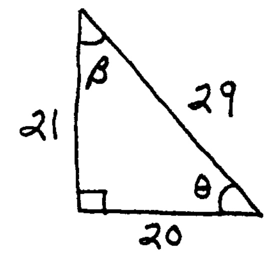
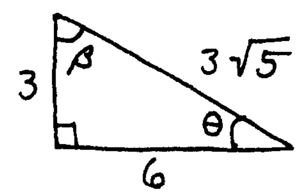
Section 6.1

2) $\cos\theta = \frac{20}{29}$, $\sin\theta = \frac{21}{29}$,



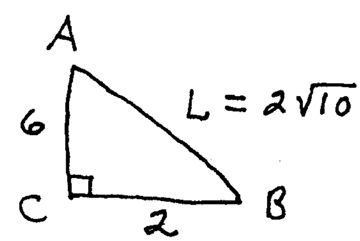
$\tan\theta = \frac{21}{20}$, $\sec\theta = \frac{29}{20}$,
$\csc\theta = \frac{29}{21}$, $\cot\theta = \frac{20}{21}$;
$\cos\beta = \frac{21}{29}$, $\sin\beta = \frac{20}{29}$,
$\tan\beta = \frac{20}{21}$, $\sec\beta = \frac{29}{21}$, $\csc\beta = \frac{29}{20}$,
$\cot\beta = \frac{21}{20}$

3) $\cos\theta = \frac{6}{3\sqrt{5}} = \frac{2}{\sqrt{5}}$,



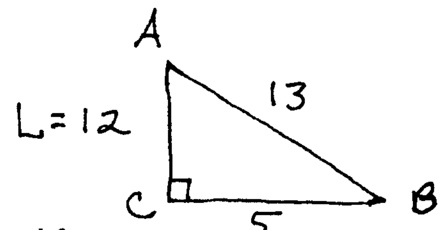
$\sin\theta = \frac{3}{3\sqrt{5}} = \frac{1}{\sqrt{5}}$,
$\tan\theta = \frac{3}{6} = \frac{1}{2}$, $\sec\theta = \frac{\sqrt{5}}{2}$,
$\csc\theta = \sqrt{5}$, $\cot\theta = 2$;
$\cos\beta = \frac{3}{3\sqrt{5}} = \frac{1}{\sqrt{5}}$, $\sin\beta = \frac{6}{3\sqrt{5}} = \frac{2}{\sqrt{5}}$,
$\tan\beta = \frac{6}{3} = 2$, $\sec\beta = \sqrt{5}$, $\csc\beta = \frac{\sqrt{5}}{2}$,
$\cot\beta = \frac{1}{2}$

6) $L^2 = 2^2 + 6^2 = 4 + 36 = 40 \rightarrow$



$L = \sqrt{40} = \sqrt{4 \cdot 10} = 2\sqrt{10}$;
a.) $\cos A = \frac{6}{2\sqrt{10}} = \frac{3}{\sqrt{10}}$,
$\sin A = \frac{2}{2\sqrt{10}} = \frac{1}{\sqrt{10}}$, $\tan A = \frac{2}{6} = \frac{1}{3}$;
b.) $\sec B = \frac{2\sqrt{10}}{2} = \sqrt{10}$, $\csc B = \frac{2\sqrt{10}}{6} = \frac{\sqrt{10}}{3}$,
$\cot B = \frac{2}{6} = \frac{1}{3}$

7) $5^2 + L^2 = 13^2 \rightarrow$

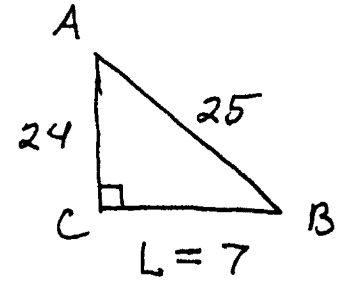


$L^2 = 169 - 25 = 144 \rightarrow L = 12$;
$\cos B = \frac{5}{13}$, $\sin B = \frac{12}{13}$, $\tan B = \frac{12}{5}$,
$\sec B = \frac{13}{5}$, $\csc B = \frac{13}{12}$, $\cot B = \frac{5}{12}$

