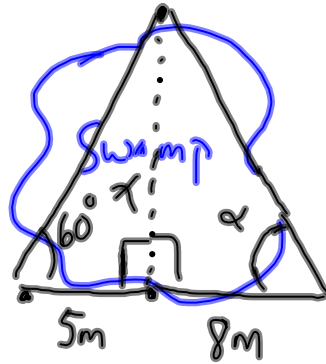


# Surveying Challenges (Indirect Solutions)

Example



To find  $x$ :

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 60^\circ = \frac{x}{5\text{m}}$$

$$x = (5\text{m})\tan 60^\circ$$

$$x = 8.66\text{m}$$

To find  $\alpha$

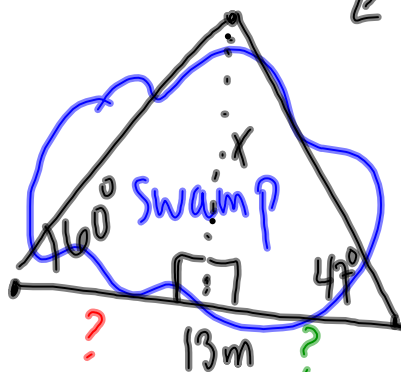
$$\tan \alpha = \frac{\text{opp}}{\text{adj}}$$

$$\tan \alpha = \frac{8.66\text{m}}{8\text{m}}$$

$$\alpha = \tan^{-1}\left(\frac{8.66\text{m}}{8\text{m}}\right)$$

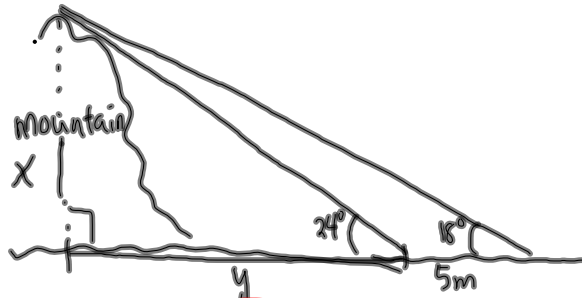
$$\alpha = 47^\circ$$

What about?



← we can't solve using the given info using right angle trip?

Example



13.5m

smaller Δ

larger Δ

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 24^\circ = \frac{x}{y}$$

$$\tan 18^\circ = \frac{x}{y+5}$$

$$x = y \tan 24^\circ$$

$$x = (y+5) \tan 18^\circ$$

$$y \tan 24^\circ = (y+5) \tan 18^\circ$$

$$y \tan 24^\circ = y \tan 18^\circ + 5 \tan 18^\circ$$

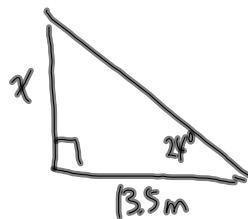
$$0.445 y = 0.325 y + 1.625$$

$$0.12 y = 1.625$$

$$y = \frac{1.625}{0.12}$$

$$y = 13.5 \text{ m}$$

← how far from the mountain for the first angle of elevation



To find the height: (smaller Δ)

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 24^\circ = \frac{x}{13.5 \text{ m}}$$

$$x = (13.5 \text{ m}) \tan 24^\circ$$

$$x = 6.0 \text{ m}$$

The height of the "mountain" is 6.0m