

Examen: Ejercicio 1

Calcula las razones trigonométricas (seno, coseno y tangente) de α : (1,5 puntos)

a) $\cos \alpha = \frac{-\sqrt{5}}{4}; \text{sen } \alpha < 0.$

b) $\text{tg } \alpha = 2,25; \text{sen } \alpha < 0$

c) $\cos \alpha = -0,32; \text{sen } \alpha > 0$

d) $\cos \alpha = 0,375; \text{sen } \alpha < 0$

a) Si $\cos \alpha < 0$: $\alpha \in 2^\circ \text{ o } 3^\circ \text{ Cuadrante.}$ $\left\{ \begin{array}{l} \text{Si } \text{sen } \alpha < 0: \alpha \in 3^\circ \text{ o } 4^\circ \text{ Cuadrante} \end{array} \right\} \rightarrow \alpha \in 3^\circ \text{ Cuadrante.}$

$$\cos \alpha = \frac{\sqrt{5}}{4} \rightarrow \text{sen}^2 \alpha + \cos^2 \alpha = 1 \rightarrow \text{sen}^2 \alpha = 1 - \frac{5}{16} = \frac{11}{16} \rightarrow$$

$$\text{sen } \alpha = \frac{\sqrt{11}}{4}$$

$$\text{tg } \alpha = \frac{\text{sen } \alpha}{\cos \alpha} = \frac{\frac{\sqrt{11}}{4}}{\frac{\sqrt{5}}{4}} = \frac{\sqrt{11}}{\sqrt{5}} = \frac{\sqrt{55}}{5}$$

Como estamos en el $3^\circ \text{ Cuadrante:}$ $\left\{ \begin{array}{l} \text{sen } \alpha = -\frac{\sqrt{11}}{4} \\ \cos \alpha = -\frac{\sqrt{5}}{4} \\ \text{tg } \alpha = \frac{\sqrt{55}}{5} \end{array} \right.$

b) $\text{tg } \alpha = 2,25; \text{sen } \alpha < 0$ $\left\{ \begin{array}{l} \text{sen } \alpha < 0: \alpha \in 3^\circ \text{ o } 4^\circ \text{ Cuadrante} \\ \text{tg } \alpha > 0: \alpha \in 1^\circ \text{ o } 3^\circ \text{ Cuadrante} \end{array} \right\} \rightarrow \alpha \in 3^\circ \text{ Cuad.}$

$$\frac{1}{\cos^2 \alpha} = 1 + \text{tg}^2 \alpha \rightarrow \frac{1}{\cos^2 \alpha} = 1 + 2,25^2 \Rightarrow \cos \alpha = 0,1649$$

$$\text{tg } \alpha = \frac{\text{sen } \alpha}{\cos \alpha} \Rightarrow 2,25 = \frac{\text{sen } \alpha}{0,1649} \Rightarrow \text{sen } \alpha = 0,3711.$$

Como $\alpha \in 3^\circ \text{ Cuadrante:}$ $\left\{ \begin{array}{l} \text{sen } \alpha = -0,3711 \\ \cos \alpha = -0,1649 \\ \text{tg } \alpha = 2,25 \end{array} \right.$

c) $\cos \alpha = -0,32; \text{sen } \alpha > 0$ $\left\{ \begin{array}{l} \cos \alpha < 0: \alpha \in 2^\circ \text{ o } 3^\circ \text{ Cuadrante.} \\ \text{sen } \alpha > 0: \alpha \in 1^\circ \text{ o } 2^\circ \text{ Cuadrante} \end{array} \right\} \rightarrow \alpha \in 2^\circ \text{ Cuad.}$

$$\text{sen}^2 \alpha + \cos^2 \alpha = 1 \rightarrow \text{sen } \alpha = \sqrt{1 - (0,32)^2} = 0,9474$$

$$\text{tg } \alpha = \frac{\text{sen } \alpha}{\cos \alpha} = \frac{0,9474}{-0,32} = -2,96.$$