11) $L^2 + 24^2 = 25^2 \rightarrow$

$L^2 = 25^2 - 24^2 = (25-24)(25+24)$

$= (1)(49) \rightarrow L = 7$;



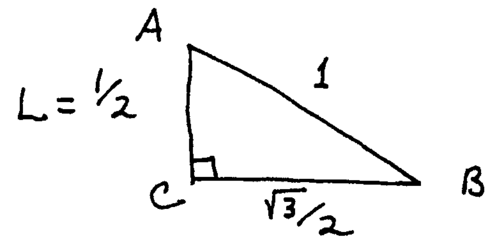
a.) $\cos A = 24/25$, $\sin A = 7/25$, $\tan A = 7/24$

b.) $\cos B = 7/25$, $\sin B = 24/25$, $\tan B = 24/7$

c.) $(\tan A)(\tan B) = (7/24)(24/7) = 1$

12) $L^2 + \left(\frac{\sqrt{3}}{2}\right)^2 = 1^2 \rightarrow$

$L^2 = 1 - 3/4 = 1/4 \rightarrow L = 1/2$;



a.) $\cos A = \frac{1/2}{1} = 1/2$,

$\sin B = \frac{1/2}{1} = 1/2$;

b.) $\tan A = \frac{\sqrt{3}/2}{1/2} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$,

$\cot B = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$

c.) $\sec A = \frac{1}{1/2} = 1 \cdot \frac{2}{1} = 2$, $\csc B = \frac{1}{1/2} = 1 \cdot \frac{2}{1} = 2$

13) $\cos(65°) = 0.423$, $\sin(65°) = 0.906$,

$\tan(65°) = 2.145$

18) $\cos(0.99°) = 0.999$, $\sin(0.99°) = 0.017$,

$\tan(0.99°) = 0.017$

37) $\cos 60° = \cos^2 30° - \sin^2 30° \rightarrow$

$\frac{1}{2} = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 \rightarrow \frac{1}{2} = \frac{3}{4} - \frac{1}{4} \rightarrow \frac{1}{2} = \frac{2}{4}$ (TRUE)

40) $\sin 30° \cos 60° + \cos 30° \sin 60° = 1 \rightarrow$

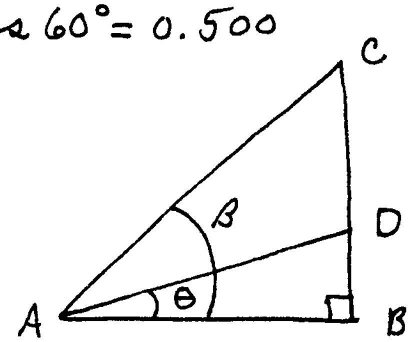
$(1/2)(1/2) + (\sqrt{3}/2)(\sqrt{3}/2) = 1 \rightarrow \frac{1}{4} + \frac{3}{4} = 1$ (TRUE)

42) $2\sin 45^\circ \cos 45^\circ = 1 \rightarrow 2\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) = 1 \rightarrow$
$2\left(\frac{2}{4}\right) = 1 \rightarrow \frac{4}{4} = 1$ (TRUE)

46) $\tan 30^\circ = \frac{1-\cos 60^\circ}{\sin 60^\circ} \rightarrow \frac{1}{\sqrt{3}} = \frac{1-\frac{1}{2}}{\sqrt{3}/2} \rightarrow$
$\frac{1}{\sqrt{3}} = \frac{1}{2}\cdot\frac{2}{\sqrt{3}}$ (TRUE)

