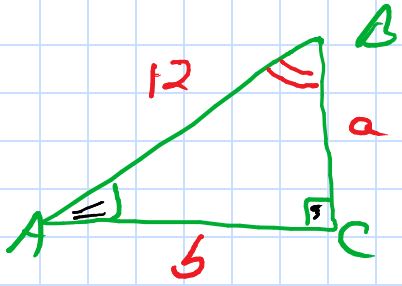
6.01 Right Triangles.

cosine, sine } hyp → adj, → opp.

tangent → no hyp

1-x $\triangle ABC$ $C = 90^\circ$ $c = 12$ $A = 40^\circ$

$B = 90^\circ - A$
$= 90^\circ - 40^\circ$
$= 50^\circ$



$\cos A = \frac{b}{12}$

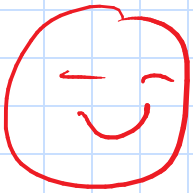
$b = 12 \cos 40^\circ \approx 9.2$ cm

$\sin 40^\circ = \frac{a}{12} \Rightarrow a = 12 \sin 40^\circ \approx 7.7$ cm

$\frac{\sqrt{1}}{2}$

30° $\frac{1}{2}$

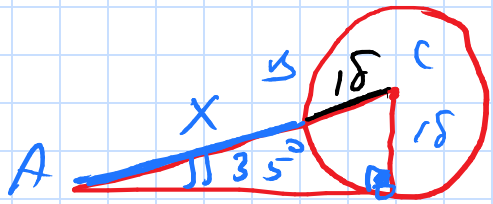
0° 0



40°

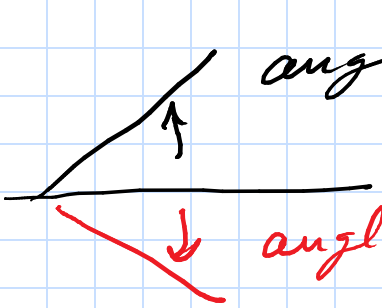
$\sin 0^\circ = 0$
$\sin 30^\circ = \frac{1}{2}$
$\sin 45^\circ \approx .707$

1-y $\sin 35^\circ = \frac{18}{x + 18}$



$x + 18 = \frac{18}{\sin 35^\circ}$

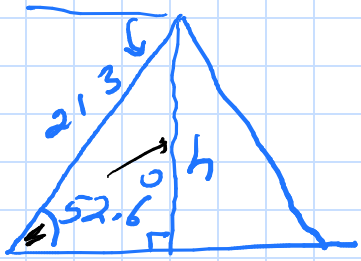
$x = \frac{18}{\sin 35^\circ} - 18 \approx 13$ in



ex

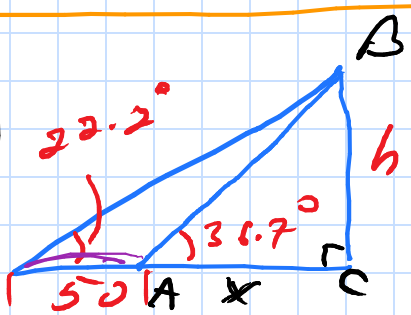
$$\sin 52.6^\circ = \frac{h}{213}$$

$$h = 213 \sin 52.6^\circ$$



$\triangle ACB \Rightarrow \tan 36.7^\circ = \frac{h}{x}$

$$h = x \tan 36.7^\circ \quad (1)$$



$\triangle DCB$

$$\tan 22.2^\circ = \frac{h}{x+50}$$

$$h = (x+50)\tan 22.2^\circ = x \tan 36.7^\circ$$

$$x \tan 22.2^\circ + 50 \tan 22.2^\circ - x \tan 36.7^\circ = 0$$

$$x(-\tan 22.2^\circ + \tan 36.7^\circ) = +50 \tan 22.2^\circ$$

$$x = \frac{50 \tan 22.2^\circ}{\tan 36.7^\circ - \tan 22.2^\circ}$$

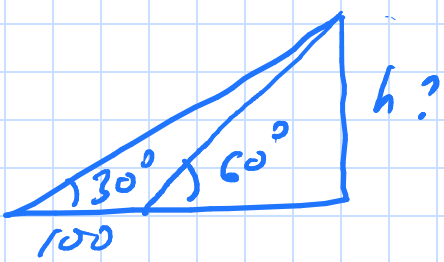
(1) $$h = \frac{50 \tan 22.2^\circ \cdot \tan 36.7^\circ}{\tan 36.7^\circ - \tan 22.2^\circ}$$

