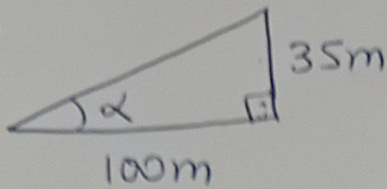


P152:32

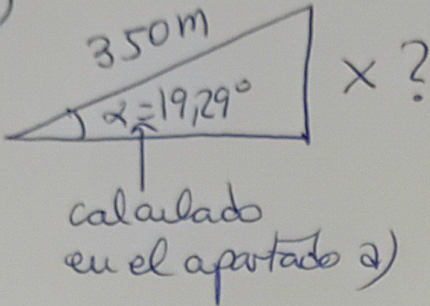
a)



$$\operatorname{tg} \alpha = \frac{35}{100} = 0,35$$

$$\boxed{\alpha = \operatorname{arctg} 0,35 = 19,29^\circ}$$

b)



$$\operatorname{sen} 19,29 = \frac{x}{350}$$

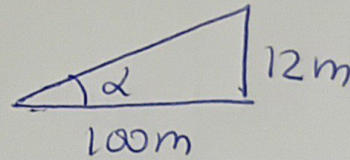
$$\boxed{x = 350 \cdot \operatorname{sen} 19,29 = 115,62\text{m}}$$

Sol: El ángulo que forman es $19,29^\circ$.

Si recorres 350m por la calle, en vertical subirás 115,62m

P152:33

$$m = 12\% = 0,12 = \frac{12}{100} \rightarrow$$

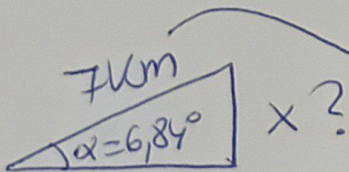


a)

$$\operatorname{tg} \alpha = \frac{12}{100} = 0,12$$

$$\boxed{\alpha = \operatorname{arctg} 0,12 = 6,84^\circ}$$

b)



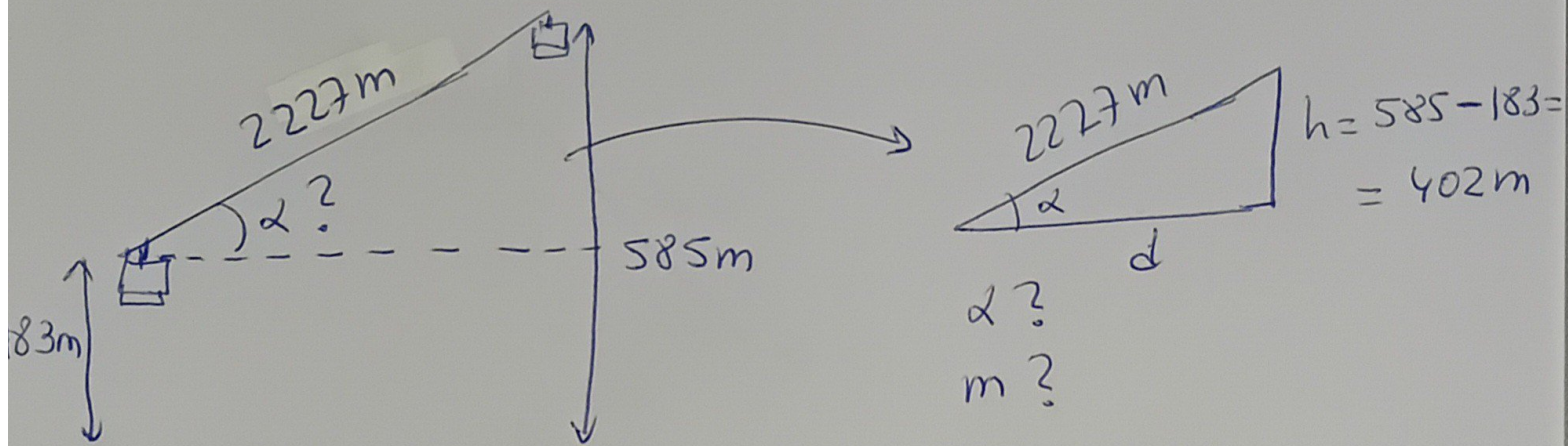
Si recorremos 7Km por la carretera, eso corresponde a la hipotenusa, que es por donde circula el coche realmente. Los catetos indican lo que se avanza en horizontal y en vertical.

$$\operatorname{sen} 6,84^\circ = \frac{x}{7} \rightarrow \boxed{x = 7 \cdot \operatorname{sen} 6,84^\circ = 0,8337 \text{ Km} = 833,7\text{m}}$$

