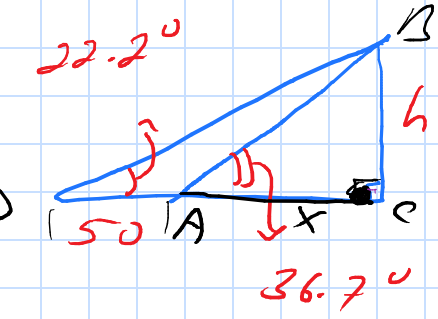
6.4 (cont.)

Ex h?



$\triangle ACB$: $\tan 36.7^\circ = \frac{h}{x}$ ①

$\triangle DCB$: $\tan 22.2^\circ = \frac{h}{x+50}$ ②

② $h = (x+50)\tan 22.2^\circ$

① $h = x \tan 36.7^\circ$ → ③

hyp, adj: cosine
opp: sine
no hyp → tangent

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

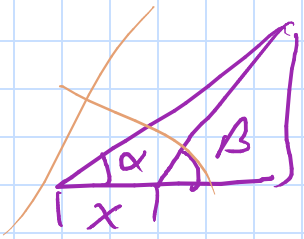
$x \tan 36.7^\circ - x \tan 22.2^\circ =$

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

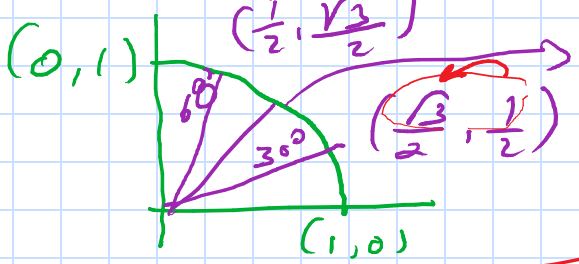
$x = \frac{50 \tan 22.2^\circ}{\tan 36.7^\circ - \tan 22.2^\circ}$

③ $h = \frac{50 \tan 22.2^\circ \tan 36.7^\circ}{\tan 36.7^\circ - \tan 22.2^\circ}$ ⟸

$h = \frac{x \tan\alpha \tan\beta}{\tan\beta - \tan\alpha}$ ↓ larger



$\tan 45^\circ = 1$

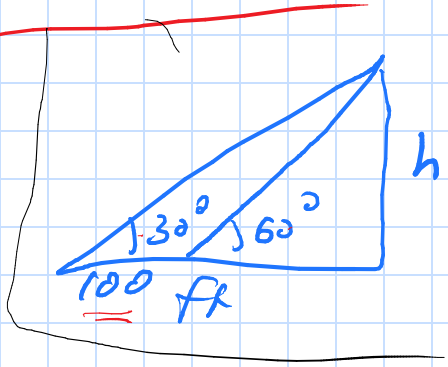


20/ $h = \frac{100 \tan 60^\circ \tan 30^\circ}{\tan 60^\circ - \tan 30^\circ}$

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

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

$= 50\sqrt{3}$



$\frac{(\sqrt{3})^2 - (}{\sqrt{3}}$

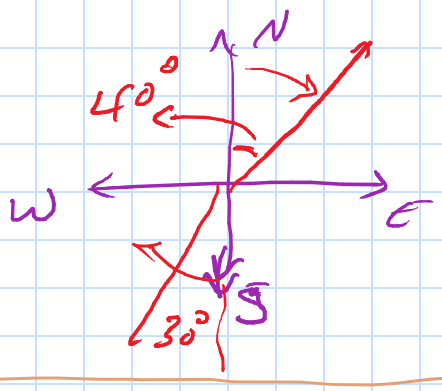
$\frac{100}{2} \cdot \frac{\sqrt{3}}{2}$

1, ↖ √3

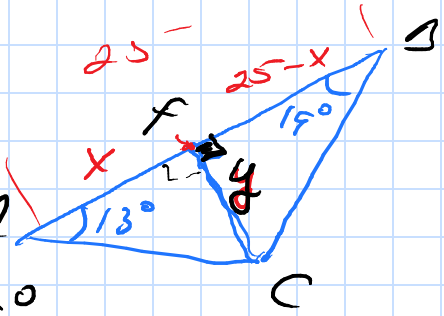
Bearing: N 40° E

1st

S 30° W



#5 $\triangle AFC$ & $\triangle BFC$



$\tan 13^\circ = \frac{y}{x} \Rightarrow y = x \tan 13^\circ$ (1)

