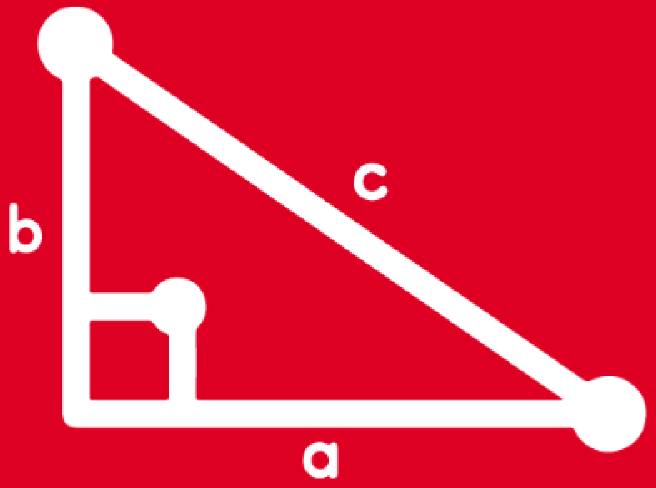
TRIGONOMETRY

INTRODUCTORIO 2024

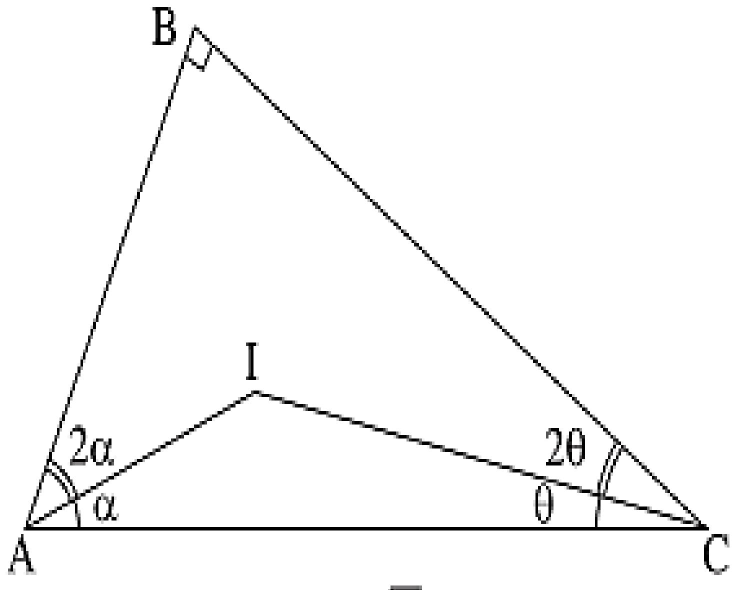


5th
SECONDARY

EXPLORATORIO

SACO OLIVEROS

1) Del gráfico, calcule
$L = 13\tan\alpha - \cot\theta$; si
$AI = 4$ u , $CI = 6\sqrt{3}$ u .



A) -1　　B) $\sqrt{3}$　　C) 0
D) $-\sqrt{3}$　　E) 1

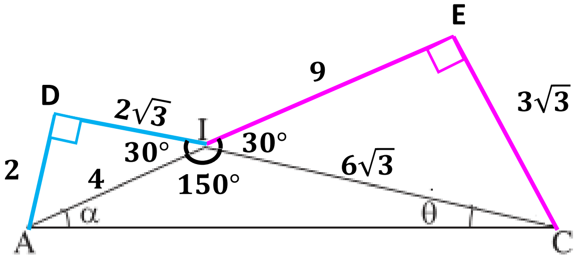
RESOLUCIÓN

En ◺ABC: $3\alpha + 3\theta = 90°$

$\Rightarrow \alpha + \theta = 30°$

Luego : $m\angle AIC = 150°$

En ΔAIC, tenemos:



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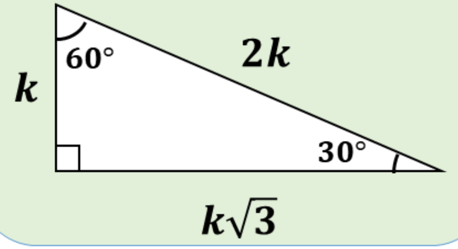