Sol: El ángulo que forman es $6,84^\circ$

Si recorremos 7Km, ascenderemos (o descenderemos) 833,7m

p153:34



$$\text{sen } \alpha = \frac{402}{2227} \rightarrow \boxed{\alpha = \arcsen \frac{402}{2227} = 10,4^\circ}$$

$$\text{pendiente: } m = \frac{h}{d} = \frac{402}{2190,41} = 0,1835 \xrightarrow{\cdot 100} 18,35\%$$

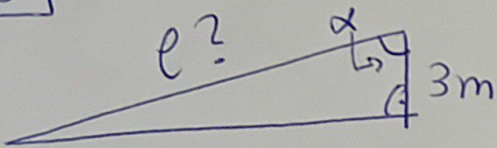
Para calcular d: $\cos 10,4^\circ = \frac{d}{2227}$

$$d = 2227 \cdot \cos 10,4^\circ = 2190,41 \text{ m}$$

Sol: Forma un ángulo de $10,4^\circ$ y la pendiente que tiene es del $18,35\%$

35

$$70^\circ \leq \alpha \leq 75^\circ$$

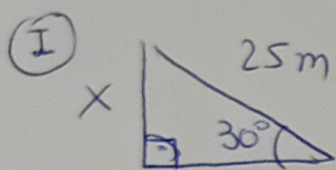
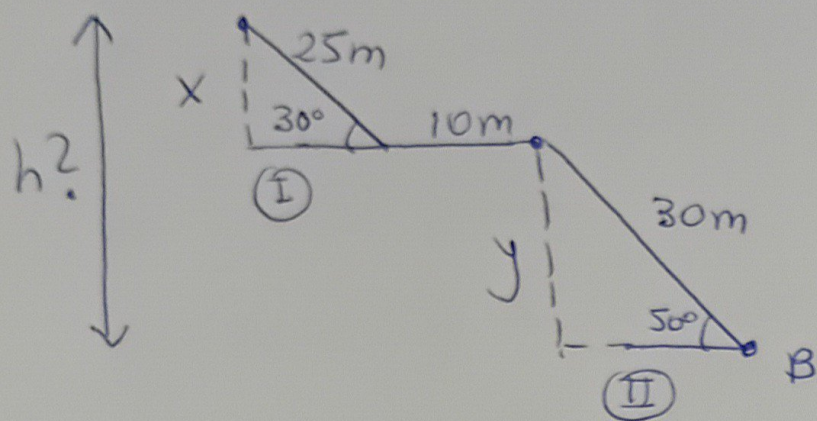


$$\bullet \text{ Si } \alpha = 70^\circ \rightarrow \cos \alpha = \cos 70 = \frac{3}{l} \rightarrow \boxed{l = \frac{3}{\cos 70} = 8,77 \text{ m}}$$

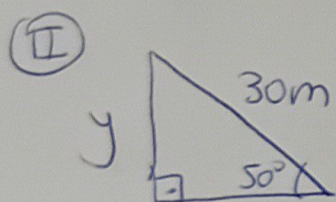
$$\bullet \text{ Si } \alpha = 75^\circ \rightarrow \cos 75^\circ = \frac{3}{l} \rightarrow \boxed{l = \frac{3}{\cos 75^\circ} = 11,59 \text{ m}}$$

Sol: La longitud de la rampa tiene que estar entre $8,77 \text{ m}$ y $11,59 \text{ m}$

p153:36



$$\text{sen } 30^\circ = \frac{x}{25} \rightarrow x = 25 \cdot \text{sen } 30 = 12'5 \text{ m}$$

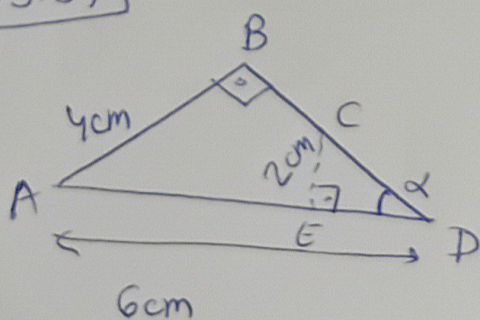


$$\text{sen } 50^\circ = \frac{y}{30} \rightarrow y = 30 \cdot \text{sen } 50 = 22'98 \text{ m}$$

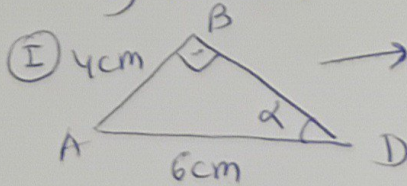
$$\boxed{h = x + y = 12'5 + 22'98 = 35'48 \text{ m}}$$

Sol: El punto B está a 35'48m de profundidad

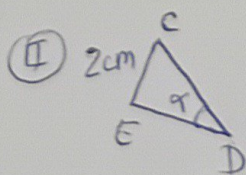
p153:37



a) $\text{sen } \hat{D} ?$



$$\boxed{\text{sen } \hat{D} = \frac{AB}{AD} = \frac{4}{6} = \frac{2}{3}}$$



Nos faltan datos.