$\tan 19^\circ = \frac{y}{25-x} \Rightarrow y = (25-x)\tan 19^\circ$

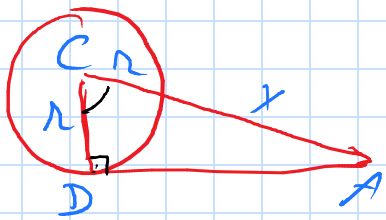
$x \tan 13^\circ = 25\tan 19^\circ - x \tan 19^\circ$

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

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

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

#6 $r = 15$ $C = 30^\circ$

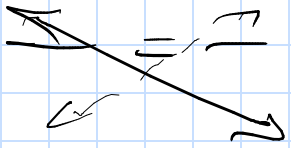


$\cos 30^\circ = \frac{15}{15+x} \Rightarrow \frac{\sqrt{3}}{2}$

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

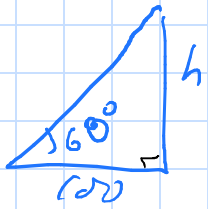
$x = \frac{30\sqrt{3}}{3} - 15$

$= 10\sqrt{3} - 15$

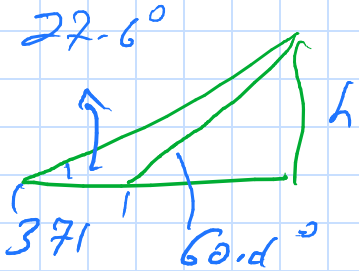


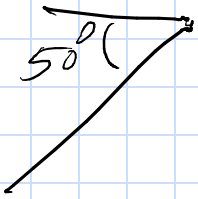
11/ $\tan 60^\circ = \frac{h}{100} = \sqrt{3}$

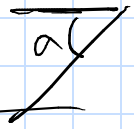
$h = 100\sqrt{3}$ ft



17/ $h = \frac{371 \tan 60.4^\circ \tan 27.6^\circ}{\tan 60.4^\circ - \tan 27.6^\circ}$

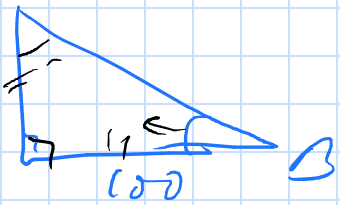






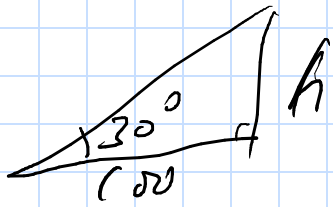
30/ $B = 45^\circ$

$\tan B = \frac{100}{100} = 1$



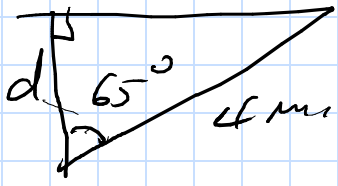
37/ $\tan 30^\circ = \frac{h}{100} \Rightarrow \frac{1}{\sqrt{3}}$

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



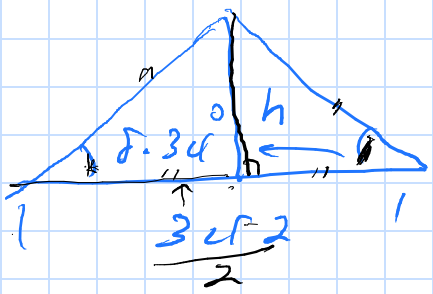
39/ $\cos 65^\circ = \frac{d}{4}$

$d = 4 \cos 65^\circ$



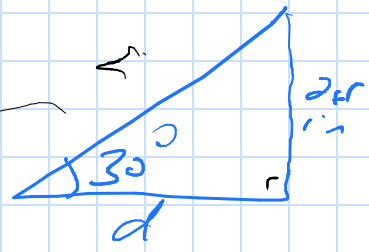
42/ $\tan 8.34^\circ = \frac{h}{171}$

$h = 171 \tan 8.34^\circ$



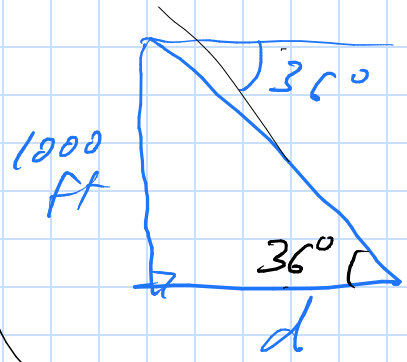
65 $\tan 30^\circ = \frac{2d}{d} = \frac{1}{\sqrt{3}}$

