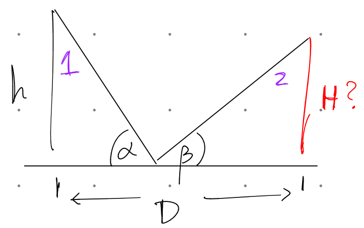
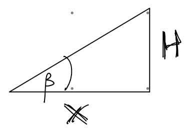
P01 En síntesis:

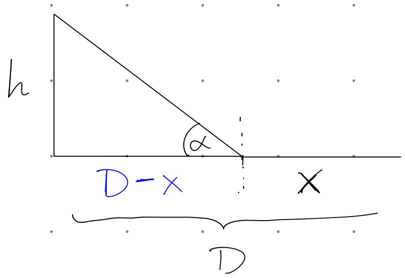


notemos que, para determinar H, nos falta solamente conocer el cateto del triángulo 2, ya que:



$$\tan\beta = \frac{H}{x} \Rightarrow H = x\tan\beta$$

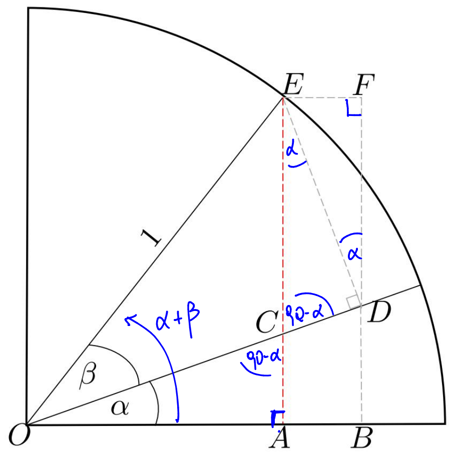
¿Cómo determinar x? Usando la información del $\triangle$ 1



así: $\tan\alpha = \dfrac{h}{D-x} \Rightarrow x = D - \dfrac{h}{\tan\alpha}$

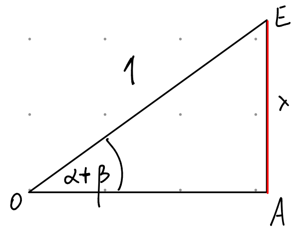
Por lo tanto: $\boxed{H = \left(D - \dfrac{h}{\tan\alpha}\right)\tan\beta}$

P1



a)

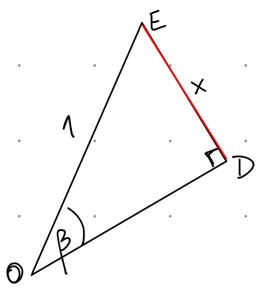
- $\overline{EA}$: notemos el triángulo OEA



sabemos que, por def. del seno:

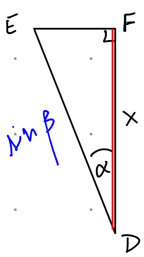
$$\sin(\alpha+\beta) = \frac{x}{1} \Rightarrow x = \overline{EA} = \sin(\alpha+\beta)$$

- $\overline{ED}$: notemos el triángulo OED



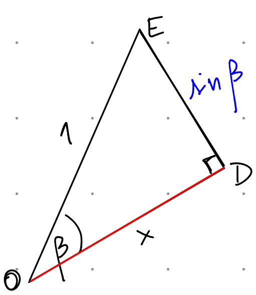
análogamente $\sin\beta = \frac{x}{1} \Rightarrow x = \overline{ED} = \sin\beta$

- $\overline{DF}$: notemos el triángulo EDF



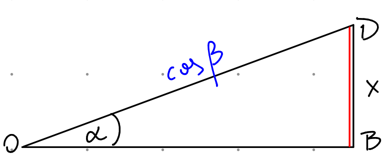
por def. del coseno: $\cos\alpha = \frac{x}{\sin\beta} \Rightarrow x = \overline{FD} = \cos\alpha \sin\beta$

- $\overline{OD}$: nuevamente notemos el triángulo OED



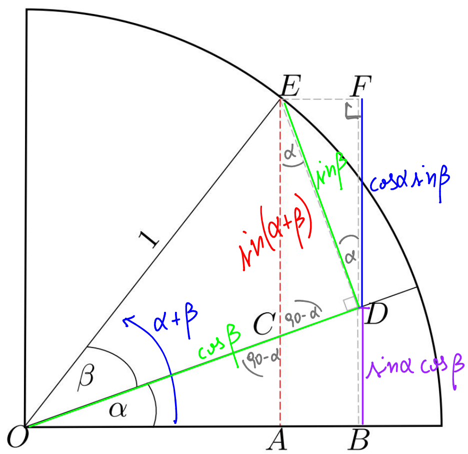
análogamente: $\cos\beta = \frac{x}{1} \Rightarrow x = \overline{OD} = \cos\beta$

