

$$\begin{aligned}
 37. (1 + \cos \theta)(1 - \cos \theta) &= 1 - \cos^2 \theta \\
 &= (\sin^2 \theta + \cos^2 \theta) - \cos^2 \theta \\
 &= \sin^2 \theta
 \end{aligned}$$

$$\begin{aligned}
 41. (a) \sin 12^\circ &\approx 0.2079 \\
 (b) \cos 72^\circ &\approx 0.3090
 \end{aligned}$$

45. Make sure that your calculator is in radian mode.

$$(a) \cot \frac{\pi}{16} = \frac{1}{\tan(\pi/16)} \approx 5.0273$$

$$(b) \tan \frac{\pi}{16} \approx 0.1989$$

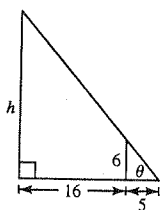
$$49. (a) \sec \theta = 2 \Rightarrow \theta = 60^\circ = \frac{\pi}{3}$$

$$(b) \cot \theta = 1 \Rightarrow \theta = 45^\circ = \frac{\pi}{4}$$

$$53. \tan 30^\circ = \frac{y}{105}$$

$$y = 105 \cdot \tan 30^\circ = 105 \frac{\sqrt{3}}{3} = 35\sqrt{3} \approx 60.6218$$

57. (a)



$$(b) \tan \theta = \frac{6}{5} \text{ and } \tan \theta = \frac{h}{21}$$

$$\text{Thus, } \frac{6}{5} = \frac{h}{21}$$

$$(c) h = \frac{6(21)}{5} = 25.2 \text{ feet}$$

$$\begin{aligned}
 39. \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} &= \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta \cos \theta} \\
 &= \frac{1}{\sin \theta \cos \theta} \\
 &= \frac{1}{\sin \theta} \cdot \frac{1}{\cos \theta} \\
 &= \csc \theta \sec \theta
 \end{aligned}$$

$$43. (a) \sec 42^\circ 12' = \sec 42.2^\circ = \frac{1}{\cos 42.2^\circ} \approx 1.3499$$

$$(b) \csc 48^\circ 7' = \frac{1}{\sin(48 + \frac{7}{60})^\circ} \approx 1.3432$$

$$47. (a) \sin \theta = \frac{1}{2} \Rightarrow \theta = 30^\circ = \frac{\pi}{6}$$

$$(b) \csc \theta = 2 \Rightarrow \theta = 30^\circ = \frac{\pi}{6}$$

$$51. (a) \csc \theta = \frac{2\sqrt{3}}{3} \Rightarrow \theta = 60^\circ = \frac{\pi}{3}$$

$$(b) \sin \theta = \frac{\sqrt{2}}{2} \Rightarrow \theta = 45^\circ = \frac{\pi}{4}$$

$$55. \cot 60^\circ = \frac{x}{38}$$

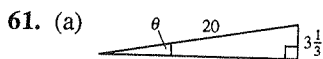
$$\frac{\sqrt{3}}{3} = \frac{x}{38}$$

$$\frac{38\sqrt{3}}{3} = x$$

$$59. \tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 58^\circ = \frac{w}{100}$$

$$w = 100 \tan 58^\circ \approx 160.03 \text{ feet}$$



(b) $\sin \theta = \frac{\text{opp}}{\text{hyp}}$
 $\sin \theta = \frac{10/3}{20} = \frac{1}{6}$

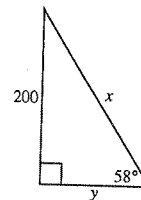
(c) Using the table feature, you obtain $\theta \approx 9.59^\circ$.

