



TRIGONOMETRY

Sesión 1

4th
SECONDARY

REVIEW



1. Simplifique: $F = \frac{\cos x + \operatorname{sen} x \cdot \tan x}{\operatorname{sen} x \cdot \sec x}$

Resolución:

$$F = \frac{\cos x + \operatorname{sen} x \cdot \tan x}{\operatorname{sen} x \cdot \sec x}$$

$$\cos x + \operatorname{sen} x \cdot \frac{\operatorname{sen} x}{\cos x}$$

$$F = \frac{\cos x + \operatorname{sen} x \cdot \frac{1}{\cos x}}{\operatorname{sen} x \cdot \frac{1}{\cos x}}$$

$$F = \frac{\cos x + \frac{\operatorname{sen}^2 x}{\cos x}}{\frac{\operatorname{sen} x}{\cos x}}$$

$$\tan x = \frac{\operatorname{sen} x}{\cos x}$$

$$\sec x = \frac{1}{\cos x}$$



$$\cos^2 x + \operatorname{sen}^2 x = 1$$

$$\frac{1}{\operatorname{sen} x} = \csc x$$

$$F = \frac{\cos^2 x + \operatorname{sen}^2 x}{\operatorname{sen} x}$$

$$F = \frac{\operatorname{sen}^2 x + \cos^2 x}{\operatorname{sen} x}$$

$$F = \frac{1}{\operatorname{sen} x}$$



$$\therefore F = \csc x$$



2. Reducir: $D = \frac{\text{sen}^4 x - \text{cos}^4 x}{\text{sen} x - \text{cos} x} - \text{cos} x$

Resolución:

$$D = \frac{(\text{sen}^2 x)^2 - (\text{cos}^2 x)^2}{\text{sen} x - \text{cos} x} - \text{cos} x$$

$$D = \frac{(\text{sen}^2 x + \text{cos}^2 x) \cdot (\text{sen}^2 x - \text{cos}^2 x)}{\text{sen} x - \text{cos} x} - \text{cos} x$$

$$D = \frac{(\text{sen} x + \text{cos} x) \cdot (\text{sen} x - \text{cos} x)}{(\text{sen} x - \text{cos} x)} - \text{cos} x$$

$$D = \text{sen} x + \text{cos} x - \text{cos} x$$

$$a^2 - b^2 = (a + b) \cdot (a - b)$$

$$\text{sen}^2 x + \text{cos}^2 x = 1$$



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





3. Simplificar: $S = \frac{1 - \text{sen}x}{\text{cos}x} + \frac{\text{cos}x}{1 - \text{sen}x}$

Resolución:

$$S = \frac{1 - \text{sen}x}{\text{cos}x} + \frac{\text{cos}x}{1 - \text{sen}x}$$

$$S = \frac{1 - \text{sen}x}{\text{cos}x} + \frac{1 + \text{sen}x}{\text{cos}x}$$

$$S = \frac{1 - \cancel{\text{sen}x} + 1 + \cancel{\text{sen}x}}{\text{cos}x}$$

$$S = \frac{2}{\text{cos}x} \quad \rightarrow \quad S = 2 \left(\frac{1}{\text{cos}x} \right)$$

$$\frac{\text{cos}x}{1 - \text{sen}x} = \frac{1 + \text{sen}x}{\text{cos}x}$$

$$\frac{1}{\text{cos}x} = \text{sec}x$$

$$\therefore S = 2\text{sec}x$$





4. Si: $\text{sen}x + \text{cos}x = \frac{1}{3}$

Calcule: $H = (1 + \text{sen}x)(1 + \text{cos}x)$

Resolución:

Del dato: $\text{sen}x + \text{cos}x = \frac{1}{3}$

Piden:

$$H = (1 + \text{sen}x)(1 + \text{cos}x) \quad \dots \times 2$$

$$2H = 2 \underbrace{(1 + \text{sen}x)(1 + \text{cos}x)}_{(1 + \text{sen}x + \text{cos}x)^2}$$

$$2(1 + \text{sen}x)(1 + \text{cos}x) = (1 + \text{sen}x + \text{cos}x)^2$$

$$2H = (1 + \underbrace{\text{sen}x + \text{cos}x})^2$$

$$2H = (1 + \frac{1}{3})^2$$

$$2H = \left(\frac{4}{3}\right)^2 \Rightarrow 2H = \frac{16}{9} \quad \text{with a blue arrow pointing from 16 to 8 and another from 9 to 9, indicating simplification to } \frac{8}{9}$$

$$\therefore H = \frac{8}{9}$$



5. Sabiendo que: $\tan x + \cot x = 3$
Calcule:

$$B = (\sec x + \csc x)^2$$

Resolución:

Dal dato:

$$\underbrace{\tan x + \cot x}_{\text{}} = 3$$

$$\sec x \cdot \csc x = 3 \quad ()^2$$

$$\sec^2 x \cdot \csc^2 x = 9$$

Piden: $B = (\sec x + \csc x)^2$

$$B = \sec^2 x + 2\sec x \cdot \csc x + \csc^2 x$$

$$B = \underbrace{\sec^2 x + \csc^2 x}_{\text{}} + 2\sec x \cdot \csc x$$

$$B = \underbrace{\sec^2 x \cdot \csc^2 x}_{(9)} + 2 \underbrace{\sec x \cdot \csc x}_{(3)}$$

$$B = 9 + 2(3) = 9 + 6$$

$$\therefore B = 15$$

$$\tan x + \cot x = \sec x \cdot \csc x$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$\sec^2 x + \csc^2 x = \sec^2 x \cdot \csc^2 x$$

6. Si: $\emptyset \in \text{IIC}$; $1 - \text{sen}^4 \emptyset - \text{cos}^4 \emptyset = \frac{1}{2} \text{cos}^2 \emptyset$

Calcule: $E = \text{csc} \emptyset . \cot \emptyset$

Resolución:

Dato: $1 - \text{sen}^4 \emptyset - \text{cos}^4 \emptyset = \frac{1}{2} \text{cos}^2 \emptyset$

$$1 - (\text{sen}^4 \emptyset + \text{cos}^4 \emptyset) = \frac{1}{2} \text{cos}^2 \emptyset$$

$$1 - (1 - 2\text{sen}^2 \emptyset . \text{cos}^2 \emptyset) = \frac{1}{2} \text{cos}^2 \emptyset$$

$$2\text{sen}^2 \emptyset \text{cos}^2 \emptyset = \frac{1}{2} \text{cos}^2 \emptyset$$

$$\text{csc} \emptyset = \frac{r}{y}$$

$$\cot \emptyset = \frac{x}{y}$$



$$\text{sen}^4 \alpha + \text{cos}^4 \alpha = 1 - 2\text{sen}^2 \alpha . \text{cos}^2 \alpha$$

$$\text{sen}^2 \emptyset = \frac{1}{4} \rightarrow \text{sen} \emptyset = \pm \frac{1}{2}$$

Como $\emptyset \in \text{IIC}$



$$\text{sen} \emptyset = +\frac{1}{2} = \frac{y}{r}$$

Recordar:

$$r^2 = x^2 + y^2$$

$$\Rightarrow 2^2 = x^2 + 1^2$$

Como $\emptyset \in \text{IIC}$



$$x = -\sqrt{3}$$

Piden: $E = \left(\frac{2}{1} \right) \left(\frac{-\sqrt{3}}{1} \right)$

$$\therefore E = -2\sqrt{3}$$



7. Calcular :

$$C = \frac{\text{sen}(60^\circ + x) + \text{sen}(60^\circ - x)}{\cos x}$$

Resolución:

$$\text{sen}(x + y) = \text{sen}x \cdot \cos y + \cos x \cdot \text{sen}y$$

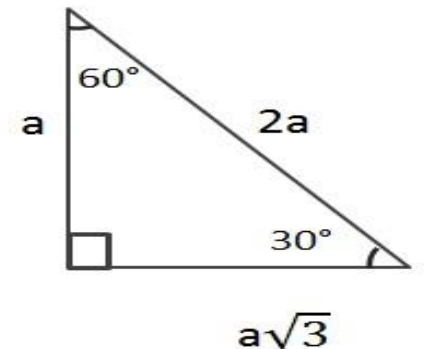
$$\text{sen}(x - y) = \text{sen}x \cdot \cos y - \cos x \cdot \text{sen}y$$

$$C = \frac{\text{sen}60^\circ \cdot \cos x + \cos60^\circ \cdot \text{sen}x + \text{sen}60^\circ \cdot \cos x - \cos60^\circ \cdot \text{sen}x}{\cos x}$$

$$C = \frac{2\text{sen}60^\circ \cdot \cos x}{\cos x}$$

$$C = 2 \text{sen}60^\circ \Rightarrow C = 2 \left(\frac{\sqrt{3}}{2} \right)$$

$$\therefore C = \sqrt{3}$$





8. Siendo : $\alpha + \beta = 45^\circ$; $\tan\alpha = \frac{3}{5}$
 Calcule: $\tan\beta$

Resolución:

Se sabe: $\tan\alpha = \frac{3}{5}$

Además: $\alpha + \beta = 45^\circ$
 $\beta = 45^\circ - \alpha$

$$\tan\beta = \tan(45^\circ - \alpha)$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \cdot \tan y}$$

$$\tan 45^\circ = 1$$

$$\tan\beta = \frac{\tan 45^\circ - \tan\alpha}{1 + \tan 45^\circ \cdot \tan\alpha}$$

$$\tan\beta = \frac{1 - \frac{3}{5}}{1 + (1) \left(\frac{3}{5} \right)}$$

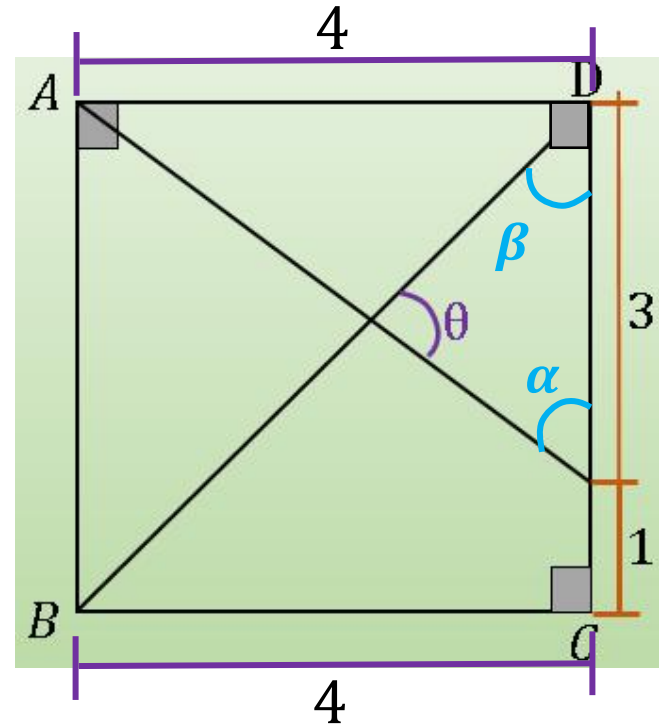
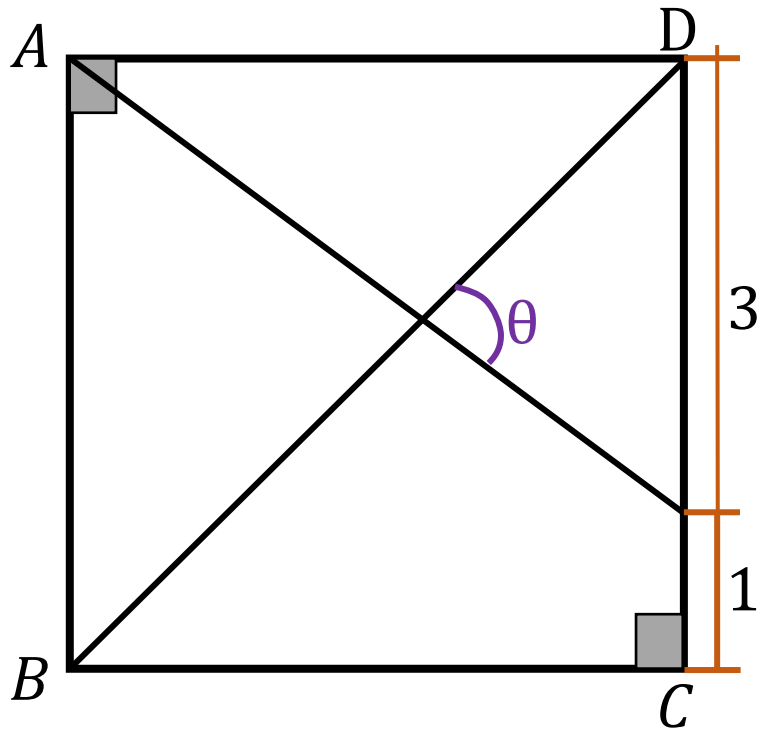
$$\Rightarrow \tan\beta = \frac{\frac{2}{5}}{\frac{8}{5}} = \frac{2}{8}$$

