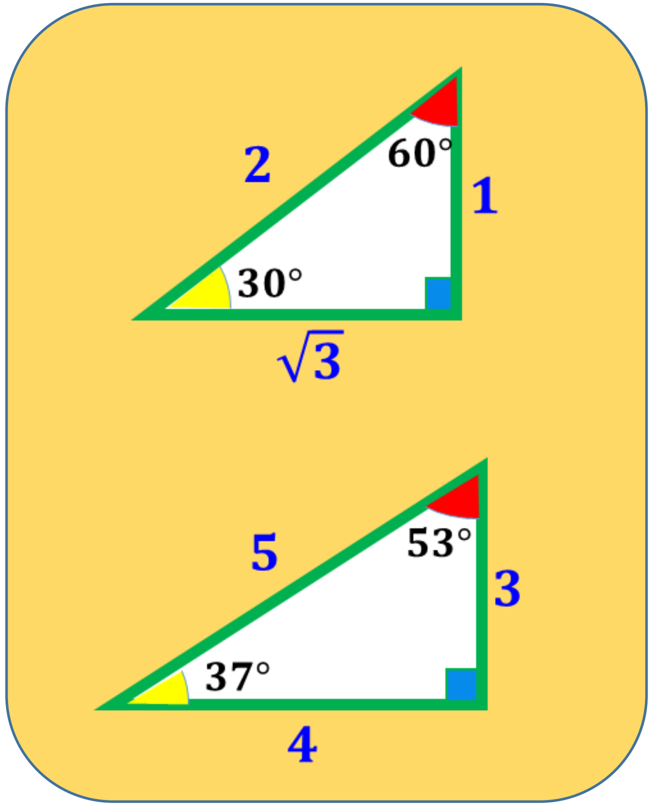
Ejemplo :

$$\csc 60° = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

α \ RT	sen	cos	tan	cot	sec	csc
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
37°	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{4}{3}$	$\frac{5}{4}$	$\frac{5}{3}$
53°	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{4}{3}$	$\frac{3}{4}$	$\frac{5}{3}$	$\frac{5}{4}$

HELICO PRACTICE 1

Efectúe $P = \left(5\,\text{sen}37° + \sqrt{3}\,\tan 60° + \cot^2 30° \right)^{\cos 60°}$



RESOLUCIÓN

$$P = \left(\cancel{5}\left(\frac{3}{\cancel{5}}\right) + \sqrt{3}\left(\sqrt{3}\right) + \left(\cancel{\sqrt{}}3\right)^{\cancel{2}} \right)^{1/2}$$

