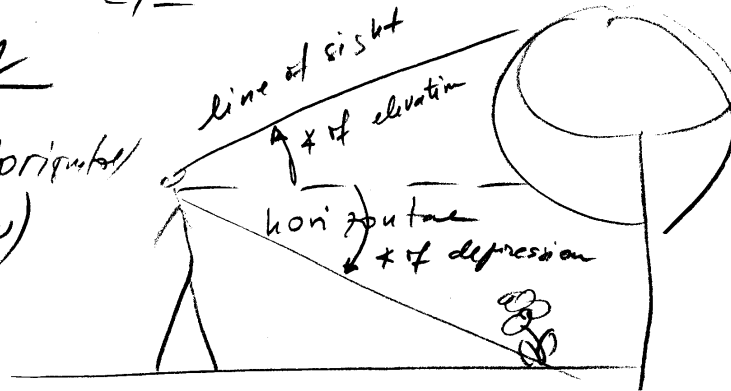
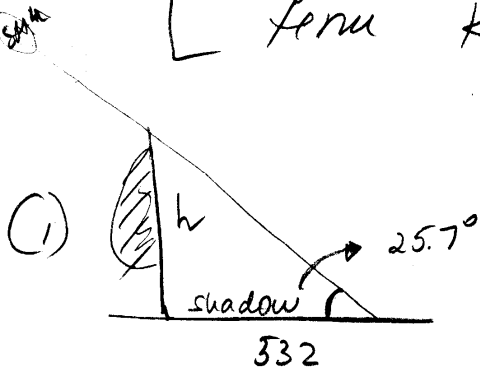


# Terminology

elevation (above horizontal)  
& depression (below)



- NOTES
- most of the times,  $\angle$ 's of elevation and depression will be given for a hypothetical observer at ground level
  - If line of sight follows a physical object (hillside), we use the term  $\angle$  of inclination

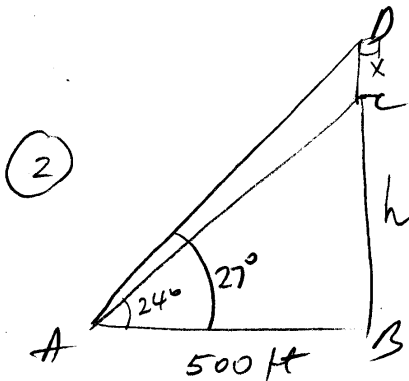


$$h = \text{height of tree}$$

$$\tan 25.7^\circ = \frac{h}{532 \text{ ft}}$$

$$h = 532 (\tan 25.7^\circ) \text{ ft}$$

$$h \approx 256 \text{ ft}$$



$$h = \text{height of building}$$

$$x = \text{length of flagpole}$$

$$\Delta ABC: \tan 24^\circ = \frac{h}{500}$$

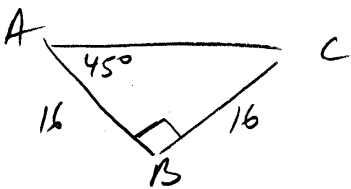
$$h = 500 (\tan 24^\circ) = 223 \text{ ft}$$

$$\Delta ABD: \tan 27^\circ = \frac{h+x}{500}$$

$$h+x = 500 \tan 27^\circ = 255 \text{ ft}$$

$$x = 255 - 223 = 32 \text{ ft}$$

(9)



$$A = 45^\circ \Rightarrow C = 45^\circ$$

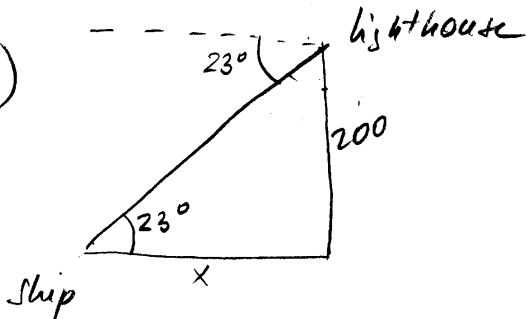
$$\triangle ABC \text{ is isosceles} \Rightarrow BC = AB = 16$$

$$AC = 16\sqrt{2}$$

OR:  $\tan 45^\circ = \frac{16}{AB} = 1 \Rightarrow AB = 16$

OR:  $\cos 45^\circ = \frac{AB}{16\sqrt{2}} \Rightarrow AB = 16\sqrt{2} \cdot \frac{\sqrt{2}}{2}$

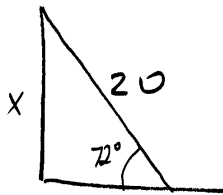
(12)



$$\tan 23^\circ = \frac{200}{x}$$

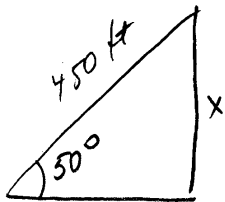
$$x = \frac{200}{\tan 23^\circ} \approx 471 \text{ ft}$$