Como $\alpha \in 2^\circ \text{ Cuadrante:}$ $\left\{ \begin{array}{l} \text{sen } \alpha = 0,9474 \\ \cos \alpha = -0,32 \\ \text{tg } \alpha = -2,96 \end{array} \right.$

d) $\cos \alpha = 0,375; \text{sen } \alpha < 0$ $\left\{ \begin{array}{l} \cos \alpha > 0: \alpha \in 1^\circ \text{ o } 4^\circ \text{ Cuad.} \\ \text{sen } \alpha < 0: \alpha \in 3^\circ \text{ o } 4^\circ \text{ Cuad.} \end{array} \right\} \rightarrow \alpha \in 4^\circ \text{ Cuad.}$

$$\text{sen}^2 \alpha + \cos^2 \alpha = 1 \rightarrow \text{sen } \alpha = \sqrt{1 - (0,375)^2} = 0,927$$

$$\text{tg } \alpha = \frac{\text{sen } \alpha}{\cos \alpha} = \frac{0,927}{0,375} = 2,472.$$

Como $\alpha \in 4^\circ \text{ Cuadrante:}$ $\left\{ \begin{array}{l} \text{sen } \alpha = -0,927 \\ \cos \alpha = 0,375 \\ \text{tg } \alpha = -2,472 \end{array} \right.$

Examen: Ejercicio 3

Expresa en un ángulo del primer cuadrante las siguientes razones trigonométricas y expresa su valor exacto sin usar la calculadora: (1,5 punto)

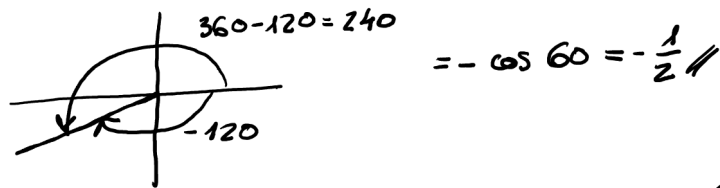
- a) $\sin 3015$
- b) $\cos -840$
- c) $\sec 120$
- d) $\cos 210$

a) $\frac{3015}{360} = 8'375$. $3015 = 8 \cdot 360 + 135$.

$$\sin 3015 = \sin(8 \cdot 360 + 135) = \sin 135 = \sin(180 - 45) = \sin 45 = \frac{\sqrt{2}}{2}$$

b) $\frac{840}{360} = 2'3$ $-840 = -2 \cdot 360 - 120$

$$\cos(-840) = \cos(-2 \cdot 360 - 120) = \cos(-120) = \cos 240 = \cos(180 + 60) =$$



c) $\sec 120 = \sec(180 - 60) = -\sec 60 = -\frac{1}{1/2} = -2$

d) $\cos 210 = \cos(180 + 30) = -\cos 30 = -\frac{\sqrt{3}}{2}$

Examen: Ejercicio 2

Sabiendo que $\cos \alpha = 0,74$, calcula: (2 puntos)

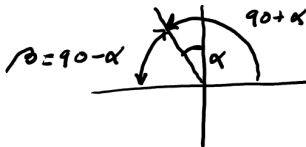
- a) $\sin(180 + \alpha)$
- b) $\cos(90 + \alpha)$
- c) $\sin(90 - \alpha)$
- d) $\tan(180 - \alpha)$
- e) $\sin(-\alpha)$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow \sin \alpha = \sqrt{1 - \cos^2 \alpha} = 0'6726$$

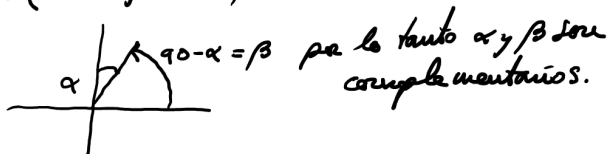
$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = 0'9089$$

a) $\sin(180 + \alpha) = -\sin \alpha = -0'6726$

b) $\cos(90 + \alpha) = -\sin \alpha = -0'6726$

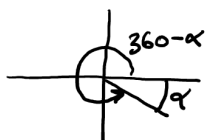


c) $\sin(90 - \alpha) = \sin \beta = \cos \alpha = 0'74$



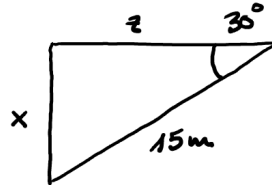
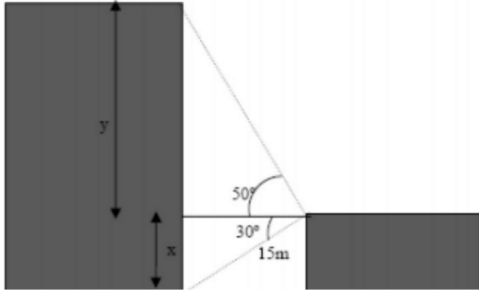
d) $\tan(180 - \alpha) = -\tan \alpha = -0'9089$

