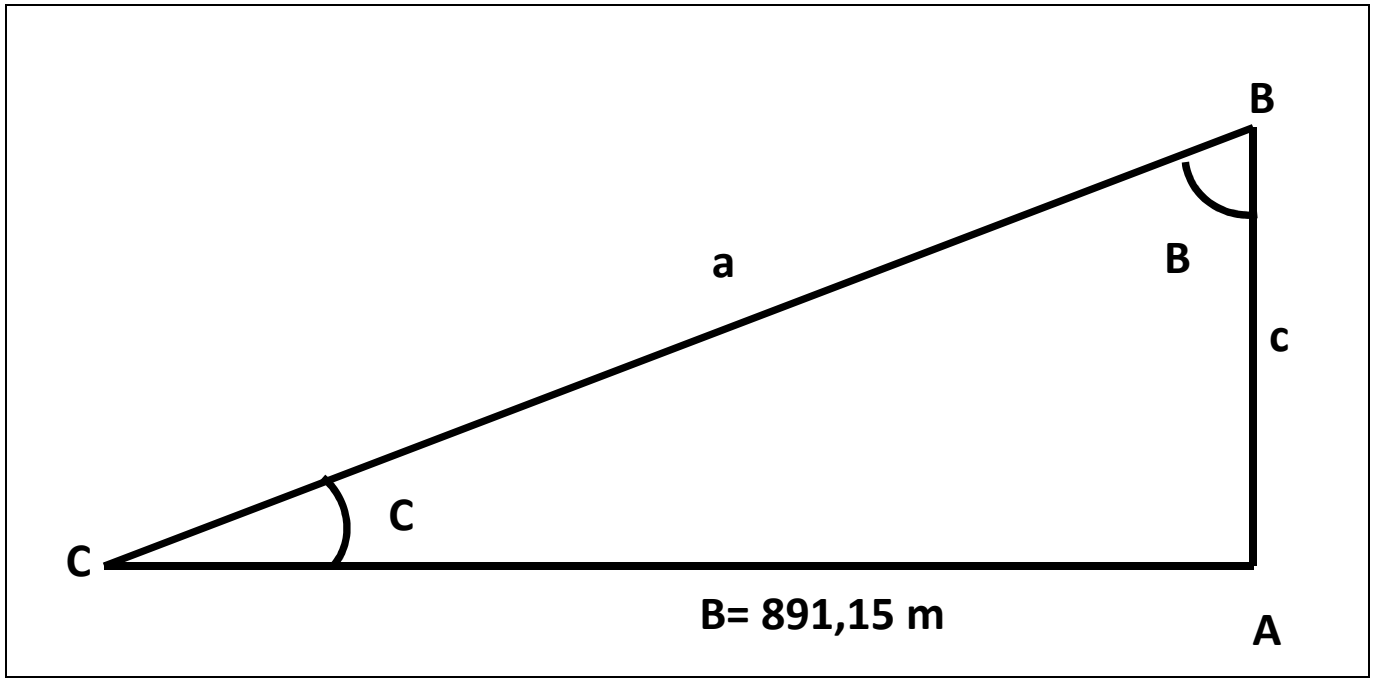
PROBLEMAS DE TRIGONOMETRÍA

Problema 59:

Se da b=891,15 m, y se sabe que sen B= tg C. Calcular c.

Solución Problema 59:

Hacemos el croquis:



Sabemos que:

$\mathrm{B} + C = 90$

$C = 90 - B$

$senB = tg\ C = \ tg(90 - B) = cotg\ B$

$senB = cotg\ B$

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

$\mathrm{c} = \frac{b^2}{a}$

$\mathrm{c} = \frac{891{,}15^2}{a}\ ecuación\ 1$

Aplicando el teorema de Pitágoras, hallaremos el valor de c:

$a^2 = b^2 + c^2$

$a^2 = 891{,}15^2 + c^2$

$a = \sqrt{891{,}15^2 + c^2}\ ecuación\ 2$

Sustituimos el valor de a de la ecuación 2 en la 1:

$$\mathrm{c} = \frac{891{,}15^2}{\sqrt{891{,}15^2 + c^2}}$$

Elevamos al cuadrado ambos miembros de la igualdad:

$$c^2 = \left(\frac{891{,}15^2}{\sqrt{891{,}15^2 + c^2}}\right)^2$$

$$c^2 = \frac{794.148{,}3225^2}{891{,}15^2 + c^2}$$

$c^2(891{,}15^2 + c^2) = 794.148{,}3225^2$

$891{,}15^2c^2 + c^4 = 794.148{,}3225^2$

$c^4 + 891{,}15^2c^2 - 794.148{,}3225^2 = 0$

Resolvemos la ecuación mediante un cambio de variable:

$c^2 = t$

$c^4 = t^2$

Por tanto:

$t^2 + 891{,}15^2\mathrm{t} - 794.148{,}3225^2 = 0$

$t^2 + 794.148{,}3225\mathrm{t} - 630.671.558.129{,}56400625 = 0$

Resolvemos la ecuación:

$$t = \frac{-794.148{,}3225 \pm \sqrt{794.148{,}3225^2 + 4\mathrm{x}630.671.558.129{,}56400625}}{2}$$

$$t = \frac{-794.148{,}3225 \pm \sqrt{794.148{,}3225^2 + 2.522.686.232.518{,}256025}}{2} =$$

$$= \frac{-794.148{,}3225 \pm \sqrt{630.671.558.129{,}56400625 + 2.522.686.232.518{,}256025}}{2}$$

$$\mathrm{t} = \frac{-794.148{,}3225 \pm \sqrt{3.153.357.790.647{,}820031255}}{2} =$$

$$= \frac{-794.148{,}3225 \pm 1.775.769{,}633327425731507537382904 1}{2} =$$

$$t_1 = \frac{-794.148{,}3225 + 1.775.769{,}633327425731507537382904 1}{2}$$

$$t_1 = \frac{-794.148{,}3225 + 1.775.769{,}633327425731507537382904 1}{2}$$

$$t_1 = \frac{981621{,}310827425731507537382904 09}{2}$$

$$\boldsymbol{t_1 = 490.810{,}655413712865753768691452 05}$$

Para t_2 la solución es negativa

$$t_2 = \frac{-794.148{,}3225 - 1.775.769{,}633327425731507537382904 1}{2}$$

$$t_2 = \frac{-2569917{,}955827425731507537382904 1}{2}$$

$$t_2 = -1.284.958{,}977913712865753768691452 1 \; solución\ no\ válida$$

Ahora se deshace el cambio de variable:

$$c^2 = t_1$$

$$c^2 = 490.810{,}655413712865753768691452 05$$

$$\mathbf{c} = \sqrt{490.810{,}655413712865753768691452 05} = \boldsymbol{700{,}578\, m}$$