$$P = (3 + 3 + 3)^{1/2}$$

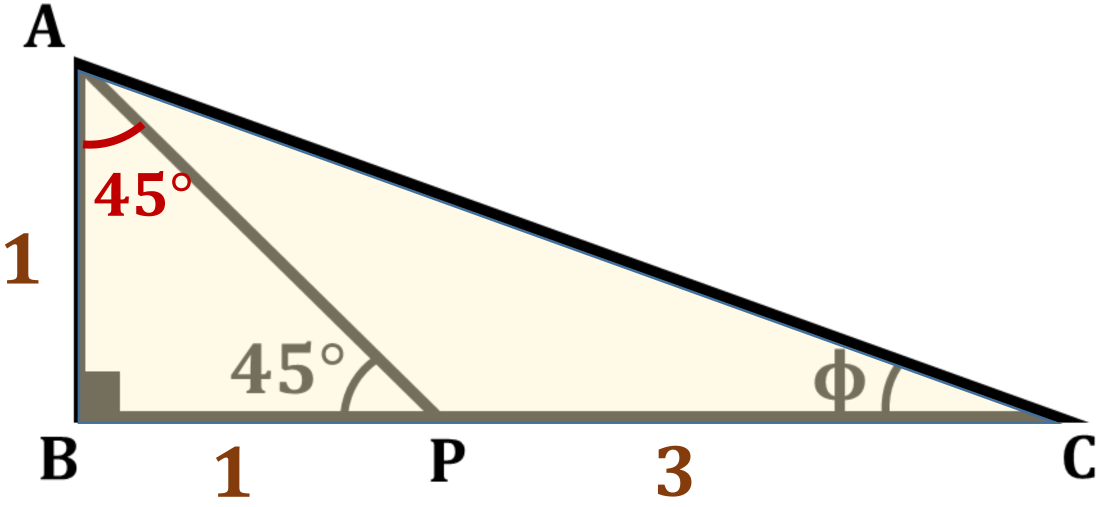
$$P = \sqrt{9}$$

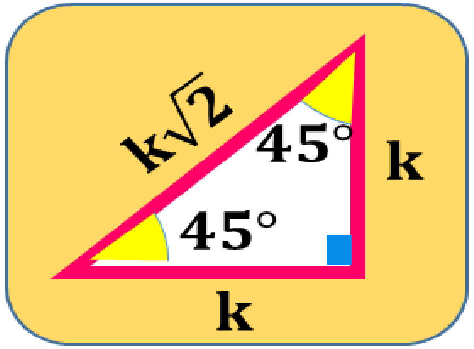
$$\boxed{\therefore\ P = 3}$$

$\text{sen}\alpha$	$\cos\alpha$	$\tan\alpha$	$\cot\alpha$	$\sec\alpha$	$\csc\alpha$
$\frac{CO}{H}$	$\frac{CA}{H}$	$\frac{CO}{CA}$	$\frac{CA}{CO}$	$\frac{H}{CA}$	$\frac{H}{CO}$

HELICO PRACTICE 2

Del gráfico, calcule $\cot\varphi$ si PC = 3 BP .





$$\cot\alpha = \frac{CA}{CO}$$

RESOLUCIÓN

Dato :

$$1\ PC = 3\ BP \Rightarrow \frac{PC}{BP} = \frac{3}{1}$$

En ΔABP (Notable de 45°) :

$$AB = BP = 1$$

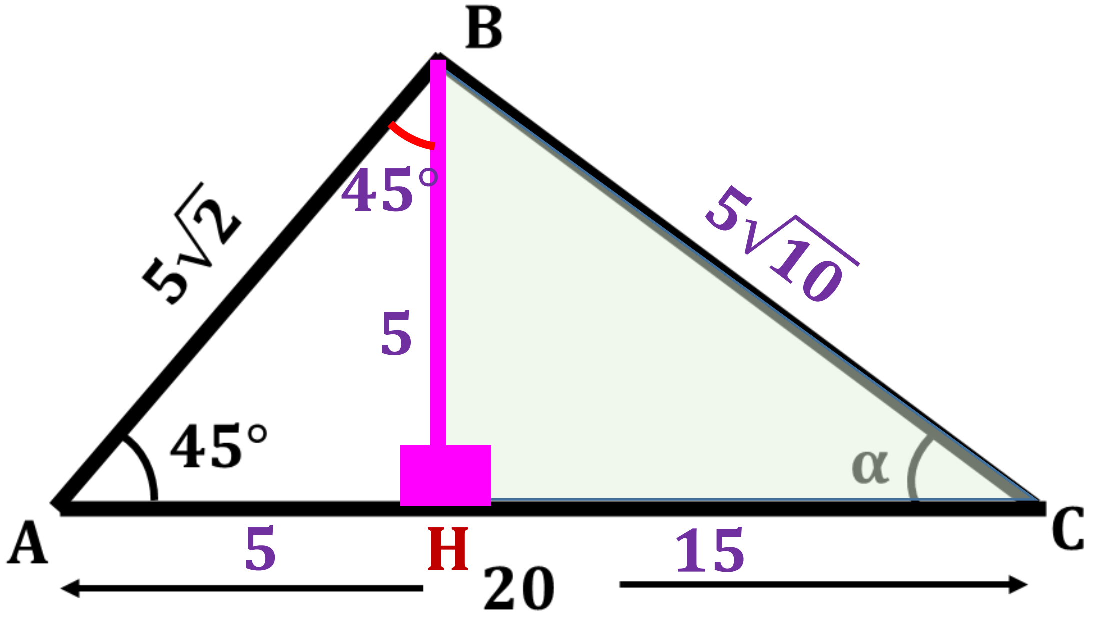
En ΔABC : $\cot\phi = \dfrac{1+3}{1}$

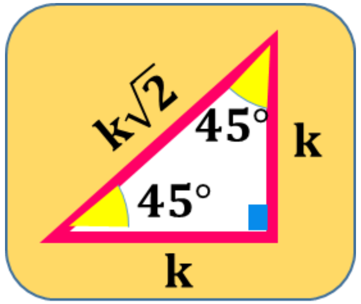
$$\boxed{\therefore \cot\phi = 4}$$

HELICO PRACTICE 3

Del gráfico, efectúe :

$$E = \sqrt{10}\,\text{sen}\alpha + \cot\alpha$$





senα	cotα
$\dfrac{CO}{H}$	$\dfrac{CA}{CO}$

RESOLUCIÓN

En ΔAHB (Notable de 45°– 45º) :