e) $\sin(-\alpha) = \sin(360 - \alpha) = -\sin \alpha = -0'6726$



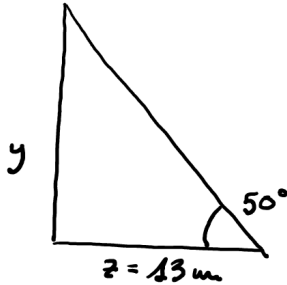
Examen: Ejercicio 5

Calcula la altura de la torre grande a partir del siguiente dibujo. (1,5 puntos)



$$\text{Sen } 30 = \frac{x}{15} \Rightarrow x = \frac{1}{2} \cdot 15 = 7'5 \text{ m.}$$

$$\text{Cos } 30 = \frac{z}{15} \Rightarrow z = \frac{\sqrt{3}}{2} \cdot 15 = 13 \text{ m.}$$

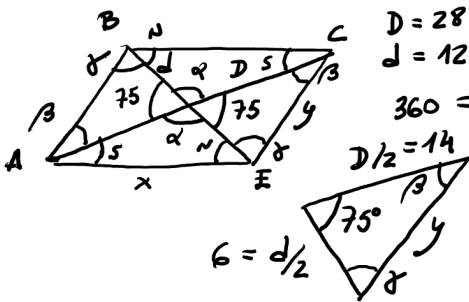


$$\text{tg } 50 = \frac{y}{13} \Rightarrow y = 15'49 \text{ m.}$$

$$h = y + x = 15'49 + 7'5 = \underline{\underline{23 \text{ m}}}$$

Examen: Ejercicio 6

Las diagonales de un paralelogramo miden 12 y 28 cm y forman un ángulo de 75°. Calcula los lados, los ángulos de sus vértices y el área. (2 puntos)



$$D = 28 \text{ cm}$$

$$d = 12 \text{ cm.}$$

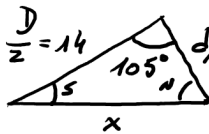
$$360 = 2 \cdot 75 + 2 \cdot \alpha \Rightarrow \alpha = \frac{210}{2} = 105^\circ$$

$$y^2 = 14^2 + 6^2 - 2 \cdot 14 \cdot 6 \cdot \cos 75 = 188'52.$$

$$y = \underline{\underline{13'73 \text{ cm.}}}$$

$$\frac{13'73}{\text{Sen } 75} = \frac{6}{\text{Sen } \beta} \Rightarrow \text{Sen } \beta = \frac{6}{13'73} \cdot \text{Sen } 75 = 0'4221 \Rightarrow \beta = \underline{\underline{24'967^\circ}}$$

$$\gamma = 180 - 75 - 24'967 = \underline{\underline{80'033^\circ}}$$



$$x^2 = 14^2 + 6^2 - 2 \cdot 14 \cdot 6 \cdot \cos 105 = 275'48$$

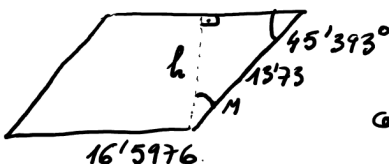
$$x = \underline{\underline{16'5976 \text{ cm}}}$$

$$\frac{16'5976}{\text{Sen } 105} = \frac{6}{\text{Sen } S} \Rightarrow \text{Sen } S = \frac{6}{16'5976} \cdot \text{Sen } 105 = 0'349 \Rightarrow S = \underline{\underline{20'426^\circ}}$$

$$\mu = 180 - 105 - 20'426 = \underline{\underline{54'574^\circ}}$$

$$\hat{A} = \hat{C} = \beta + S = 24'967 + 20'426 = \underline{\underline{45'393^\circ}}$$

$$\hat{B} = \hat{D} = \gamma + \mu = 80'033 + 54'574 = \underline{\underline{134'607^\circ}}$$



$$\mu = 180 - 90 - 45'393 = 44'607^\circ$$

$$\cos \mu = \frac{h}{13'73} \Rightarrow h = 13'73 \cdot \cos 44'607 = 11'137 \text{ cm}$$

$$A = x \cdot h = 16'5976 \cdot 11'137 = \underline{\underline{184'85 \text{ cm}^2}}$$