Pero $\hat{A}BD$ y $\hat{C}DE$ son semejantes por tener los ángulos iguales $\Rightarrow \frac{AD}{CD} = \frac{AB}{CE}$

$$\rightarrow \frac{6}{CD} = \frac{4}{2} \rightarrow \boxed{CD = \frac{6 \cdot 2}{4} = 3}$$

$$\Rightarrow \boxed{\text{sen } \hat{D} = \frac{CE}{CD} = \frac{2}{3}}$$

• Ya hemos calculado $\overline{CD} = 3\text{cm}$. (4)

El resto de segmentos podemos calcularlos por Pitágoras o calculando el ángulo $\hat{D} = \alpha$ y aplicando trigonometría.
De esta 2ª forma:

$$\text{sen } \alpha = \frac{2}{3} \rightarrow \alpha = \arcsen \frac{2}{3} = 41'81''$$

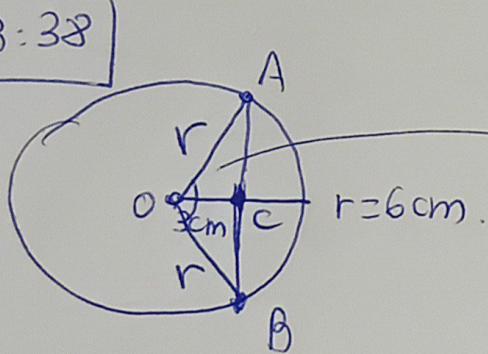
$$\textcircled{\text{I}} \quad \cos 41'81'' = \frac{\overline{BD}}{6} \rightarrow \overline{BD} = 6 \cdot \cos 41'81'' = 4'47\text{m}$$

$$\textcircled{\text{II}} \quad \text{tg } 41'81'' = \frac{2}{\overline{ED}} \rightarrow \overline{ED} = \frac{2}{\text{tg } 41'81''} = 2'24\text{m}$$

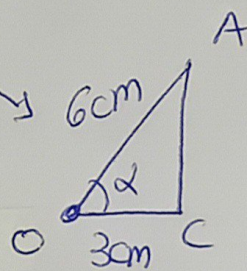
De lo calculado anteriormente:

$$\overline{BC} = \overline{BD} - \overline{CD} = 4'47 - 3 = 1'47\text{m}$$

P153:38



$\hat{AOB} ?$



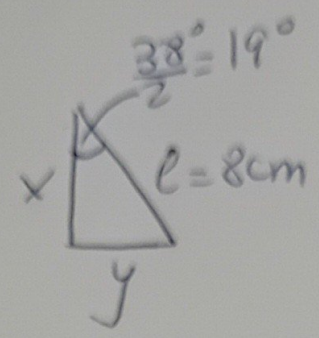
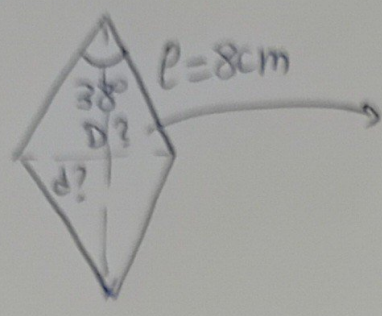
$$\cos \alpha = \frac{3}{6} = 0,5$$

$$\alpha = \arccos 0,5 = 60^\circ$$

$$\hat{AOB} = 2 \cdot \alpha = 2 \cdot 60 = 120^\circ$$

Sol: El ángulo \hat{AOB} mide 120°

p153:40



$$\cos 19^\circ = \frac{x}{8} \rightarrow \boxed{x = 8 \cdot \cos 19 = 7,56\text{m}}$$