En ◺AEC:

$$\tan\alpha = \frac{3\sqrt{3}}{13}$$

En ◺ADC:

$$\cot\theta = \frac{8\sqrt{3}}{2} = 4\sqrt{3}$$

Por lo tanto:

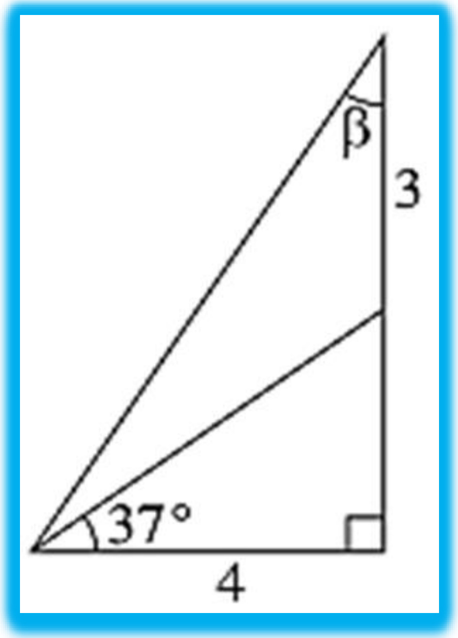
$$L = 13\left(\frac{3\sqrt{3}}{13}\right) - (4\sqrt{3})$$

$$L = 3\sqrt{3} - 4\sqrt{3} = -\sqrt{3}$$

D) $-\sqrt{3}$

RESOLUCIÓN

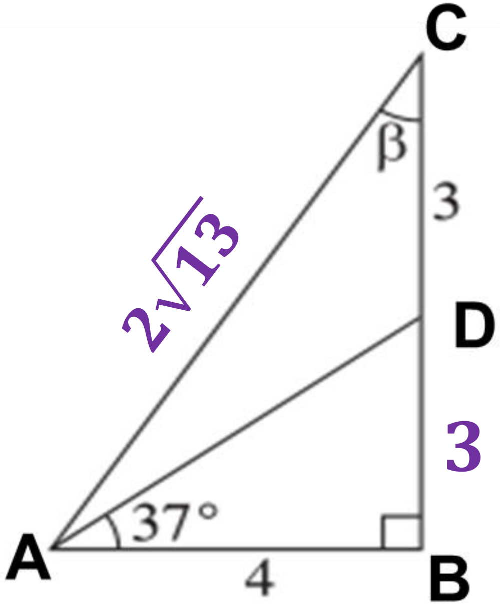
2) Calcule senβ .



A) $\frac{2}{\sqrt{13}}$ B) $\frac{3}{\sqrt{13}}$

C) $\frac{4}{\sqrt{13}}$ D) $\frac{5}{\sqrt{13}}$

E) $\sqrt{13}$



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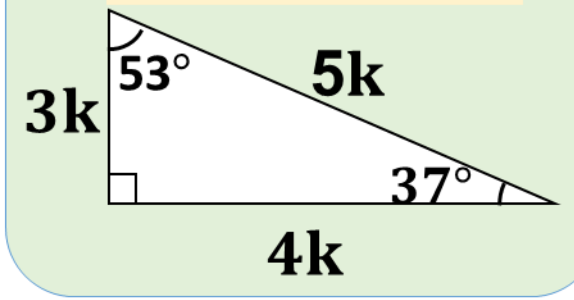


En ◺ABD, notable de 37° y 53°:

$$\mathbf{BD = 3}$$

En ◺ ABC : $AB^2 + BC^2 = AC^2$

$$\Longrightarrow 4^2 + 6^2 = AC^2$$

$$52 = AC^2$$

$$2\sqrt{13} = AC$$

En ◺ABC:

$$\text{sen}\beta = \frac{4}{2\sqrt{13}} = \frac{2}{\sqrt{13}}$$

A) $\frac{2}{\sqrt{13}}$

3) Dado el sistema de ecuaciones :

$$\tan(\alpha - 25°) = \cot(\beta - 30°)$$

$$2\beta - \alpha = 35°,$$

donde α y β son ángulos agudos,

efectúe $\dfrac{\tan(\alpha + \beta - 25°)}{1 + \cos\beta}$

(Examen de Admisión UNMSM 2007-II)