- $\overline{DB}$: notemos el triángulo ODB



por def. de seno: $\sin\alpha = \frac{x}{\cos\beta} \Rightarrow x = \overline{DB} = \sin\alpha\cos\beta$

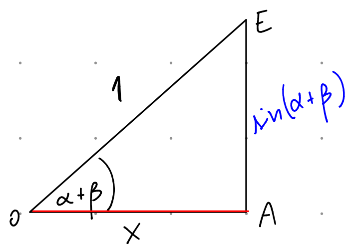
Juntemos la información



notemos que $\overline{AE} = \overline{BD} + \overline{DF}$

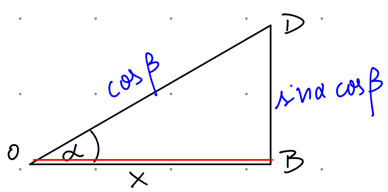
$\therefore \boxed{\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta}$ //

b) • $\overline{OA}$: notemos el triángulo OAE



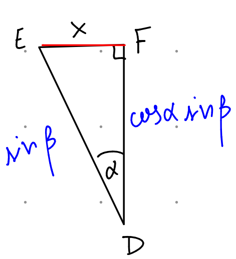
por def. de coseno: $\cos(\alpha+\beta) = \frac{x}{1} \Rightarrow x = \overline{OA} = \cos(\alpha+\beta)$

• $\overline{OB}$: notemos el triángulo OBD



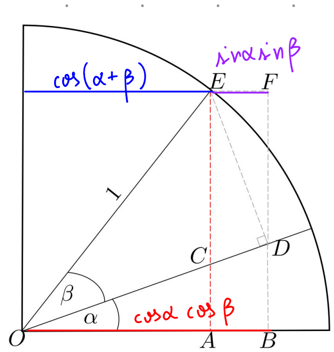
análogamente: $\cos\alpha = \frac{x}{\cos\beta} \Rightarrow x = \overline{OB} = \cos\alpha \cdot \cos\beta$

• $\overline{EF}$: notemos el triángulo DEF



por def. de seno: $\sin\alpha = \frac{x}{\sin\beta} \Rightarrow x = \overline{EF} = \sin\alpha\sin\beta$

→ Juntemos la información:

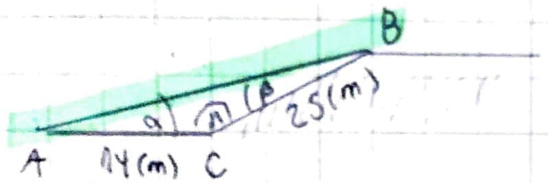


notemos que: $\overline{AB} = \overline{EF}$

y así $\overline{OB} = \overline{OA} + \overline{EF} \Rightarrow \cos\alpha\cos\beta = \cos(\alpha+\beta) + \sin\alpha\sin\beta$

$\therefore \boxed{\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta}$ //

P2



$\alpha = 21°$

$AB = ?$

Por teo. seno:

$$\frac{\operatorname{sen}\alpha}{25\,(m)} = \frac{\operatorname{sen}\beta}{14\,(m)}$$

Despejando β:

$$\operatorname{sen}\beta = \frac{14\,\cancel{(m)}\ \operatorname{sen}\alpha}{25\,\cancel{(m)}} \iff \operatorname{sen}\beta = \frac{14}{25}\operatorname{sen}21° \quad /\operatorname{arcsen}$$

Adimensional ✓✓

$$\Rightarrow \operatorname{arcsen}(\operatorname{sen}\beta) = \operatorname{arcsen}\left(\frac{14}{25}\operatorname{sen}21°\right)$$

$$\Rightarrow \beta = 11.58°$$

Con α y β, tenemos γ:

$$\alpha + \beta + \gamma = 180° \Rightarrow 21° + 11.58° + \gamma = 180°$$

$$\Rightarrow \gamma = 147.42°$$

Nuevamente, por teo. seno:

$$\frac{\operatorname{sen}\alpha}{25(m)} = \frac{\operatorname{sen}\gamma}{AB} \Rightarrow AB = 25\,(m) \cdot \frac{\operatorname{sen}\gamma}{\operatorname{sen}\alpha}$$

$$\Rightarrow AB = 25\,(m) \cdot \frac{\operatorname{sen}147.42°}{\operatorname{sen}21°}$$

$$\Rightarrow AB = 37.56\,(m)$$ ✓✓ → La unidad da (m) ✓