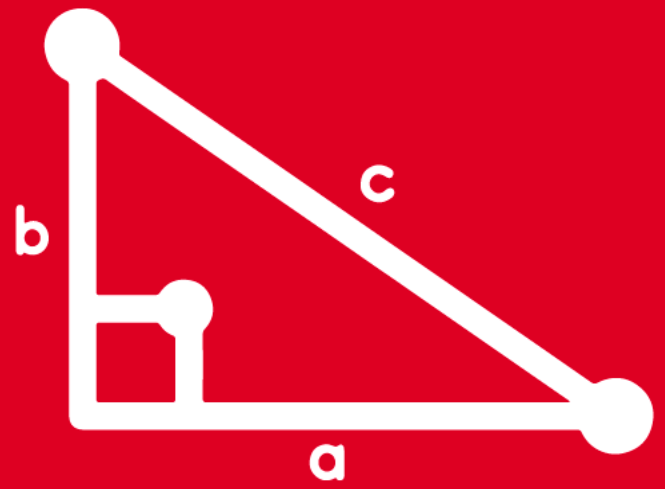
TRIGONOMETRY

Chapter 05
Session I



4th
SECONDARY

Razones trigonométricas de ángulos notables

SACO OLIVEROS

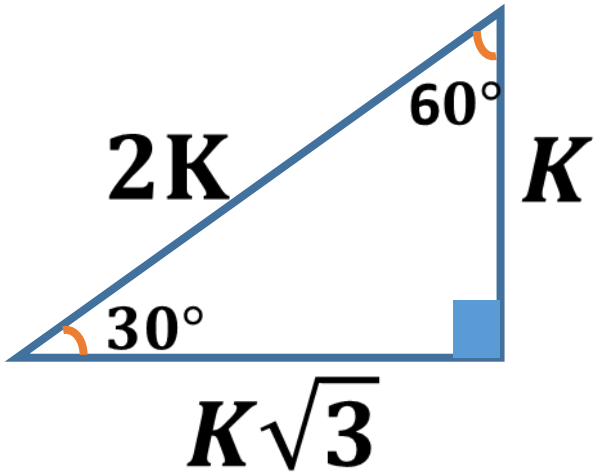
MOTIVACIÓN

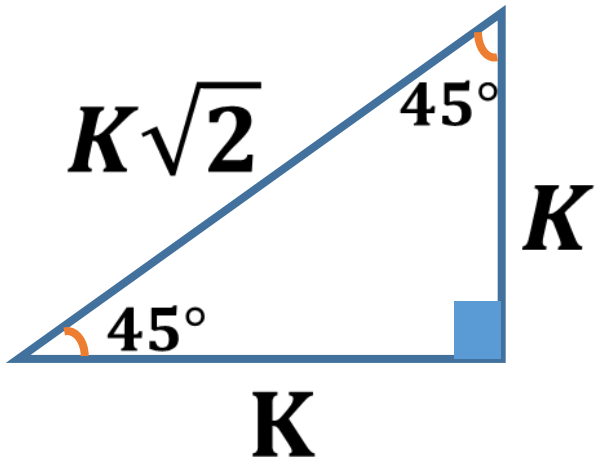
Sabías que existen varios ángulos notables, ¿Cuántas conoces?. Completemos el cuadro.

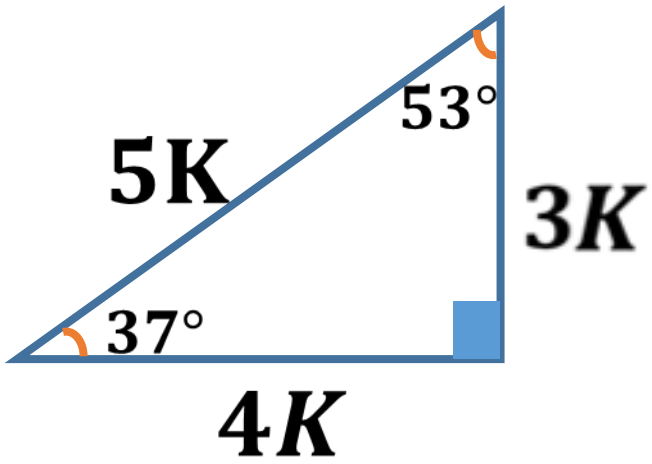
RT \ α	30^0	60^0	45^0	37^0	53^0	16^0	74^0
Sen α	1/2	$\sqrt{3}/2$	$\sqrt{2}/2$	3/5	$4/5$	$7/25$	24/25
Cos α	$\sqrt{3}/2$	1/2	$\sqrt{2}/2$	$4/5$	$3/5$	$24/25$	$7/25$
Tan α	$\sqrt{3}/3$	$\sqrt{3}$	1	$3/4$	4/3	7/24	$24/7$
Cot α	$\sqrt{3}$	$\sqrt{3}/3$	1	4/3	$3/4$	$24/7$	7/24
Sec α	$2\sqrt{3}/3$	2	$\sqrt{2}$	$5/4$	$5/3$	25/24	$25/7$
Csc α	2	$2\sqrt{3}/3$	$\sqrt{2}$	$5/3$	5/4	$25/7$	$25/24$