A) $-\dfrac{2\sqrt{3}}{9}$ B) $-\dfrac{3\sqrt{3}}{2}$ C) $\dfrac{3\sqrt{3}}{2}$

D) $\dfrac{2\sqrt{3}}{3}$ E) $-\dfrac{2\sqrt{3}}{3}$

Por CO - RT :

$$\tan(x) = \cot(y) \Longrightarrow x + y = 90°$$

RESOLUCIÓN

Dato : $\tan(\alpha - 25°) = \cot(\beta - 30°)$

$$\Longrightarrow \alpha - 25° + \beta - 30° = 90°$$

Dato :

$$\begin{aligned} \cancel{\alpha} + \beta &= 145° \\ 2\beta - \cancel{\alpha} &= 35° \quad + \\ \hline 3\beta &= 180° \end{aligned}$$

$$\beta = 60°$$

$$\Longrightarrow \alpha = 85°$$

Por lo tanto :

$$\frac{\tan(\alpha + \beta - 25°)}{1 + \cos\beta} = \frac{\tan(85° + 60° - 25°)}{1 + \cos60°}$$

$$= \frac{\tan120°}{1 + \cos60°} = \frac{-\sqrt{3}}{1 + \frac{1}{2}} = -\frac{2\sqrt{3}}{3}$$

$$\boxed{E)\ -\frac{2\sqrt{3}}{3}}$$

4) Determine un ángulo en radianes si cumple que :

$$C - S = \frac{R}{\pi}\sqrt{\frac{SC}{10}}$$

A) $\frac{\pi}{6}\,\text{rad}$ B) $\frac{\pi}{3}\,\text{rad}$ C) $\frac{\pi}{2}\,\text{rad}$

D) $\frac{\pi}{4}\,\text{rad}$ E) $\pi\,\text{rad}$

RECORDAR :

$$\boxed{\frac{S}{9} = \frac{C}{10} = \frac{R}{\frac{\pi}{20}} = n} \Rightarrow \left\{\begin{array}{l} S = 9n \\ C = 10n \\ R = \dfrac{n\pi}{20} \end{array}\right\}$$

RESOLUCIÓN

Dato : $C - S = \frac{R}{\pi}\sqrt{\frac{SC}{10}}$

Luego : $10n - 9n = \frac{\frac{n\pi}{20}}{\pi}\sqrt{\frac{(9n)(10n)}{10}}$

$$1n = \frac{n}{20}(3n) \Longrightarrow n = \frac{20}{3}$$

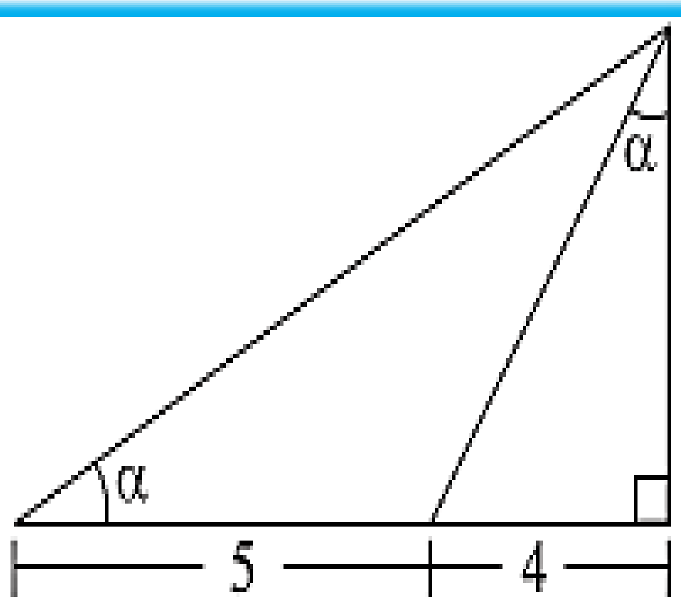
Medida del ángulo en radianes:

$$R = \frac{\pi}{20}\left(\frac{20}{3}\right) \Longrightarrow R\,\text{rad} = \frac{\pi}{3}\,\text{rad}$$