(12)

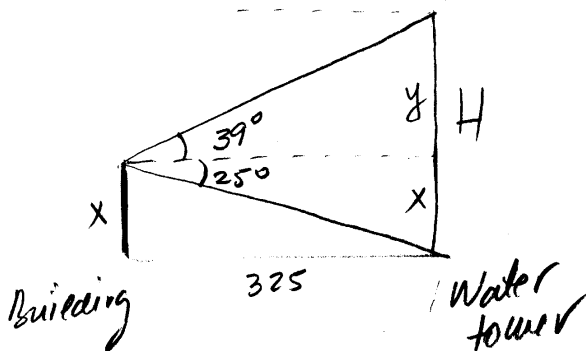


$$\sin 72^\circ = \frac{x}{20} \Rightarrow x = 20 \sin 72^\circ$$

(13)



(14)



H = height of the tower

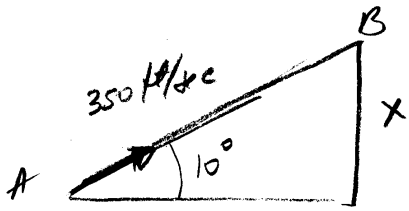
$$H = x + y$$

$$\tan 39^\circ = \frac{y}{325} \Rightarrow y \approx 263 \text{ ft}$$

$$\tan 25^\circ = \frac{x}{325} \Rightarrow x = 151 \text{ ft}$$

$$H = 263 + 151 = 414 \text{ ft}$$

(15)

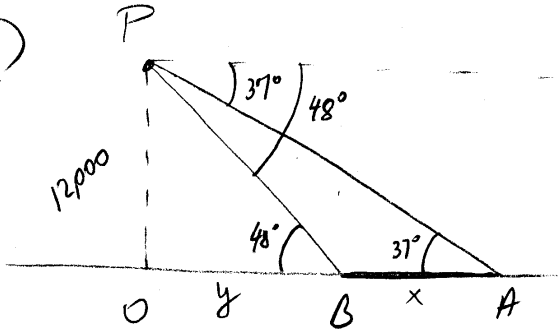


$$d = AB = 350 \frac{\text{ft}}{\text{sec}} \cdot 15 \text{ sec}$$

$$d = 5250 \text{ ft}$$

$$\sin 10^\circ = \frac{x}{5250} \Rightarrow x = 912 \text{ ft}$$

(16)



$$\Delta POB: \tan 48^\circ = \frac{12,000}{y}$$

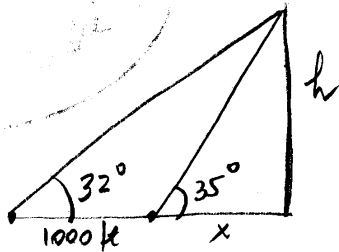
$$y = \frac{12,000}{\tan 48^\circ} \approx 10,804$$

$$\Delta POA: \tan 37^\circ = \frac{12,000}{x+y}$$

$$x+y = \frac{12,000}{\tan 37^\circ} \approx 15,925$$

$$x = 15,925 - 10,804 = 5,121 \text{ ft}$$

(17)



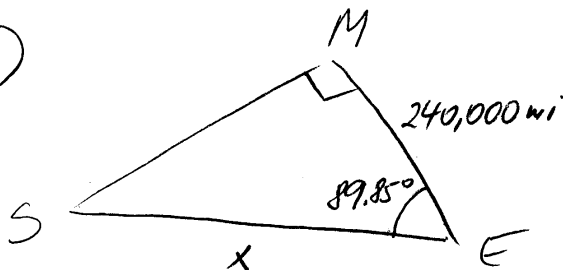
$$\left\{ \begin{aligned} \tan 35^\circ &= \frac{h}{x} = 0.7 \\ \tan 32^\circ &= \frac{h}{x+1000} = 0.6 \end{aligned} \right.$$

$$\left\{ \begin{aligned} h &= 0.7x \\ h &= 0.6(1000+x) \end{aligned} \right.$$

$$x = 6000 \text{ ft}$$

$$h = 4200 \text{ ft}$$

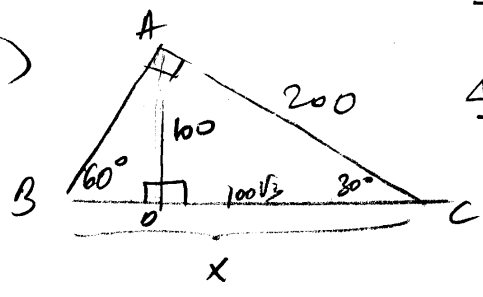
(18)



$$\cos 89.85^\circ = \frac{240,000}{x}$$

$$x \approx 91,673,351 \text{ mi}$$

(19)