$$h = \frac{x \tan \quad \tan}{\tan \quad - \tan}$$

2 of them

#20

$$h = \frac{100 \tan 60^\circ \tan 30^\circ}{\tan 60^\circ - \tan 30^\circ}$$



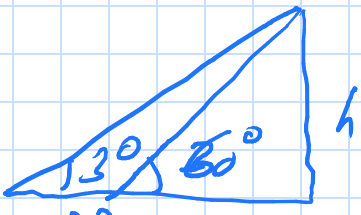
#10

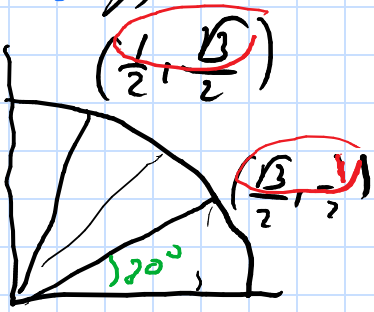
$$h = \frac{100 \tan 60^\circ \tan 30^\circ}{\tan 60^\circ - \tan 30^\circ}$$

$$= \frac{100 \quad \sqrt{3} \quad \frac{1}{\sqrt{3}}}{\sqrt{3} - \frac{1}{\sqrt{3}}}$$

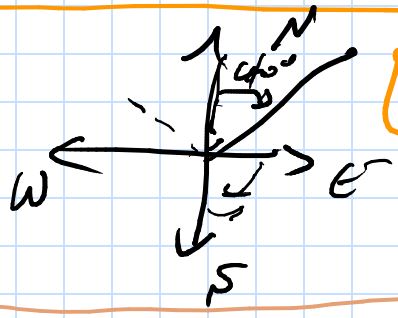
$$= \frac{100}{\frac{2}{\sqrt{3}}} \longrightarrow 100 \cdot \frac{\sqrt{3}}{2}$$

$$= 50\sqrt{3} \text{ ft}$$





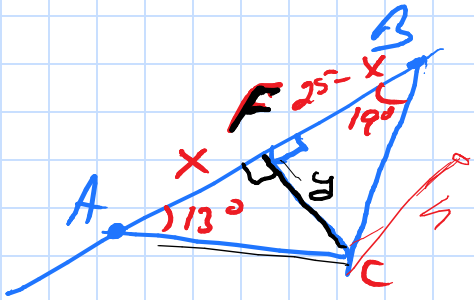
N 40° E



$\tan 45^\circ = 1$

$\triangle AFC$: $\tan 13^\circ = \frac{y}{x}$ (1)

$\triangle BFC$: $\tan 19^\circ = \frac{y}{25 - x}$ (2)



(1) $y = x \tan 13^\circ$ (3)