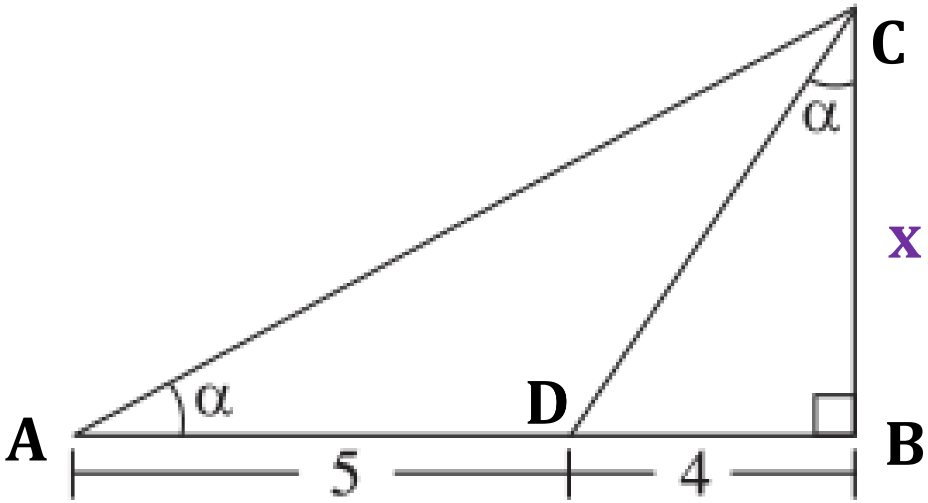
B) $\frac{\pi}{3}$ rad

5) De la figura, calcule $\tan\alpha$.

A) $\frac{1}{3}$
B) 2
C) $\frac{2}{3}$
D) 3
E) $\frac{1}{9}$



RESOLUCIÓN



RECORDAR :

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

En ◺ABC: $\tan\alpha = \frac{x}{9}$

En ◺DBC: $\tan\alpha = \frac{4}{x}$

Luego : $\frac{x}{9} = \frac{4}{x} \Longrightarrow x^2 = 36 \Longrightarrow x = 6$

Por lo tanto : $\tan\alpha = \frac{6}{9} = \frac{2}{3}$

C) $\frac{2}{3}$

6) Siendo α y θ ángulos agudos que cumplen tanα . tanθ = 1, calcule $P = \sqrt{3}\cot\left(\frac{\alpha+\theta}{3}\right) + 2$

A) 2 B) 3 C) 5 D) 6 E) 7

Propiedades de razones trigonométricas :

$$\tan\alpha \,.\, \tan\theta = 1 \implies \alpha + \theta = 90°$$

RESOLUCIÓN

$$\tan\alpha \,.\, \tan\theta = 1 \implies \alpha + \theta = 90°$$

Luego : $P = \sqrt{3}\cot\left(\frac{\alpha+\theta}{3}\right) + 2$

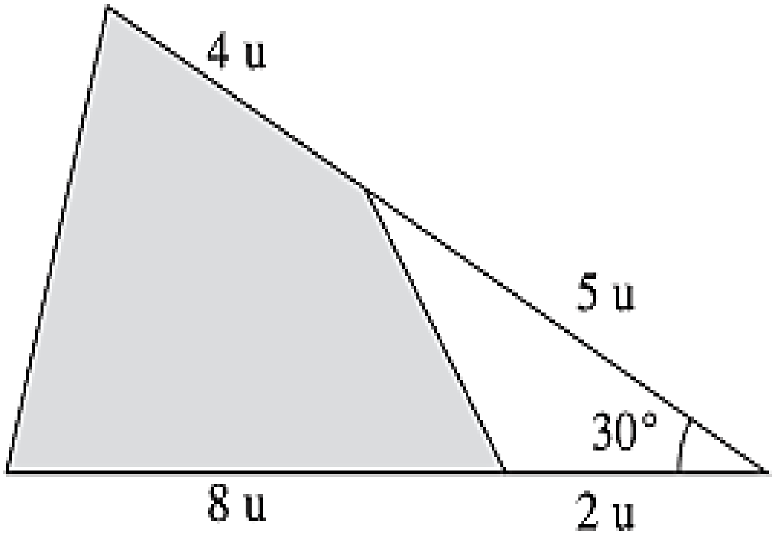
$$P = \sqrt{3}\cot\left(\frac{90°}{3}\right) + 2$$