$AB = 5\sqrt{2} \Rightarrow AH = HB = 5$

En ΔBHC : Teorema de Pitágoras

$$(BC)^2 = (5)^2 + (15)^2$$

$$(BC)^2 = 250 \Rightarrow BC = 5\sqrt{10}$$

Luego : $E = \sqrt{10}\,\text{sen}\alpha + \cot\alpha$

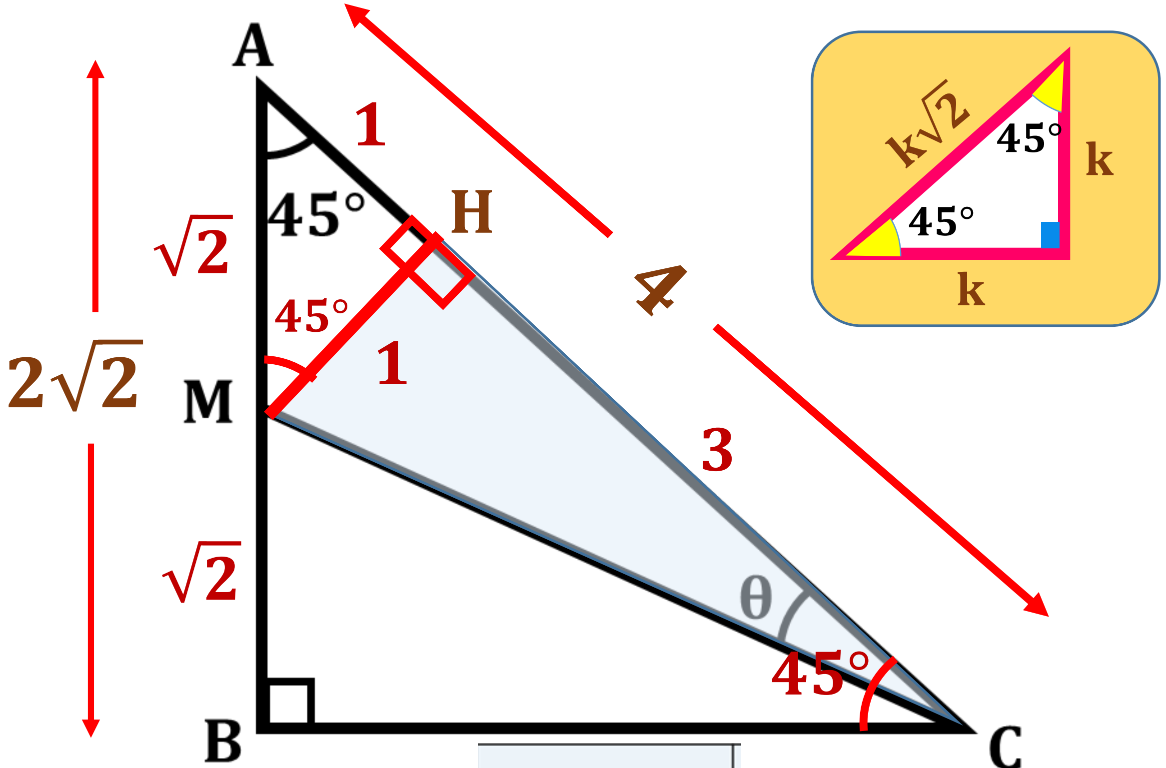
$$E = \cancel{\sqrt{10}}\left(\frac{5}{5\cancel{\sqrt{10}}}\right) + \frac{15}{5}$$

$$E = 1 + 3$$

$$\boxed{\therefore E = 4}$$

HELICO PRACTICE 4

Del gráfico, calcule $\tan\theta$ si AM = MB .