51) a.) The sine of an angle is opp/r, where r is fixed. As the angle goes from 20° to 40° to 60° the "opp's" (RC, QB, PA) get bigger. Thus the sines get bigger. Hence $\sin 20^\circ < \sin 40^\circ < \sin 60^\circ$.
b.) $\sin 20^\circ = 0.342 < \sin 40^\circ = 0.643 < \sin 60^\circ = 0.866$

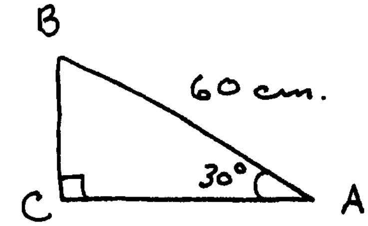
52) a.) The cosine of an angle is adj/r, where r is fixed. As the angle goes from 20° to 40° to 60° the "adj's" (OC, OB, OA) get smaller. Thus the cosines get smaller. Hence $\cos 20^\circ > \cos 40^\circ > \cos 60^\circ$.
b.) $\cos 20^\circ = 0.940 > \cos 40^\circ = 0.766 > \cos 60^\circ = 0.500$



53) a.) $\cos\theta = \frac{AB}{AD}$, $\cos\beta = \frac{AB}{AC}$
and $AD < AC$ so $\cos\theta > \cos\beta$
b.) $\sec\theta = \frac{AD}{AB}$, $\sec\beta = \frac{AC}{AB}$

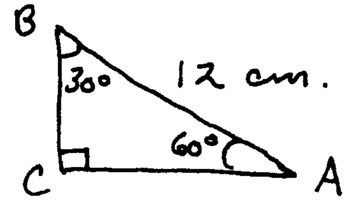
and $AD < AC$ so $\sec\theta < \sec\beta$

Section 6.2



1) BC = 30 cm. ($\frac{1}{2}$ of hypotenuse) then

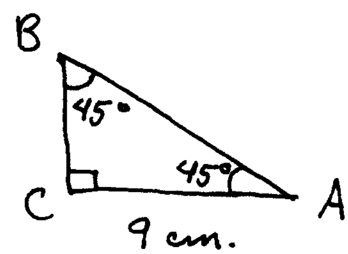
$\cos 30° = \frac{AC}{60} \rightarrow \frac{\sqrt{3}}{2} = \frac{AC}{60} \rightarrow AC = 30\sqrt{3}$ cm.



2) AC = 6 cm. ($\frac{1}{2}$ of hypotenuse) then

$\sin 60° = \frac{BC}{12} \rightarrow \frac{\sqrt{3}}{2} = \frac{BC}{12} \rightarrow$

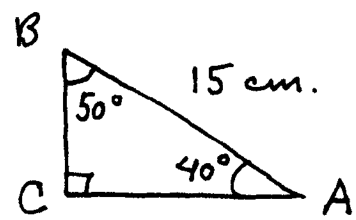
$BC = 6\sqrt{3}$ cm.



4) BC = 9 cm. then

$AB^2 = 9^2 + 9^2 = 81 + 81 = 162 \rightarrow$

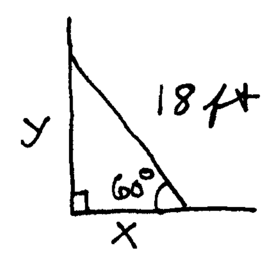
$AB = \sqrt{162} = \sqrt{81 \cdot 2} = 9\sqrt{2}$ cm.



5) $\cos 50° = \frac{BC}{15} \rightarrow$

$BC = 15 \cos 50° = 9.641$ cm. ,

$\sin 50° = \frac{AC}{15} \rightarrow AC = 15 \sin 50° = 11.491$ cm.



7) a.) $\sin 60° = \frac{y}{18} \rightarrow$

$y = 18 \sin 60° = 18 \cdot \frac{\sqrt{3}}{2} = 9\sqrt{3}$

$= 15.59$ ft.