$d = 2d\sqrt{3}$ in



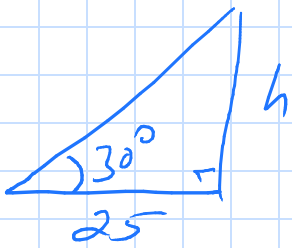
67 $\tan 36^\circ = \frac{1000}{d}$

$d = \frac{1000}{\tan 36^\circ}$



73 $\tan 30^\circ = \frac{h}{25} = \frac{1}{\sqrt{3}}$

$h = \frac{25}{\sqrt{3}}$



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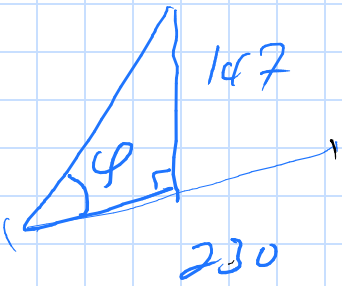
91 $\tan \varphi = \frac{147}{115}$

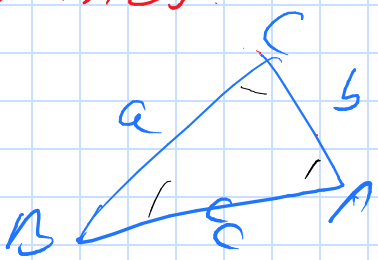
$\varphi = \tan^{-1}\left(\frac{147}{115}\right)$



6.5 Law of Sines / Cosines

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

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



Ex Δ: $A = 30°$, $B = 70°$, $a = 8$, c?

$$C = 180° - 30° - 70° = 80°$$

$$\frac{c}{\sin 80°} = \frac{8}{\sin 30°}$$

$$c = \frac{8}{\frac{1}{2}} \sin 80°$$

$$= 16 \sin 80°$$

$\sin 60° = \frac{\sqrt{3}}{2}$

.86
.07
.93
≈ .78

Ex/ $A = 32°$, $C = 81.8°$, $a = 42.9$

$$B = 180° - 32° - 81.8°$$

$$= 66.2°$$

$$b = \frac{42.9 \sin 66.2°}{\sin 32°}$$

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

$$c = \frac{42.8 \sin 81.8°}{\sin 32°}$$

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

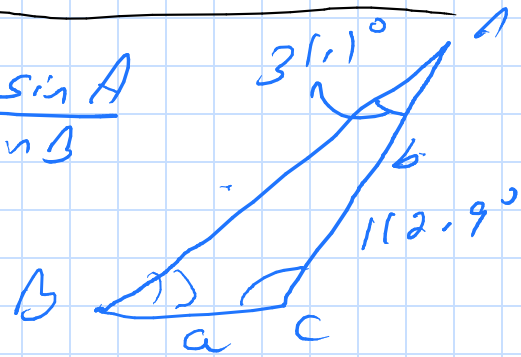
Ex $b = 347.6$, a?

$$B = 180° - 31.1° - 112.9°$$

$$= 36°$$

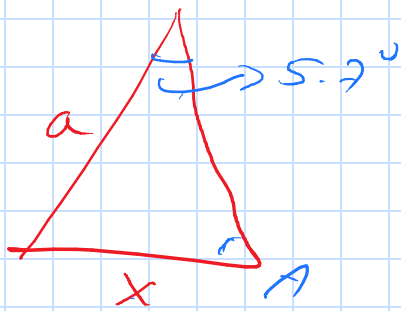
$$a = \frac{347.6 \sin 31.1°}{\sin 36°}$$

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



Ex $a = 562$, $A = 85.3^\circ$

$$x = \frac{562 \sin 5.7^\circ}{\sin 85.3^\circ}$$



$0 \le \sin\theta \le 1$

$-1 \le \frac{\sin\theta}{\cos\theta} \le 1$

$\sin\theta$, $\theta \in QI, QII$ > 0 (+)

Ex $a = 2$ $b = 6$ $A = 30^\circ$

$$\frac{\sin B}{6} = \frac{\sin 30^\circ}{2}$$

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

$$\sin B = \frac{6}{2} \cdot \frac{1}{2}$$

$$= \frac{3}{2} > 1 \quad \#$$

No triangle

Ex $C = 35.4^\circ$ $a = 205$ $c = 314$

$$\sin A = \frac{205 \sin 35.4^\circ}{314}$$

$$\hat{A} = \sin^{-1}\left(\frac{205 \sin 35.4^\circ}{314}\right) \approx 22.2^\circ$$

$A \approx 22.2^\circ$

$B = 180^\circ - 22.2^\circ - 35.4^\circ$

$\approx 122.4^\circ$

$A = 180 - 22.2^\circ$

$= 157.8^\circ$

$B = 180^\circ - 157.8^\circ - 35.1^\circ$

$- \quad \#$

$$b = \frac{314 \sin 122.4^\circ}{\sin 35.4^\circ}$$

$(f \circ f^{-1})(x) = x$