63. (a) $\sin(58^\circ) = \frac{200}{x}$

$x = \frac{200}{\sin(58^\circ)}$
 $\approx 235.84 \text{ ft}$

(b) $\tan(58^\circ) = \frac{200}{y}$

$y = \frac{200}{\tan(58^\circ)} \approx 124.97 \text{ ft}$



65. $\tan 3^\circ = \frac{x}{15}$

$x = 15 \tan 3^\circ$
 $d = 5 + 2x$
 $= 5 + 2(15 \tan 3^\circ)$
 $\approx 6.57 \text{ centimeters}$

67. True.

$\sin 60^\circ \csc 60^\circ = \sin 60^\circ \frac{1}{\sin 60^\circ}$
 $= 1$

69. False.

$\sin 45^\circ + \cos 45^\circ = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}$
 $= \sqrt{2} \neq 1$

71. (a)

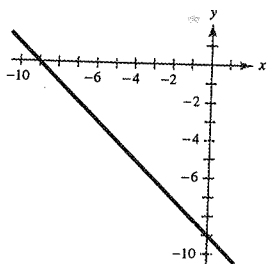
θ	0°	20°	40°	60°	80°
$\sin \theta$	0	0.3420	0.6428	0.8660	0.9848
$\cos \theta$	1	0.9397	0.7660	0.5000	0.1736
$\tan \theta$	0	0.3640	0.8391	1.7321	5.6713

(b) Sine and tangent are increasing, cosine is decreasing.

(c) In each case, $\tan \theta = \frac{\sin \theta}{\cos \theta}$

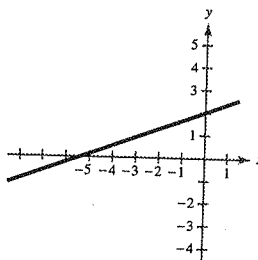
73. $y = -x - 9$

Intercepts: $(0, -9), (-9, 0)$



75. $-3x + 8y = 16$

Intercepts: $(0, 2), (-\frac{16}{3}, 0)$

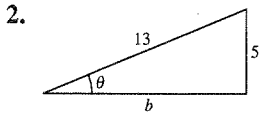


77. $2.16^{3.8} \approx 18.661$

79. $\sqrt[3]{5286} \approx 17.420$

Section 5.2 Right Triangle Trigonometry

Solutions to Odd-Numbered Exercises



$$b = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = 12$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{5}{13}$$

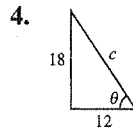
$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{12}{13}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{5}{12}$$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} = \frac{13}{5}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{13}{12}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{12}{5}$$



$$c = \sqrt{18^2 + 12^2} = \sqrt{468} = 6\sqrt{13}$$

$$\sin \theta = \frac{18}{6\sqrt{13}} = \frac{3\sqrt{13}}{13}$$

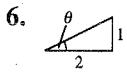
$$\cos \theta = \frac{12}{6\sqrt{13}} = \frac{2\sqrt{13}}{13}$$

$$\tan \theta = \frac{18}{12} = \frac{3}{2}$$

$$\csc \theta = \frac{\sqrt{13}}{3}$$

$$\sec \theta = \frac{\sqrt{13}}{2}$$

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



$$\text{hyp} = \sqrt{1^2 + 2^2} = \sqrt{5}$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

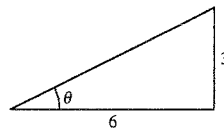
$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{1}{2}$$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} = \frac{\sqrt{5}}{1} = \sqrt{5}$$

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{\sqrt{5}}{2}$$

$$\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{2}{1} = 2$$



$$\text{hyp} = \sqrt{3^2 + 6^2} = 3\sqrt{5}$$

$$\sin \theta = \frac{3}{3\sqrt{5}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

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

$$\tan \theta = \frac{3}{6} = \frac{1}{2}$$

$$\csc \theta = \frac{3\sqrt{5}}{3} = \sqrt{5}$$

$$\sec \theta = \frac{3\sqrt{5}}{6} = \frac{\sqrt{5}}{2}$$

$$\cot \theta = \frac{6}{3} = 2$$

The function values are the same because the triangles are similar, and corresponding sides are proportional.