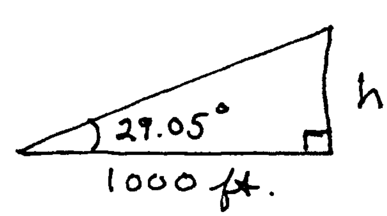
b.) $\cos 60° = x/18 \rightarrow x = 18 \cos 60°$

$= 18 \cdot 1/2 = 9$ ft.

Extra) $\tan 29.05° = h/1000 \rightarrow$

$h = 1000 \tan 29.05°$

$= 555.5$ ft.



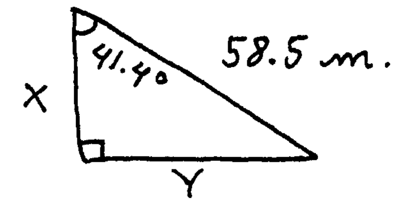
10) $\cos 41.4° = {}^{x}/_{58.5} \rightarrow$

$x = 58.5 \cos 41.4° = 43.9$ m.,

$\sin 41.4° = {}^{y}/_{58.5} \rightarrow$

$y = 58.5 \sin 41.4° = 38.7$ m., then

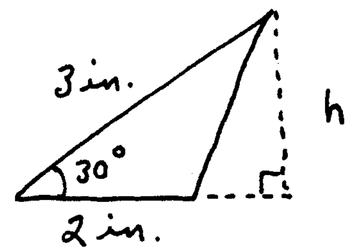
perimeter is 141.1 m.



14) $h = 3/2$ in. ($\frac{1}{2}$ the hypotenuse) so

$\text{Area} = \frac{1}{2}(\text{base})(\text{height})$

$= \frac{1}{2}(2)(3/2) = 3/2 \text{ in.}^2$



21)

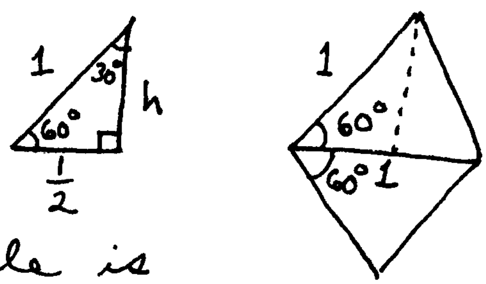
$\sin 60° = \frac{h}{1} \rightarrow$

$h = \sqrt{3}/2$ so

area of right triangle is

$\frac{1}{2}\left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right) = \sqrt{3}/8$ so total shaded area is

$4 \cdot \frac{\sqrt{3}}{8} = \sqrt{3}/2$

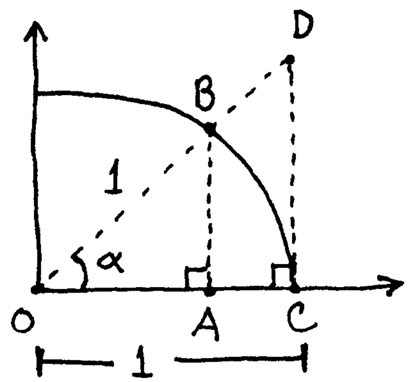


24)

$\cos\alpha = \frac{OA}{1} \rightarrow OA = \cos\alpha$;

$\sin\alpha = \frac{AB}{1} \rightarrow AB = \sin\alpha$;

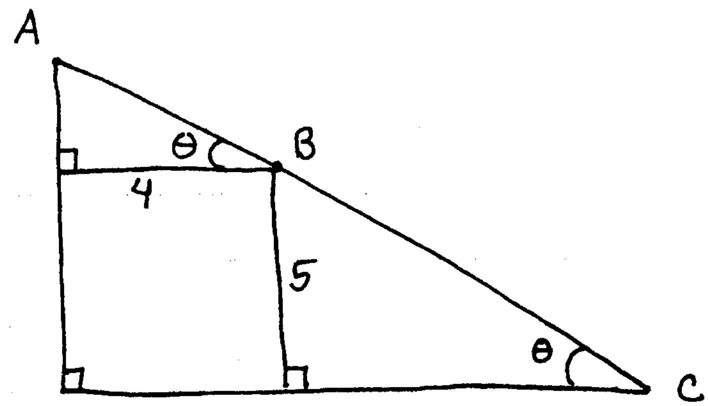
$\tan\alpha = \frac{DC}{1} \rightarrow DC = \tan\alpha$



26) a.)