$tan\alpha$
$\frac{CO}{CA}$

RESOLUCIÓN

En Δ AHM(Notable de 45°– 45^0) :

Sea : $AM = \sqrt{2}$ ➡ $AH = MH = 1$

$MB = AM = \sqrt{2}$

En Δ AHM(Notable de 45°– 45^0) :

$AB = 2\sqrt{2}$ ➡ $AC = 2\sqrt{2}\,\sqrt{2}$

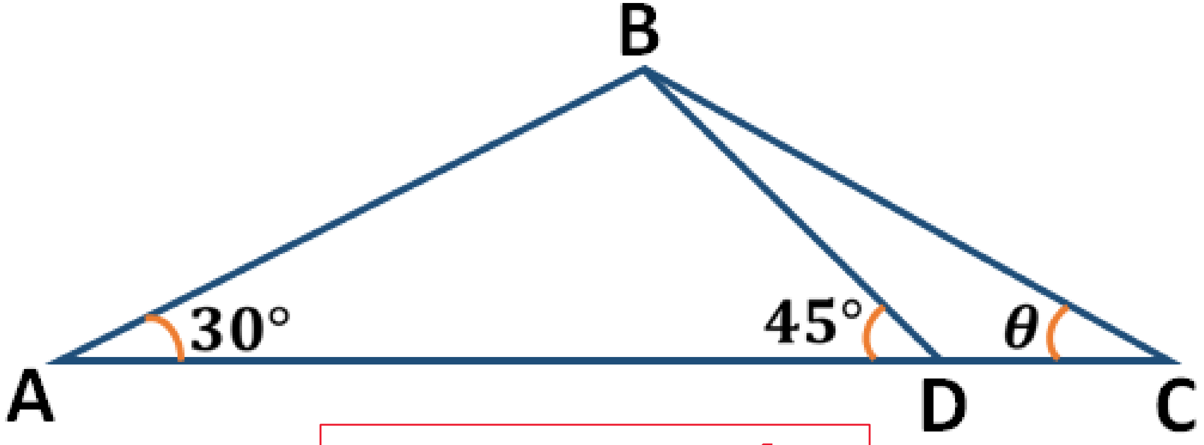
➡ $AC = 4$

En ΔCHM :

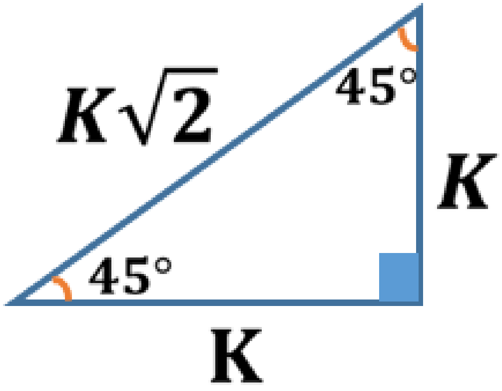
$$\boxed{\therefore \tan\theta = \frac{1}{3}}$$

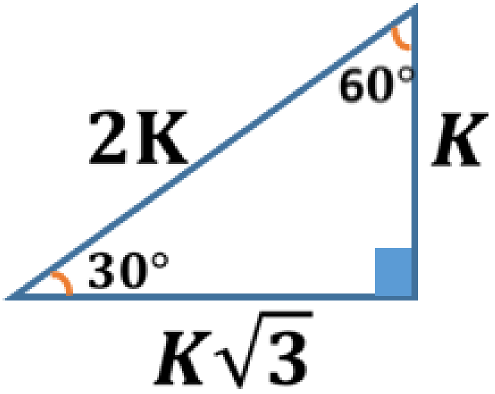
HELICO PRACTICE 5

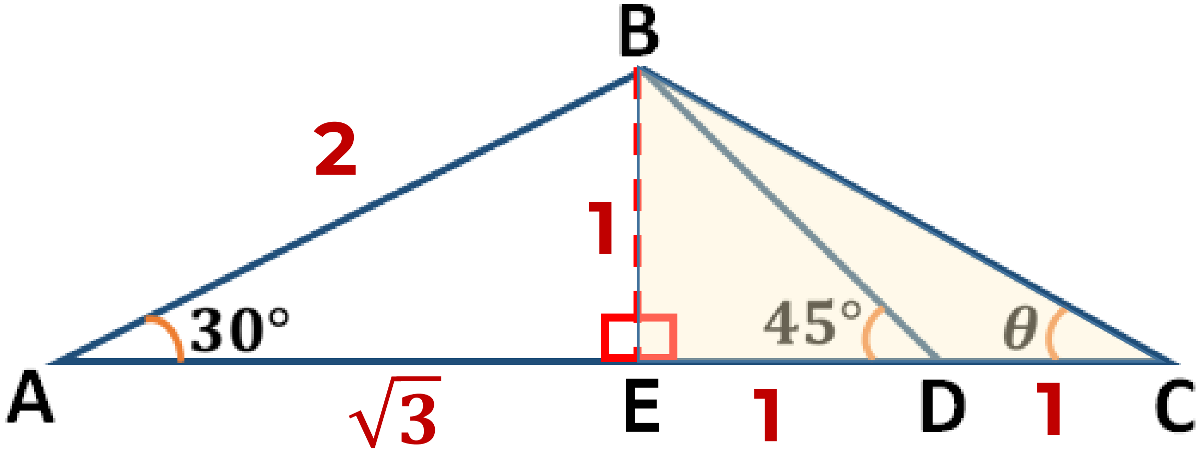
Del gráfico, calcule $\cot\theta$, si AB = 2 DC .



