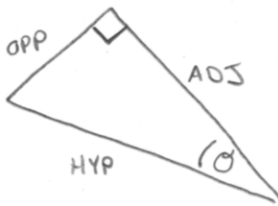


§ 6.2 TRIGONOMETRY OF RIGHT TRIANGLES

7/20/2016

\* 1, 2, 3-9 000, 15-43 000, 47-57 000

1. (a)



(b)  $\sin \theta = \frac{\text{OPP}}{\text{HYP}}$

(c) SIMILAR

$\cos \theta = \frac{\text{ADJ}}{\text{HYP}}$

$\tan \theta = \frac{\text{OPP}}{\text{ADJ}}$

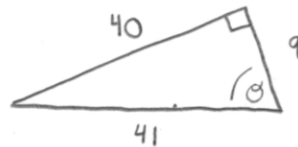
2.  $\csc \theta = \frac{1}{\sin \theta}$ ,  $\sec \theta = \frac{1}{\cos \theta}$ ,  $\cot \theta = \frac{1}{\tan \theta}$

3.  $\sin \theta = \frac{4}{5}$      $\csc \theta = \frac{5}{4}$

$\cos \theta = \frac{3}{5}$      $\sec \theta = \frac{5}{3}$

$\tan \theta = \frac{4}{3}$      $\cot \theta = \frac{3}{4}$

5.



$40^2 + b^2 = 41^2$

$b^2 = 41^2 - 40^2 = 1681 - 1600$

$b^2 = 81$

$b = 9$

$\sin \theta = \frac{40}{41}$

$\csc \theta = \frac{41}{40}$

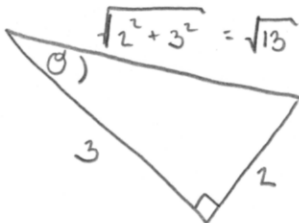
$\cos \theta = \frac{9}{41}$

$\sec \theta = \frac{41}{9}$

$\tan \theta = \frac{40}{9}$

$\cot \theta = \frac{9}{40}$

7.

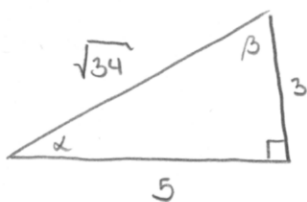


$\sin \theta = \frac{2}{\sqrt{13}}$      $\csc \theta = \frac{\sqrt{13}}{2}$

$\cos \theta = \frac{3}{\sqrt{13}}$      $\sec \theta = \frac{\sqrt{13}}{3}$

$\tan \theta = \frac{2}{3}$      $\cot \theta = \frac{3}{2}$

9. (a)

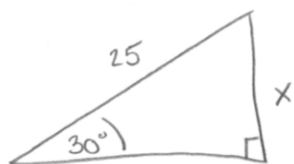


$$\sin \alpha = \frac{3}{\sqrt{34}}, \quad \cos \beta = \frac{3}{\sqrt{34}}$$

$$(b) \tan \alpha = \frac{3}{5}, \quad \cot \beta = \frac{3}{5}$$

$$(c) \sec \alpha = \frac{\sqrt{34}}{5}, \quad \csc \beta = \frac{\sqrt{34}}{5}$$

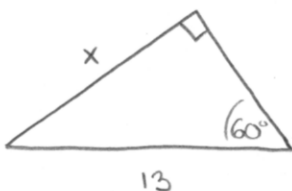
15.



$$\sin(30^\circ) = \frac{x}{25}$$

$$x = 25 \sin(30^\circ) = 25 \left(\frac{1}{2}\right) = \boxed{\frac{25}{2}}$$

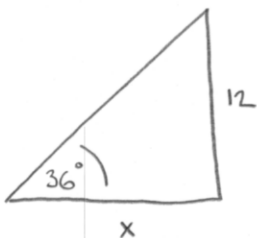
17.



$$\sin(60^\circ) = \frac{x}{13}$$

$$x = 13 \sin(60^\circ) = 13 \cdot \frac{\sqrt{3}}{2} = \boxed{\frac{13\sqrt{3}}{2}}$$

19.



$$\tan(36^\circ) = \frac{12}{x}$$

$$x = \boxed{\frac{12}{\tan(36^\circ)}}$$

21.



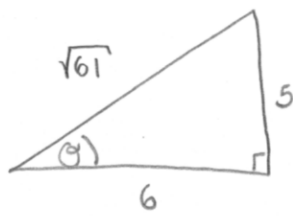
$$\sin \theta = \frac{y}{28} \rightarrow$$

$$y = 28 \sin \theta$$

$$\cos \theta = \frac{x}{28} \rightarrow$$

$$x = 28 \cos \theta$$

23.