$= (25 - x) \tan 19^\circ$

$x \tan 13^\circ = 25 \tan 19^\circ - x \tan 19^\circ$

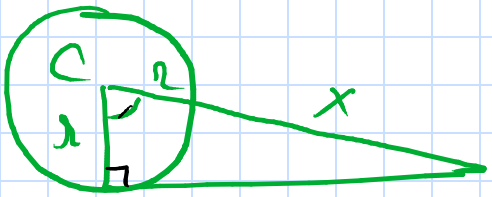
$x \tan 13^\circ + x \tan 19^\circ$

$x(\tan 13^\circ + \tan 19^\circ) = 25 \tan 19^\circ$

$$x = \frac{25 \tan 19^\circ}{\tan 13^\circ + \tan 19^\circ}$$

$$y = \frac{25 \tan 19^\circ \tan 13^\circ}{\tan 13^\circ + \tan 19^\circ}$$

#6 $C = 30°$ $r = 15$



$\cos 30° = \frac{r}{x+r}$

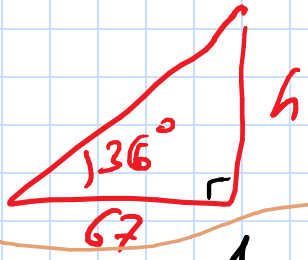
$\frac{\sqrt{3}}{2} = \frac{15}{x+15}$

$x + 15 = \frac{30}{\sqrt{3}}$

$x = 10\sqrt{3} - 15$

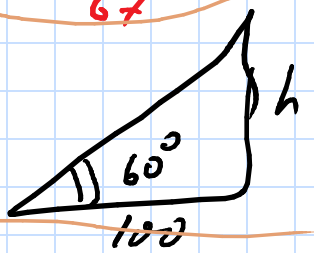
10/ $\tan 36° = \frac{h}{67}$

$h = 67 \tan 36°$

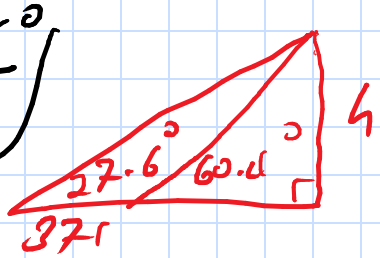


11/ $\tan 60° = \frac{h}{100} = \sqrt{3}$

$h = 100\sqrt{3}$

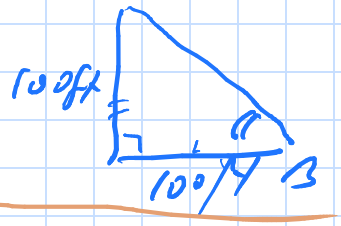


#17/ $h = \frac{37 \tan 60.4° \tan 37.6°}{\tan 60.4° - \tan 37.6°}$



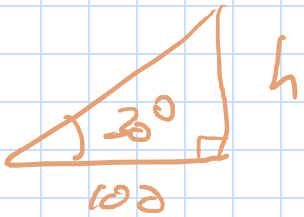
#30/ $\tan B = \frac{100}{100} = 1$

$B = 45°$



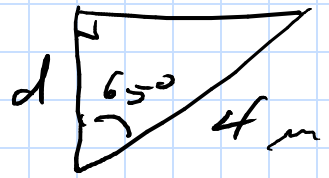
#37/ $\tan 30° = \frac{h}{100} = \frac{1}{\sqrt{3}}$

$h = \frac{100}{\sqrt{3}}$ $\frac{100\sqrt{3}}{3}$



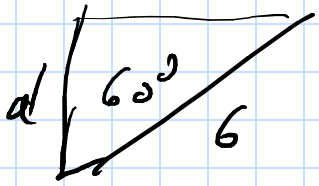
#39 $\cos 65^\circ = \frac{d}{4}$

$d = 4\cos 65^\circ$



#40 $\cos 60^\circ = \frac{d}{6} = \frac{1}{2}$

$d = 3$ mi

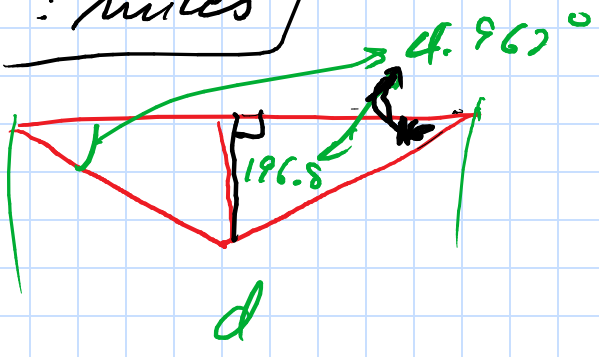


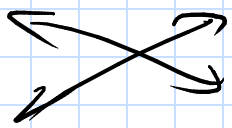
mi : miles

#42 $\tan 4.962^\circ = \frac{196.8}{d/2}$

$\frac{d}{2} = \frac{196.8}{\tan 4.962^\circ}$

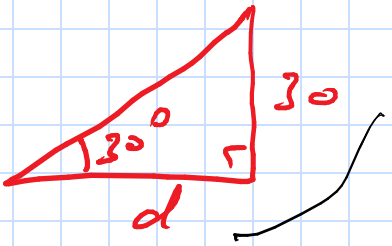
$d = \frac{393.6}{\tan 4.962^\circ}$





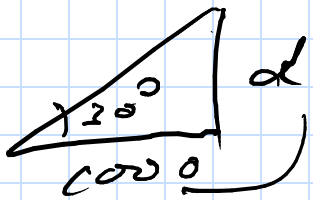
#49 (29) $\tan 30^\circ = \frac{30}{d} = \frac{1}{\sqrt{3}}$

$d = 30\sqrt{3}$



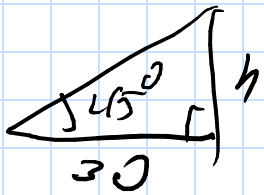
63 (73) $\tan 30^\circ = \frac{d}{1000} = \frac{1}{\sqrt{3}}$

$d = \frac{1000}{\sqrt{3}}$



#66 $\tan 45^\circ = \frac{d}{30} = \frac{\sqrt{2}}{2}$

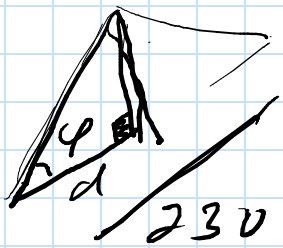
$d = 15\sqrt{2}$



8! $h = 147$ $d = 115$

$$\tan\varphi = \frac{147}{115}$$

$$\varphi = \tan^{-1}\frac{147}{115}$$



φ

6.5 Law of Sines / Cosines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

angles

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

$$\sin A = \frac{a \sin B}{b}$$

Ex $A = 30^\circ$ $B = 70^\circ$ $a = 8$ c?

$$C = 180^\circ - 30^\circ - 70^\circ$$

$$= 80^\circ$$

$$c = \frac{a \sin C}{\sin A} = \frac{8 \sin 80^\circ}{\sin 30^\circ}$$

$$c = 16 \sin 80^\circ$$