RESOLUCIÓN







Sean : AB = 2 ; DC = 1

Completamos lados en ◺notables :

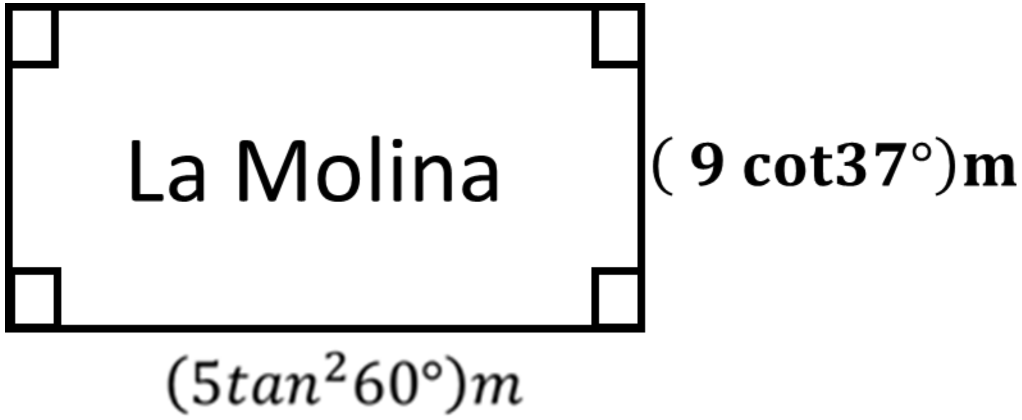
En ◺BEC : $\cot\theta = \dfrac{1+1}{1}$

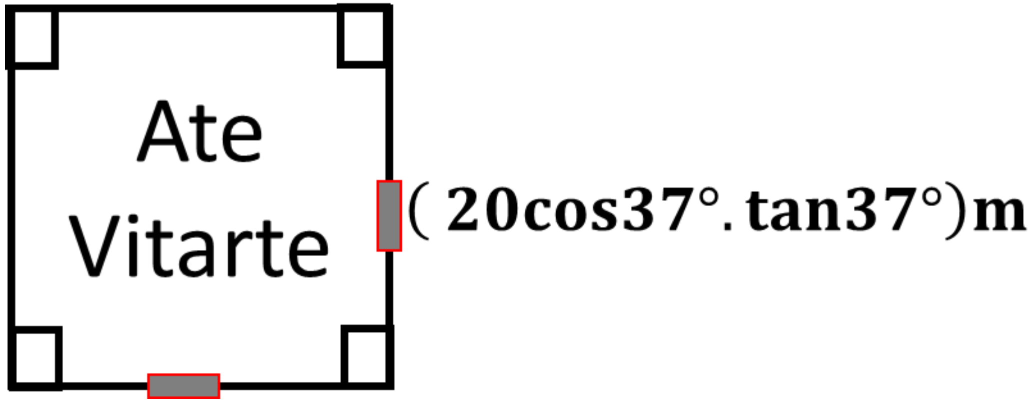
$\cot\alpha$
$\dfrac{CA}{CO}$

$$\therefore \cot\theta = 2$$

HELICO PRACTICE 6

Gigi es una corredora de bienes raíces que ante el incremento del precio del dólar decide vender uno de los terrenos que tiene.- Si el m^2 se valora en $1000.- Calcule el precio de venta del terreno de mayor área .