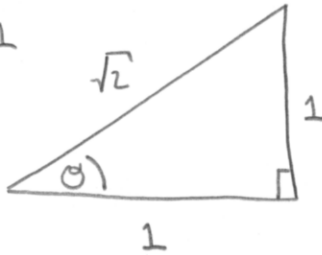


NOTE:  $\tan \theta = \frac{5}{6}$  ✓

$\sin \theta = \frac{5}{\sqrt{61}}$	$\csc \theta = \frac{\sqrt{61}}{5}$
$\cos \theta = \frac{6}{\sqrt{61}}$	$\sec \theta = \frac{\sqrt{61}}{6}$
	$\cot \theta = \frac{6}{5}$

25.

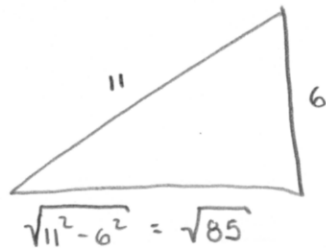
$\cot \theta = 1$



$\sin \theta = \frac{1}{\sqrt{2}}$	$\csc \theta = \sqrt{2}$
$\cos \theta = \frac{1}{\sqrt{2}}$	$\sec \theta = \sqrt{2}$
$\tan \theta = 1$	

27.

$\csc \theta = \frac{11}{6}$



$\sin \theta = \frac{6}{11}$	
$\cos \theta = \frac{\sqrt{85}}{11}$	$\sec \theta = \frac{11}{\sqrt{85}}$
$\tan \theta = \frac{6}{\sqrt{85}}$	$\cot \theta = \frac{\sqrt{85}}{6}$

29.

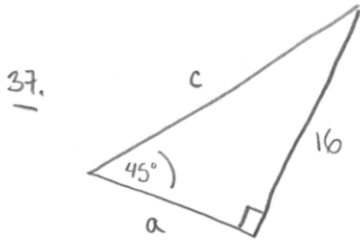
$$\sin \frac{\pi}{6} + \cos \frac{\pi}{6} = \frac{1}{2} + \frac{\sqrt{3}}{2} = \boxed{\frac{1 + \sqrt{3}}{2}}$$

31.

$$\begin{aligned} \sin 30^\circ \cos 60^\circ + \sin 60^\circ \cos 30^\circ &= \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) \\ &= \frac{1}{4} + \frac{3}{4} = \boxed{1} \end{aligned}$$

$$\begin{aligned} \underline{33.} \quad (\cos 30^\circ)^2 - (\sin 30^\circ)^2 &= \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 \\ &= \frac{3}{4} - \frac{1}{4} = \boxed{\frac{1}{2}} \end{aligned}$$

$$\begin{aligned} \underline{35.} \quad \left(\cos \frac{\pi}{4} + \sin \frac{\pi}{6}\right)^2 &= \left(\frac{\sqrt{2}}{2} + \frac{1}{2}\right)^2 = \left(\frac{\sqrt{2}+1}{2}\right)^2 \\ &= \frac{2 + 2\sqrt{2} + 1}{4} = \boxed{\frac{3 + 2\sqrt{2}}{4}} \end{aligned}$$



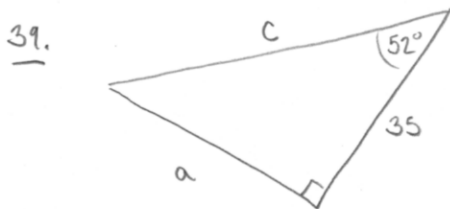
$$\sin(45^\circ) = \frac{16}{c} = \frac{\sqrt{2}}{2}$$

$$32 = c\sqrt{2}$$

$$\boxed{c = \frac{32}{\sqrt{2}} \text{ or } 16\sqrt{2}}$$

$$\tan(45^\circ) = \frac{16}{a} = 1$$

$$\boxed{a = 16}$$



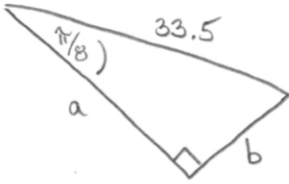
$$\cos(52^\circ) = \frac{35}{c} \rightarrow$$

$$\boxed{c = \frac{35}{\cos(52^\circ)}}$$

$$\tan(52^\circ) = \frac{a}{35} \rightarrow$$

$$\boxed{a = 35 \tan(52^\circ)}$$

41.