$\sin\theta = \frac{5}{BC} \rightarrow$

$BC = \frac{5}{\sin\theta}$;



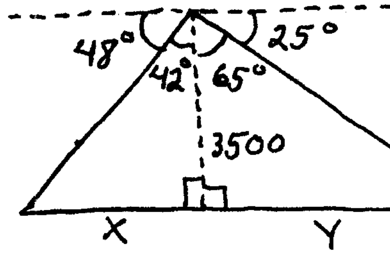
b.) $\cos\theta = \frac{4}{AB} \rightarrow$

$AB = \frac{4}{\cos\theta}$;

c.) $AC = AB + BC = \frac{4}{\cos\theta} + \frac{5}{\sin\theta}$

Worksheet 6

1)



$\tan 42° = x/3500$

$\rightarrow x = 3500 \tan 42°$

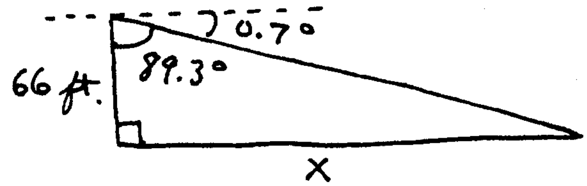
$= 3151.4$ ft.,

$\tan 65° = y/3500 \rightarrow y = 3500 \tan 65°$

$= 7505.8$ ft. so total distance

$x + y = 10,657.2$ ft.

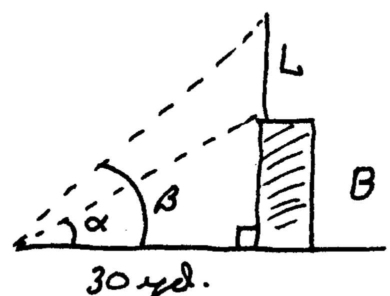
2)



$\tan 89.3° = x/66 \rightarrow$

$x = 66 \tan 89.3° = 5400$ ft.

3)



$\tan \alpha = B/30 \rightarrow$

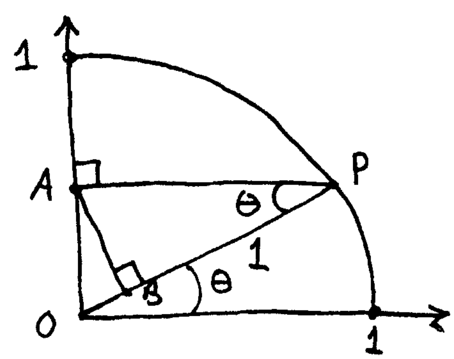
$B = 30 \tan \alpha$;

$\tan \beta = (L+B)/30 \rightarrow$

$L + B = 30 \tan \beta \rightarrow$

$L = 30 \tan \beta - B \rightarrow L = 30 \tan \beta - 30 \tan \alpha$

4)



a.) $\angle BOA = 90° - \theta$;

$\angle OAB = \theta$;

$\angle BAP = 90° - \theta$;

$\angle BPA = \theta$

b.) $\sin\theta = \frac{AO}{1} \rightarrow AO = \sin\theta$;

$\cos\theta = \frac{AP}{1} \rightarrow AP = \cos\theta$;

$\sin(\angle OAB) = \frac{OB}{AO} \rightarrow \sin\theta = \frac{OB}{\sin\theta} \rightarrow$

$OB = \sin^2\theta = (\sin\theta)^2$;

$$\cos\theta = \frac{BP}{AP} \rightarrow \cos\theta = \frac{BP}{\cos\theta} \longrightarrow$$

$$BP = \cos^2\theta = (\cos\theta)^2$$