RESOLUCIÓN

La Molina = $\left(5\tan^2 60°\right)m\ \left(9\cot 37°\right)m$

$$= 5\left(\cancel{\sqrt{3}}\right)^{\cancel{2}}.\,9\left(\frac{4}{\cancel{3}}\right)m^2 = \boxed{180\ m^2}$$

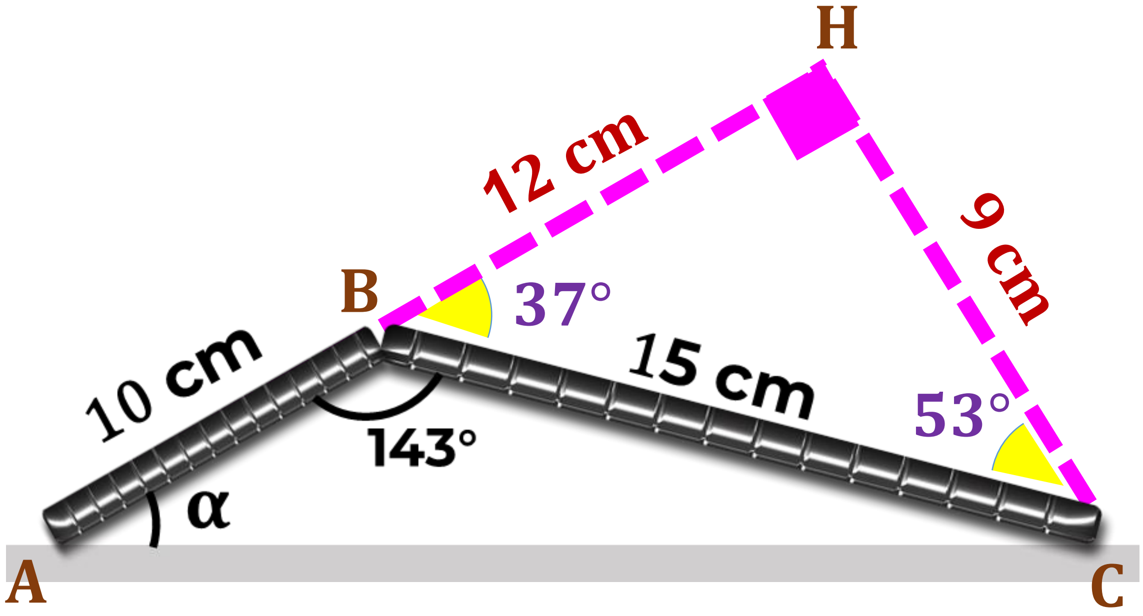
Ate Vitarte = $[(20\cos 37°.\tan 37°)\ m\ ]^2$

$$= \left[20\left(\frac{\cancel{4}}{5}\right)\left(\frac{3}{\cancel{4}}\right)m\right]^2 = 144\ m^2$$

$\therefore$ El terreno de mayor área es el de La Molina y cuesta $180000

HELICO PRACTICE 7

Dos barras metálicas se encuentran apoyadas en su parte superior , tal como se muestra en la figura.- Si el ángulo que forman las barras en su punto de apoyo es de 143°, calcule $E = 11\tan\alpha + \frac{1}{2}$.



RESOLUCIÓN

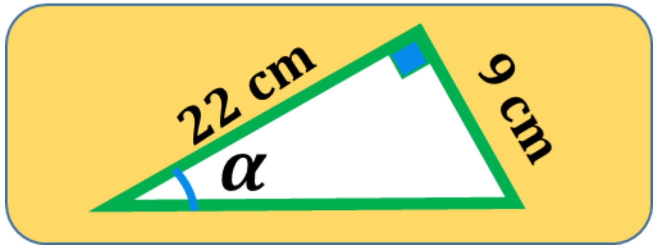
En el ΔBHC (Notable de 37° y 53°) :

$BC = 5k = 15 \text{ cm} \Rightarrow k = 3 \text{ cm}$

Luego :

$HC = 3k = 3(3 \text{ cm}) = 9 \text{ cm}$

$HB = 4k = 4(3 \text{ cm}) = 12 \text{ cm}$



Luego :

$\tan\alpha$
$\frac{CO}{CA}$

$$E = \overset{1}{\cancel{11}}\left(\frac{9}{\underset{2}{\cancel{22}}}\right) + \frac{1}{2}$$

$$E = \frac{9}{2} + \frac{1}{2}$$

$\boxed{\therefore \quad E = 5}$

SACO OLIVEROS