$$P = \sqrt{3}\cot 30° + 2$$

$$P = \sqrt{3}\left(\sqrt{3}\right) + 2 = 5$$

C) 5

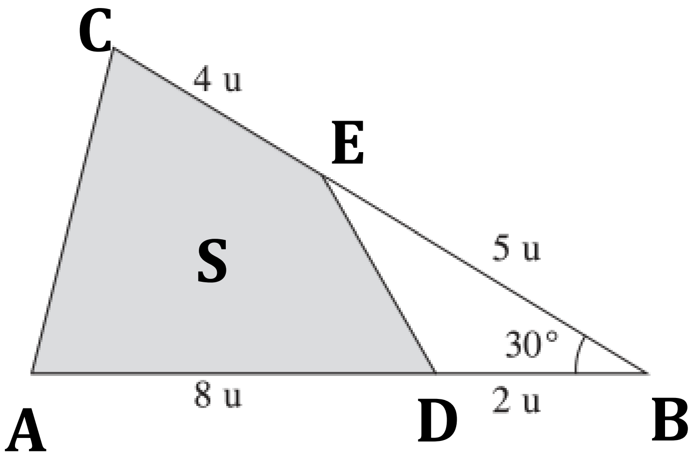
7) Del gráfico mostrado, calcule el área de la región sombreada .



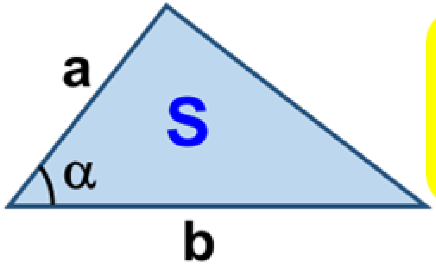
A) 10 u^2 B) 20 u^2 C) 30 u^2
D) 40 u^2 E) 60 u^2

RESOLUCIÓN

Tenemos :



RECORDAR :



$$S = \frac{a.b}{2} \operatorname{sen}\alpha$$

$$\mathbf{S = Área_{\Delta ABC} - Área_{\Delta DBE}}$$

$$\mathbf{S = \frac{(10)(9)sen30°}{2} - \frac{(2)(5)sen30°}{2} = 45\left(\frac{1}{2}\right) - 5\left(\frac{1}{2}\right)}$$

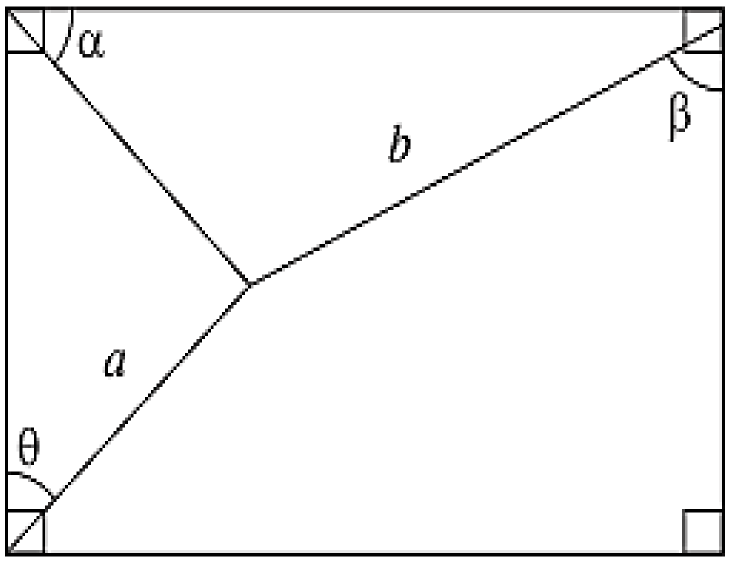
$$\mathbf{S = \frac{40}{2} = 20\ u^2}$$

B) 20 u^2

(UNI 2013-I)