$\triangle ADC$   $DC^2 = 40000 - 10000 = 30,000$

$DC = 100\sqrt{3}$

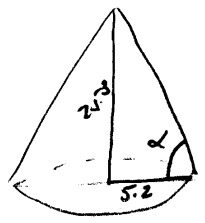
OR  $\cos 30^\circ = \frac{DC}{200} \Rightarrow DC = 200 \cdot \frac{\sqrt{3}}{2}$

$\triangle ABD$   $\tan 60^\circ = \frac{100}{BD}$

$BC = \frac{100\sqrt{3}}{3} + 100\sqrt{3} = \frac{400\sqrt{3}}{3}$   
 $\approx 230.9 \text{ ft}$

$\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{100}{BD} \Rightarrow BD = \frac{100\sqrt{3}}{3}$

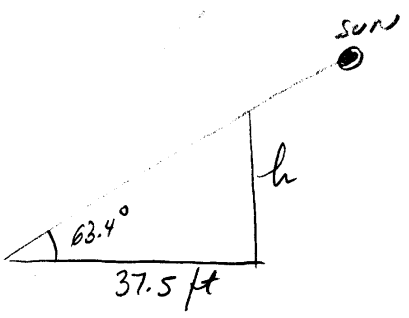
(20)



$\tan \alpha = \frac{25.3}{5.2}$

$\alpha = \tan^{-1}\left(\frac{25.3}{5.2}\right) \approx 78.4^\circ$

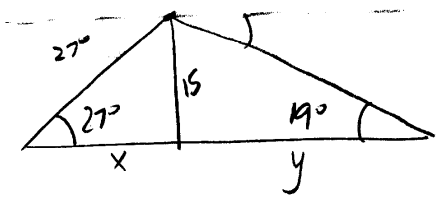
(21)



$\tan 63.4^\circ = \frac{h}{37.5}$

$h = 74.9 \text{ ft}$

(22)



$\tan 27^\circ = \frac{15}{x}$

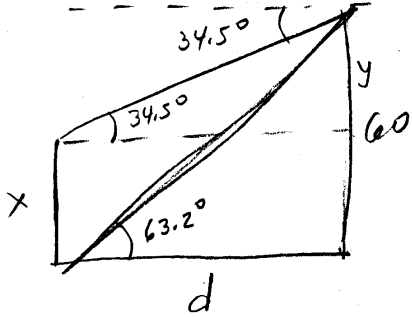
$\tan 19^\circ = \frac{15}{y}$

$x = \frac{15}{\tan 27^\circ}$

$y = \frac{15}{\tan 19^\circ}$

$x + y = 73 \text{ ft}$

(23)



$$x = 60 - y$$

$$y = ? \text{ med } d$$

$$d: \tan 63.2^\circ = \frac{60}{d} \Rightarrow d = \frac{60}{\tan 63.2^\circ}$$

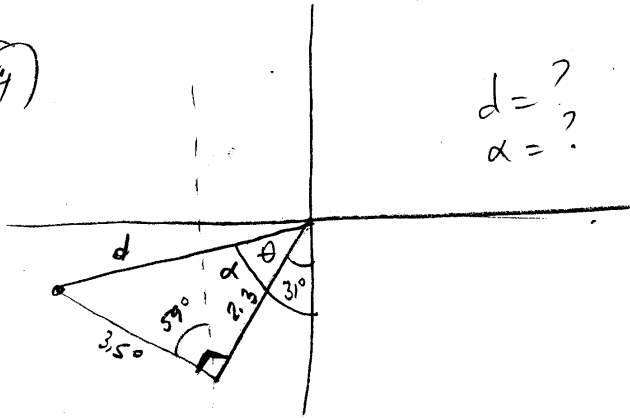
$$d \approx 30.3 \text{ ft}$$

$$y: \tan 34.5^\circ = \frac{y}{d} \Rightarrow y = 30.3 (\tan)$$

$$y = 20.8$$

$$x = 60 - 20.8 = 39.2 \text{ ft}$$

(24)



$$d = ?$$

$$\alpha = ?$$

$$d = \sqrt{3.5^2 + 2.3^2}$$

$$\alpha = 31^\circ + \theta$$

$$\tan \theta = \frac{3.5}{2.3}$$

$$\theta = \tan^{-1} \frac{3.5}{2.3} = 57^\circ$$

$$\alpha = 31^\circ + 57^\circ = 88^\circ$$

$$S 88^\circ W$$