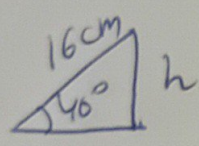
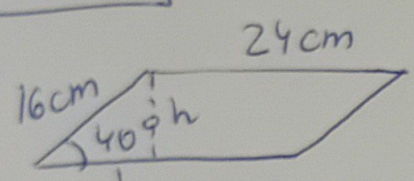
$$\text{sen } 19^\circ = \frac{y}{8} \rightarrow \boxed{y = 8 \cdot \text{sen } 19 = 2,6\text{m}}$$

$$\text{Diagonal mayor: } \boxed{D = 2x = 2 \cdot 7,56 = 15,12\text{m}}$$

$$\text{Diagonal menor: } \boxed{d = 2y = 2 \cdot 2,6 = 5,2\text{m}}$$

Sol: Las diagonales miden $5,2\text{m}$ y $15,12\text{m}$

p153:41



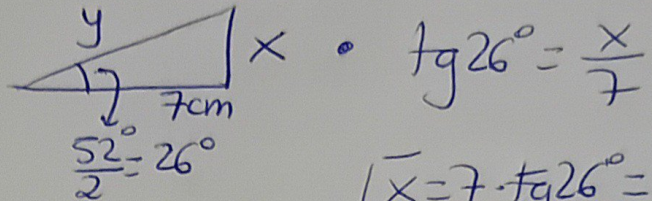
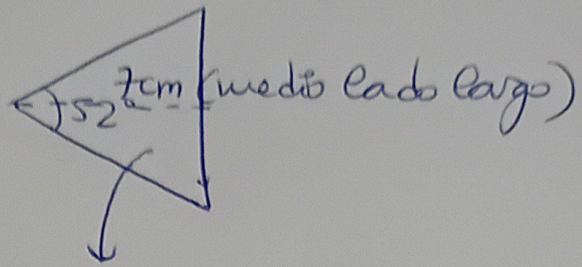
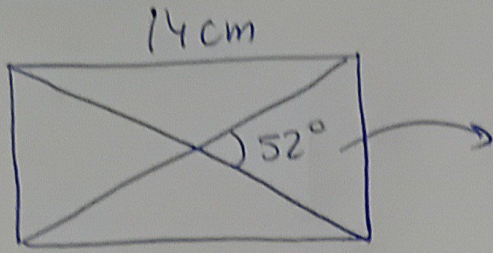
$$\text{sen } 40^\circ = \frac{h}{16} \rightarrow \boxed{h = 16 \cdot \text{sen } 40 = 10,28\text{m}}$$

$$\boxed{A = b \cdot h = 24 \cdot 10,28 = 246,72\text{cm}^2}$$

Sol: Tendrá un área de $246,72\text{cm}^2$

P153:42

(6)



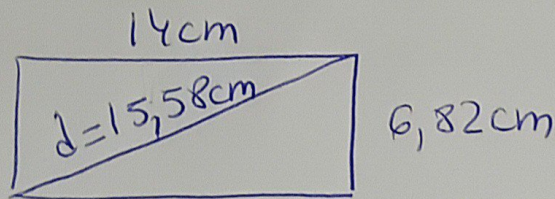
$$\tan 26^\circ = \frac{x}{7} \quad \cdot \quad \boxed{x = 7 \cdot \tan 26^\circ = 3,41 \text{ cm}}$$

$$\boxed{\text{El pequeño} = 2x = 6,82 \text{ cm}}$$

$$\cdot \cos 26^\circ = \frac{7}{y} \rightarrow \boxed{y = \frac{7}{\cos 26^\circ} = 7,79 \text{ cm}}$$

$$\boxed{\text{Diagonal} = 2y = 15,58 \text{ cm}}$$

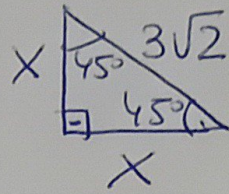
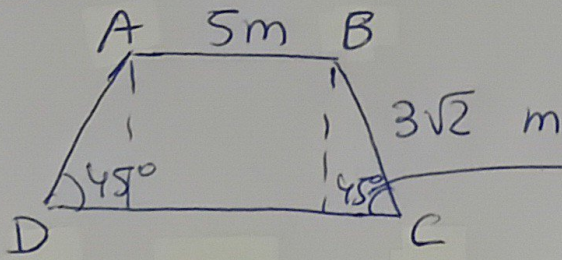
Las dimensiones del rectángulo son:



$$\boxed{\text{Perímetro} = 2 \cdot 14 + 2 \cdot 6,82 = 41,64 \text{ cm}}$$

Sol: El perímetro mide 41,64 cm y la diagonal 15,58 cm

p154: 51



A?