$$\therefore \tan\beta = \frac{1}{4}$$





9. Si ABCD es un cuadrado; calcular: $\tan\theta$



Resolución:

Observamos:

$$\theta + \alpha + \beta = 180^\circ$$

Además:

$$\tan\alpha = \frac{4}{3}$$

$$\tan\beta = 1$$

$$\tan\theta + \frac{4}{3} + 1 = \tan\theta \cdot \frac{4}{3} \cdot 1 \Rightarrow \frac{7}{3} = \frac{1}{3} \cdot \tan\theta$$

$$\therefore \tan\theta = 7$$

Si $\alpha + \beta + \theta = 180^\circ$, entonces:
 $\tan\alpha + \tan\beta + \tan\theta = \tan\alpha \cdot \tan\beta \cdot \tan\theta$



- 10.** Carlos tiene un terreno rectangular de dimensiones "A" y "B".
Calcule el área de dicho terreno en metros, si:

$$A \operatorname{sen}^B x = 2 \left(\frac{1 - \cos x}{1 - \operatorname{sen} x} \right) (1 - \operatorname{sen} x + \cos x)^2$$

$$(1 - \operatorname{sen} x + \cos x)^2 = 2(1 - \operatorname{sen} x)(1 + \cos x)$$

Resolución:

$$(a - b)(a + b) = a^2 - b^2$$

$$1 - \cos^2 x = \operatorname{sen}^2 x$$

$$A \operatorname{sen}^B x = 2 \left(\frac{1 - \cos x}{1 - \operatorname{sen} x} \right) \underbrace{(1 - \operatorname{sen} x + \cos x)^2}_{2(1 - \operatorname{sen} x)(1 + \cos x)}$$

$$A \operatorname{sen}^B x = 2 \left(\frac{1 - \cos x}{1 - \operatorname{sen} x} \right) \cancel{2(1 - \operatorname{sen} x)}(1 + \cos x)$$

$$A \operatorname{sen}^B x = 4(1 - \cos x)(1 + \cos x)$$

$$A \operatorname{sen}^B x = 4 \underbrace{(1 - \cos^2 x)}_{\operatorname{sen}^2 x}$$

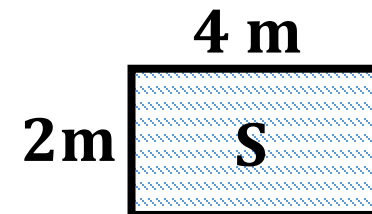
$$\Rightarrow A \operatorname{sen}^B x = 4 \operatorname{sen}^2 x$$

$$A = 4$$

$$B = 2$$

Piden:

$$S = 4\text{m} \cdot 2\text{m}$$



$$\therefore S = 8 \text{ m}^2$$



Creé en ti
y todo será

posible