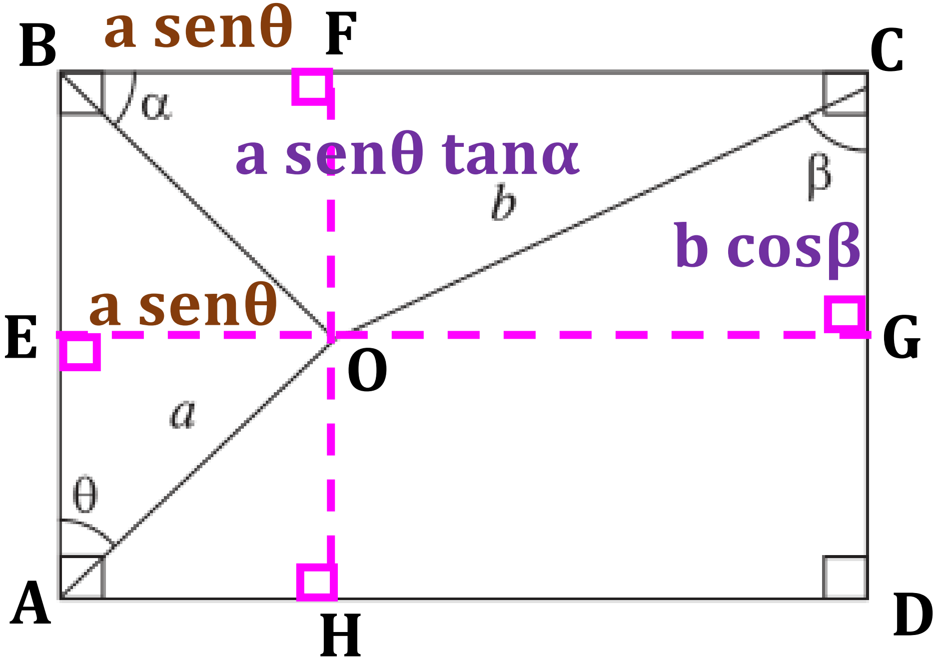
8) En la figura mostrada, calcule el valor de

$$E = \frac{a \tan\alpha \, . \, \text{sen}\theta}{b \cos\beta}$$

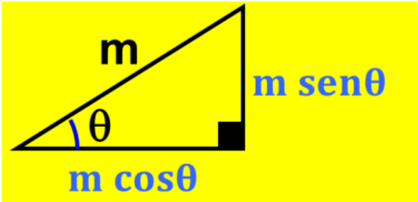


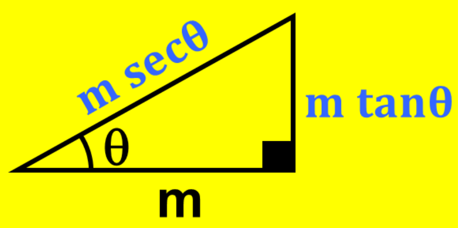
A) –2 B) –1 C) 1
D) 2 E) 3

RESOLUCIÓN



RECORDAR :





En ◺AEO: $EO = a\,\text{sen}\theta \Rightarrow BF = a\,\text{sen}\theta$

En ◺BFO: $FO = a\,\text{sen}\theta \tan\alpha$

En ◺CGO: $CG = b\cos\beta$

C) 1

Luego : $a\,\text{sen}\theta \tan\alpha = b\cos\beta \Rightarrow \dfrac{a\,\text{sen}\theta \tan\alpha}{b\cos\beta} = 1$

SACO
OLIVEROS