TEORÍA

Razones trigonométricas de ángulos notables

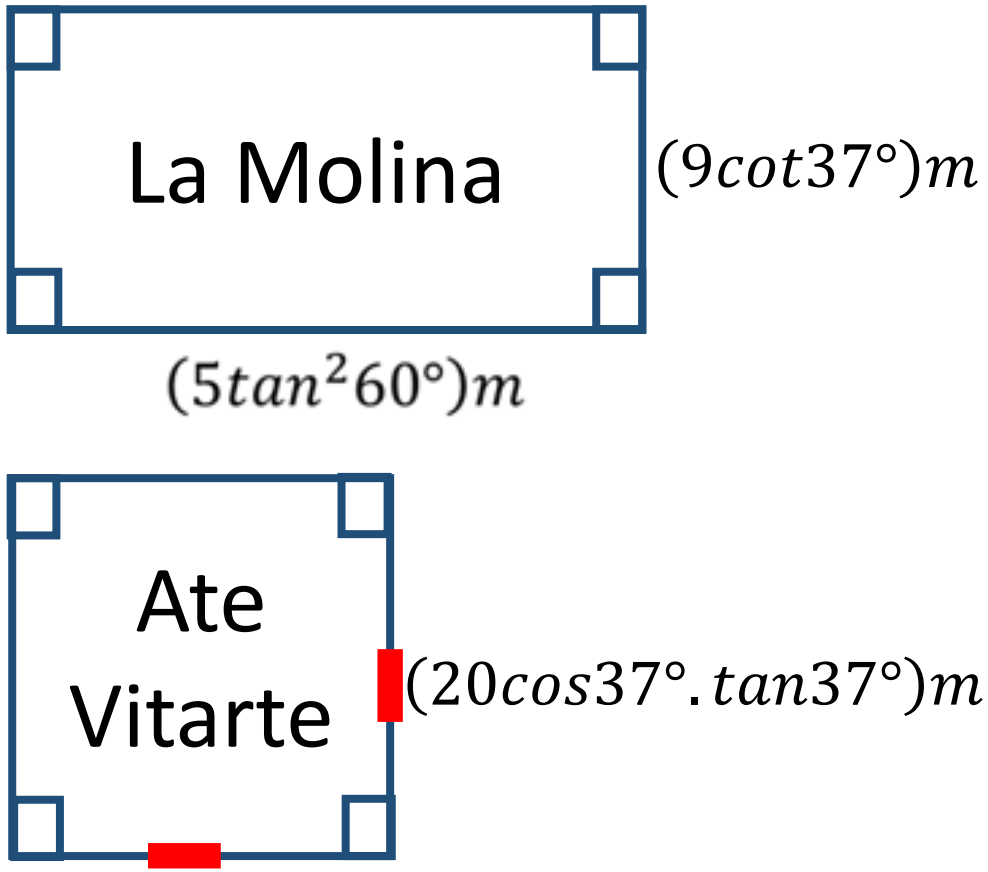






RT \ ∠	30°	60°	37°	53°	45°
sen	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{\sqrt{2}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{\sqrt{2}}{2}$
tan	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{3}{4}$	$\frac{4}{3}$	1
cot	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$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

1. Thomas tiene dos terrenos en los distritos de la Molina y Ate-Vitarte. Si los terrenos tienen las siguientes dimensiones, ¿cuál de ellos tiene la mayor área?