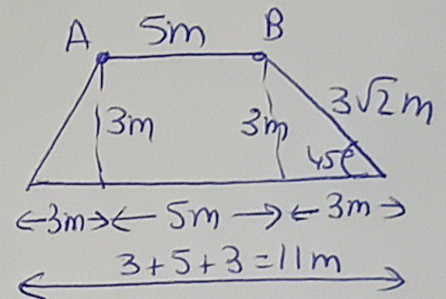
Como el ángulo que forma el lado oblicuo con la base, el triángulo rectángulo que se forma con la altura es isósceles, o sea, los 2 catetos son iguales, y su valor es:

$$\cos 45^\circ = \frac{x}{3\sqrt{2}} \rightarrow$$

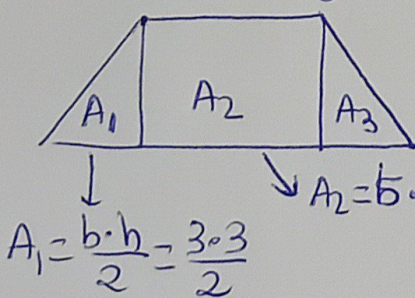
$$\rightarrow x = 3\sqrt{2} \cdot \cos 45^\circ = 3\sqrt{2} \cdot \frac{\sqrt{2}}{2}$$

$$\boxed{x = 3\text{m}}$$

Luego las medidas del trapecio son:



Para calcular el área, podemos usar la fórmula del trapecio si la recordamos, o sumar las áreas de los 2 triángulos y el rectángulo que forman el trapecio:



$$A = A_1 + A_2 + A_3 = 2A_1 + A_2 =$$

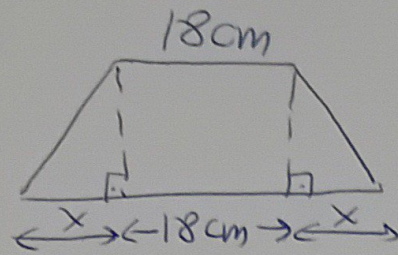
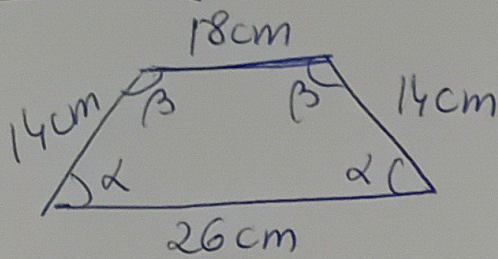
$$A_1 = A_3$$

$$= 2 \cdot \frac{3 \cdot 3}{2} + 5 \cdot 3 = 9 + 15 = 24 \text{ m}^2$$

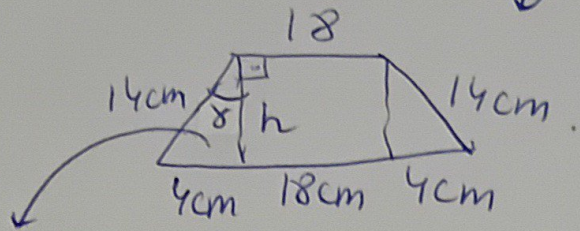
Sol: El área es de 24 m²

p/54: 52

(8)



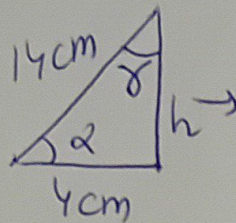
$$26 - 18 = 8 \text{ cm} \rightarrow x = \frac{8}{2} = 4 \text{ cm}$$



α ?

β ?

A?



$$\cos \alpha = \frac{4}{14} \rightarrow$$

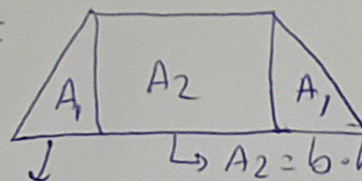
$$\rightarrow \boxed{\alpha = \arccos \frac{4}{14} = 73,4^\circ}$$

$$\Rightarrow \boxed{\delta = 90 - 73,4^\circ = 16,6^\circ}$$

$$\Rightarrow \boxed{\beta = \delta + 90^\circ = 16,6 + 90 = 106,6^\circ}$$

$$\begin{aligned} \bullet \text{ Sen } \alpha = \text{sen } 73,4 &= \frac{h}{14} \rightarrow \boxed{h = 14 \cdot \text{sen } 73,4^\circ =} \\ &= \boxed{13,42 \text{ cm}} \end{aligned}$$

Para calcular el área:



$$\hookrightarrow A_2 = b \cdot h = 18 \cdot 13,42 = 241,56 \text{ cm}^2$$

$$A_1 = \frac{b \cdot h}{2} = \frac{4 \cdot 13,42}{2} = 26,84 \text{ cm}^2$$

$$\boxed{A = 2A_1 + A_2 = 2 \cdot 26,84 + 241,56 = 295,24 \text{ cm}^2}$$