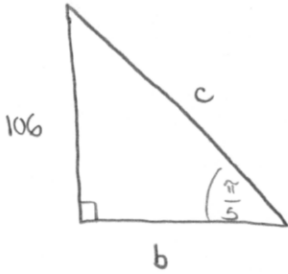
$$\sin \frac{\pi}{8} = \frac{b}{33.5} \rightarrow$$

$$b = 33.5 \sin \frac{\pi}{8}$$

$$\cos \frac{\pi}{8} = \frac{a}{33.5} \rightarrow$$

$$a = 33.5 \cos \frac{\pi}{8}$$

43.



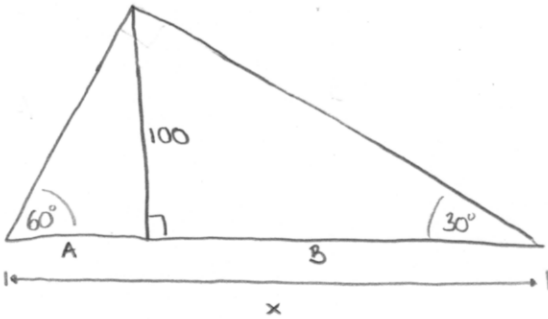
$$\sin \frac{\pi}{5} = \frac{106}{c} \rightarrow$$

$$c = \frac{106}{\sin \frac{\pi}{5}}$$

$$\tan \frac{\pi}{5} = \frac{106}{b} \rightarrow$$

$$b = \frac{106}{\tan \frac{\pi}{5}}$$

47.

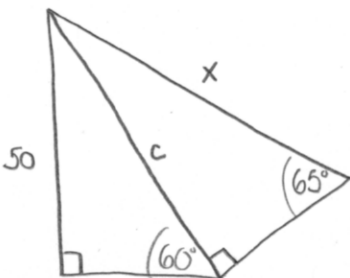


NOTE THAT THE LARGE TRIA

$$x = A + B = \frac{100}{\tan 60^\circ} + \frac{100}{\tan 30^\circ}$$

$$= 100 \left( \frac{1}{\sqrt{3}} + \sqrt{3} \right) = 100 \left( \frac{1+3}{\sqrt{3}} \right) = \boxed{\frac{400}{\sqrt{3}}}$$

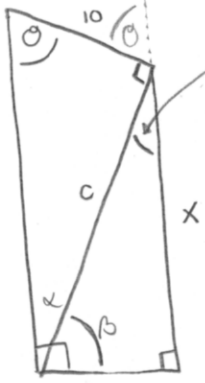
49.



$$x = \frac{c}{\sin 65^\circ} = \frac{50}{\sin 60^\circ \sin 65^\circ}$$

$$= \boxed{\frac{50}{\sin 60^\circ \sin 65^\circ}}$$

51.



$$180^\circ - 90^\circ - \theta = 90^\circ - \theta$$

$$\tan \theta = \frac{c}{10} \rightarrow c = 10 \tan \theta$$

$$\cos(90^\circ - \theta) = \frac{x}{c} \rightarrow x = c \cos(90^\circ - \theta)$$

$$x = 10 \tan \theta \cos(90^\circ - \theta)$$

Alt:  $\theta + \alpha = 90^\circ = \beta + \alpha$

$$\Rightarrow \beta = \theta$$

$$\sin \beta = \frac{x}{c}$$

$$\sin \theta = \frac{x}{c} \rightarrow x = c \sin \theta$$

$$x = 10 \tan \theta \sin \theta$$

SAME!

63.



$$\tan 11^\circ = \frac{h}{1} \text{ mi}$$

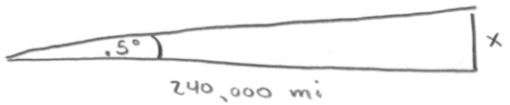
$$h = \tan 11^\circ \text{ MILES}$$

$$\approx 0.1944 \text{ mi.}$$

$$\approx 1,026 \text{ ft.}$$

55.

(a)

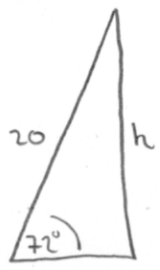


$$x = 240,000 \tan 0.5^\circ$$

$$\approx 2,094 \text{ mi}$$

(b) no.

57.



$$h = 20 \sin(72^\circ)$$

$$\left( \sin(72^\circ) = \frac{h}{20} \right)$$