RESOLUCIÓN:

La Molina

$$(9cot37°)m = \left(9.\frac{4}{3}\right)m = 12m$$

$$(5tan^260°)m = \left(5\sqrt{3}^2\right)m = 15m$$

$$S = (12m)(15m)$$
$$\boldsymbol{S = 180m^2}$$

Ate -Vitarte

$$(20cos37°.tan37°)m = \left(20.\frac{4}{5}.\frac{3}{4}\right)m = 12m$$

$$S = (12m)^2$$
$$\boldsymbol{S = 144m^2}$$

Rpta: La Molina

2. Halle el valor de x si:

$$5x.sen53° - sec60° = 2x + (tan60° + cot30°)^2$$

RESOLUCIÓN:

$$\cancel{5}x\left(\frac{4}{\cancel{5}}\right) - (2) = 2x + \left(\sqrt{3} + \sqrt{3}\right)^2$$

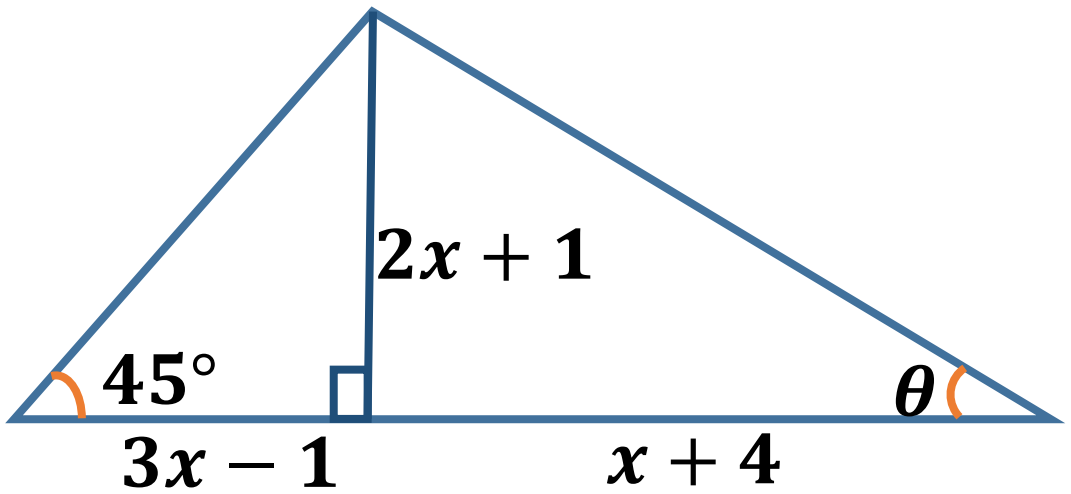
$$4x - 2 = 2x + \left(2\sqrt{3}\right)^2$$

$$4x - 2x = 2 + 12$$

$$2x = 14$$

$$\boldsymbol{x = 7}$$

3. Del gráfico, calcule tanθ



RESOLUCIÓN:

En el triángulo de 45°:

$$3x - 1 = 2x + 1$$

$$x = 2$$

Luego:

$$tan\theta = \frac{2(2)+1}{(2)+4}$$

$$\boldsymbol{tan\theta = \frac{5}{6}}$$

4. Halle el valor de $x(x > 0)$, si:

$$\frac{x + sec45°}{sen53°} = \frac{10sec60°.tan45°}{x - sec45°}$$

RESOLUCIÓN:

$$\frac{x + \sqrt{2}}{\frac{4}{5}} = \frac{10.2.1}{x - \sqrt{2}}$$

$$(x + \sqrt{2})(x - \sqrt{2}) = 10 \cdot 2 \cdot 1 \cdot \frac{4}{5}$$

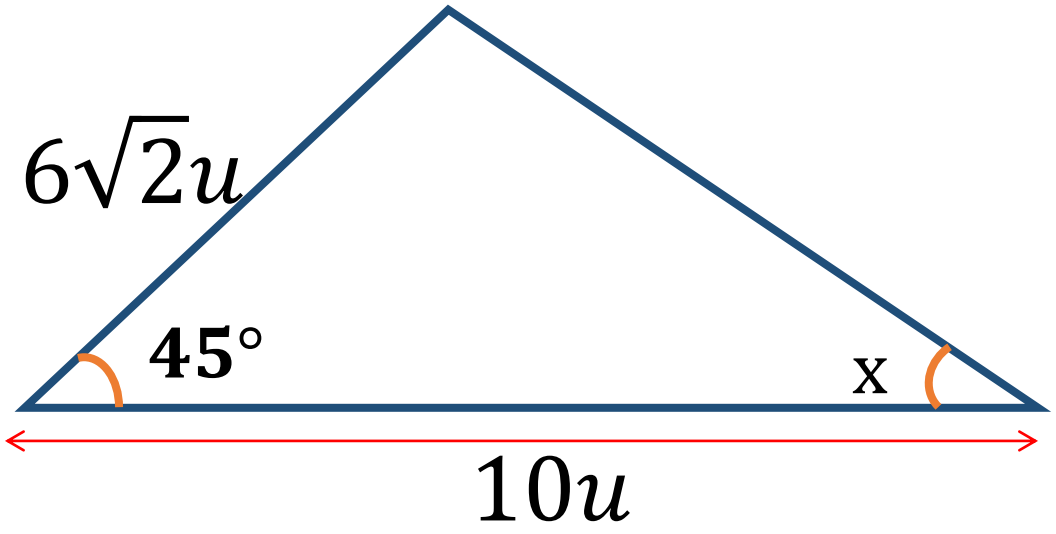
$$x^2 - \sqrt{2}^2 = 16$$

$$x^2 - 2 = 16$$

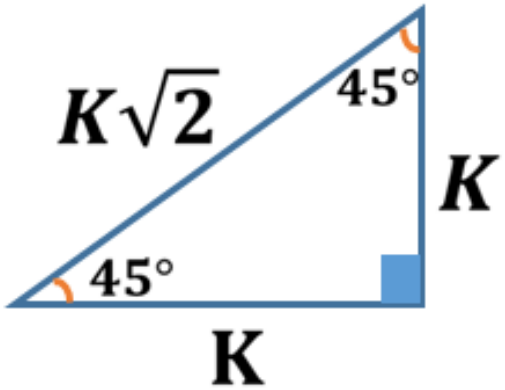
$$x^2 = 18$$

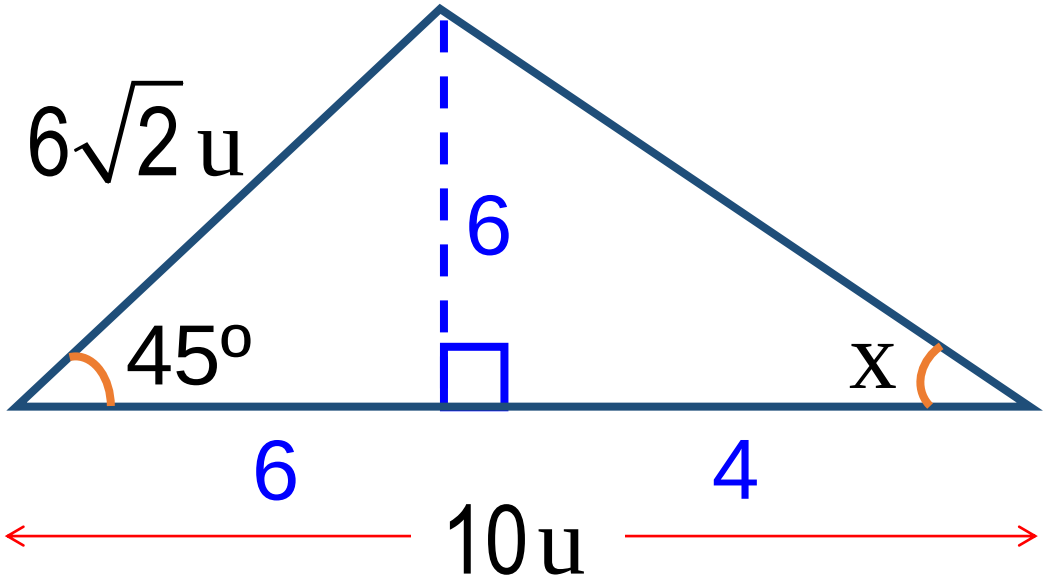
$$\boldsymbol{x = 3\sqrt{2}}$$

5. Del gráfico, calcule tanx.



RESOLUCIÓN:



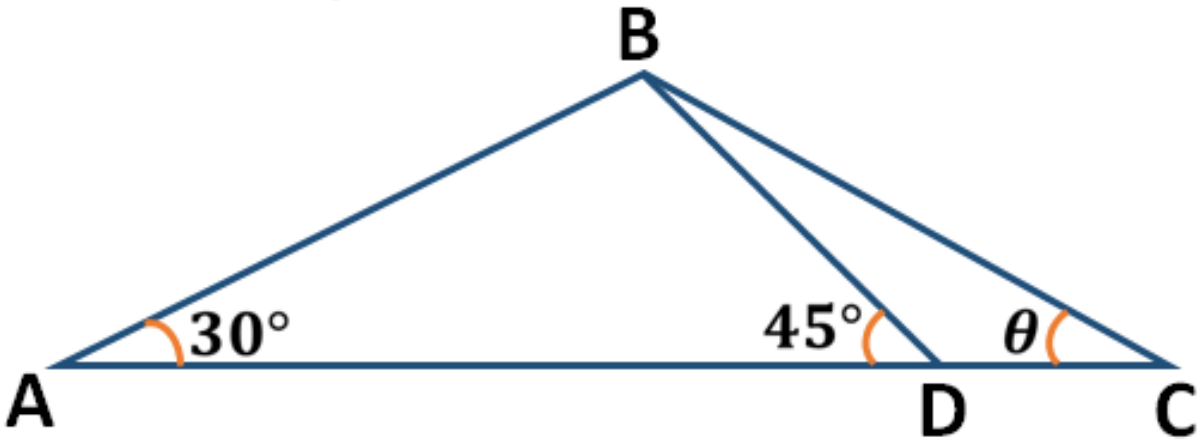


En $\triangle$ 45°: K = 6

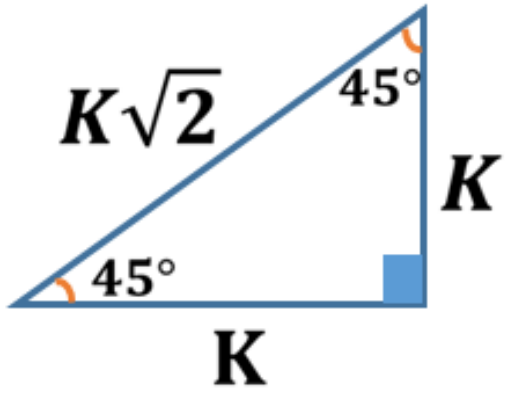
En $\triangle$ x: $\tan x = \frac{6}{4}$

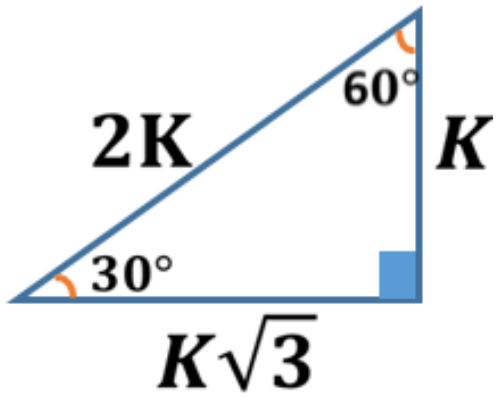
$$\tan x = \frac{3}{2}$$

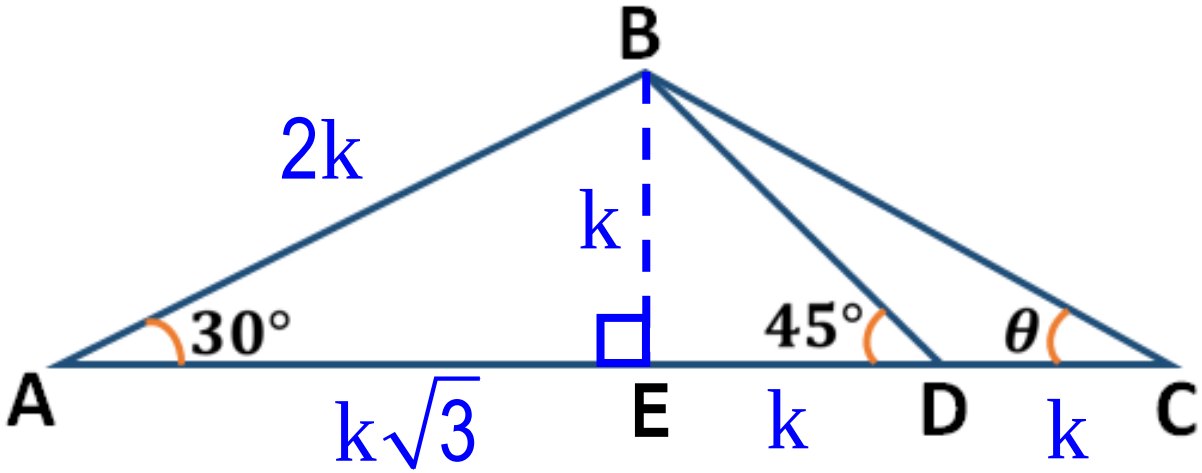
6. Del gráfico, calcule $cot\theta$ si AB=2DC.



RESOLUCIÓN:







DATO: $DC = k$; $AB = 2k$

Completar en $\triangle$ 30° y $\triangle$ 45°

En $\triangle$ BEC:

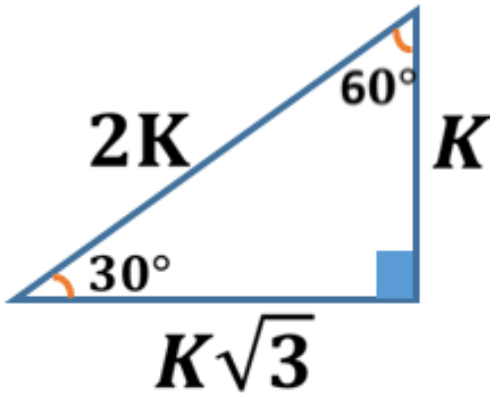
$$\cot\theta = \frac{EC}{EB} = \frac{2k}{k}$$

$$\cot\theta = 2$$

7. Si $csc\theta = sec60° - sen30°$, donde θ es un ángulo agudo, efectúe:

$$K = \sqrt{csc\theta + \sqrt{5}cot\theta}$$

RESOLUCIÓN:

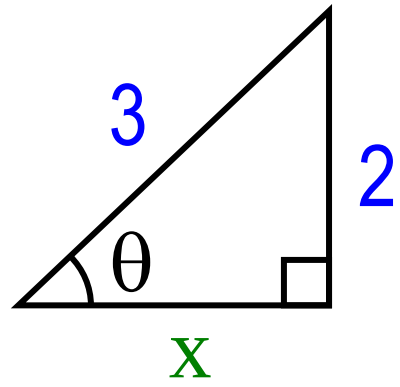


DATO:

$$\csc\theta = \sec 60° - \text{sen}30°$$

$$\csc\theta = 2 - \frac{1}{2}$$

$$\csc\theta = \frac{3}{2} = \frac{H}{CO}$$



T. de Pitágoras:

$$3^2 = 2^2 + x^2 \Rightarrow x = \sqrt{5}$$

PIDEN: $K = \sqrt{\csc\theta + \sqrt{5}\cot\theta}$

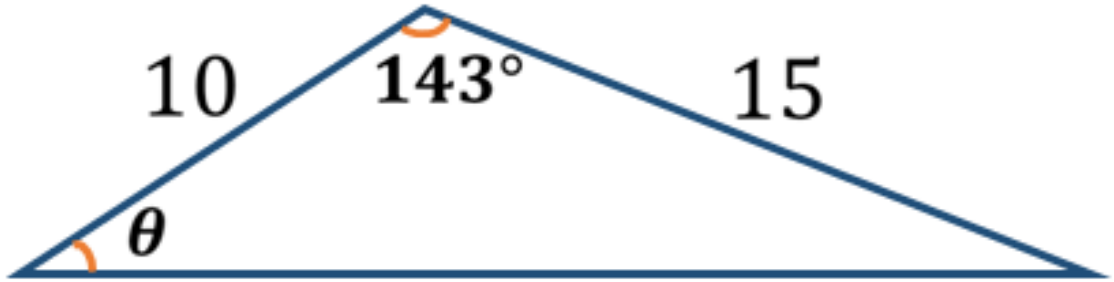
$$K = \sqrt{\frac{3}{2} + \sqrt{5}x\frac{\sqrt{5}}{2}} = \sqrt{\frac{3}{2} + \frac{5}{2}}$$

$$\Rightarrow K = \sqrt{4}$$

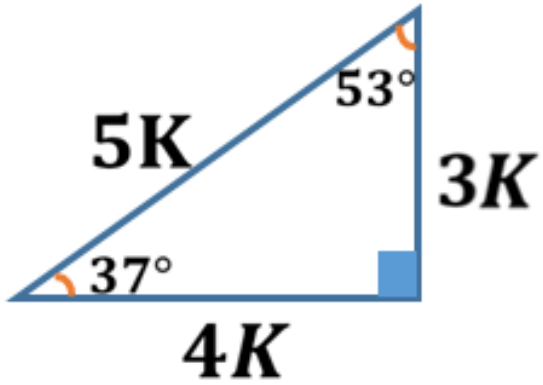
$$K = 2$$

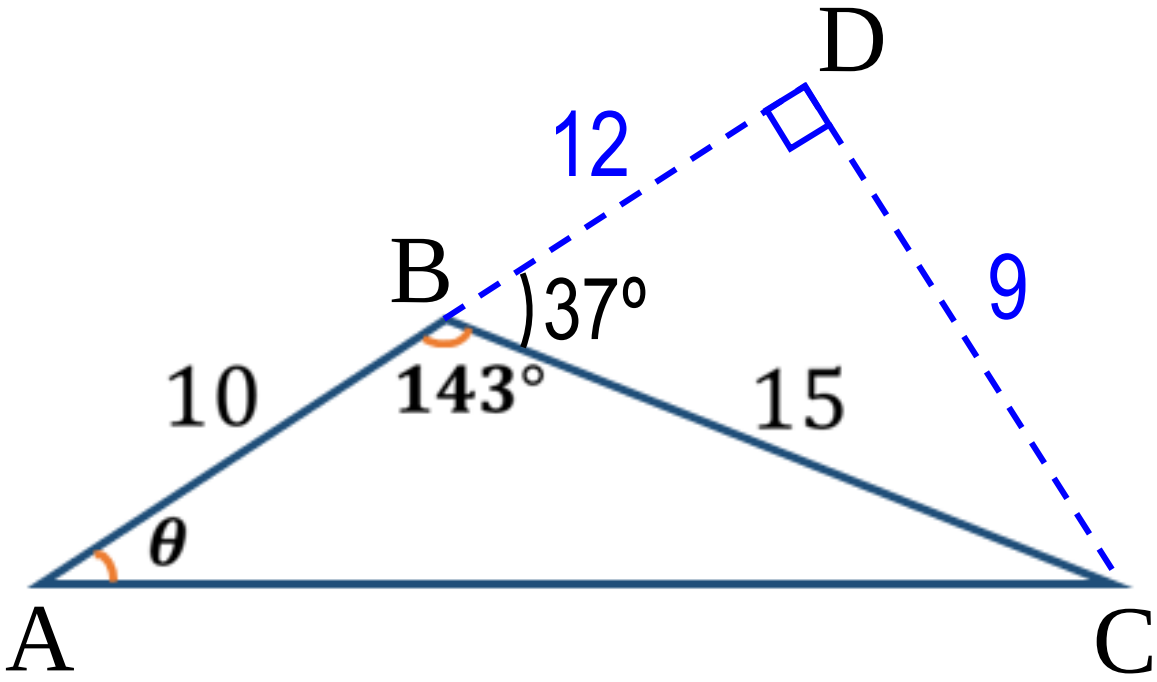
8. Del gráfico, efectúe:

$$E = 11tan\theta + \frac{1}{2} \ldots (*)$$



RESOLUCIÓN:





En $\triangle 37°$: $5K = 15 \Rightarrow K = 3$

Usando el $\triangle ADC$ en (*) :

$$E = 11x\frac{9}{22} + \frac{1}{2} = \frac{9}{2} + \frac{1}{2}$$

$$E = 5$$