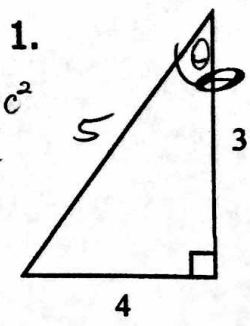
1.3 Right Triangle Trig Ratios

Find all values of the six trig functions.

1.



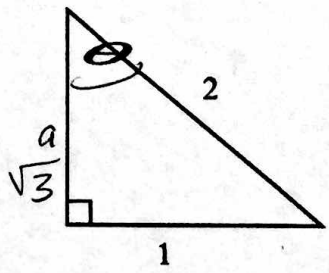
$3^2+4^2=c^2$, $25=c^2$, $c=5$

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

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

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

2.



$a^2+1^2=2^2$, $a=\sqrt{4-1}=\sqrt{3}$

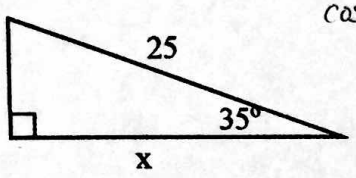
$\sin\theta=\frac{1}{2}$ $\csc\theta=2$

$\cos\theta=\frac{\sqrt{3}}{2}$ $\sec\theta=\frac{2\sqrt{3}}{3}$

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

Find the missing side. Round to 2 decimal places if necessary.

3.

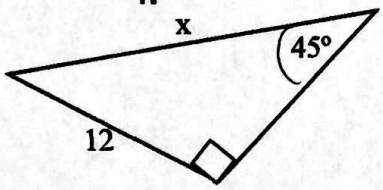


$\cos 35^\circ=\frac{x}{25}$

$x=25\cos 35^\circ$

$x=20.479$

4.



$\sin 45^\circ=\frac{12}{x}$

$x=\frac{12}{\sin 45^\circ}=16.971$

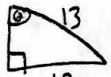
Find all missing trig functions with the given information.

5. $\sin\theta=\frac{3}{5}, \cos\theta=\frac{4}{5}$ $\tan\theta=\frac{3}{4}$

$\csc\theta=\frac{5}{3}$ $\sec\theta=\frac{5}{4}$ $\cot\theta=\frac{4}{3}$

6. $\sin\theta=\frac{2}{3}, \cos\theta=\frac{\sqrt{5}}{3}$ $\tan\theta=\frac{2\sqrt{5}}{5}$

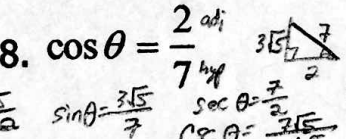
$\csc\theta=\frac{3}{2}$ $\sec\theta=\frac{3\sqrt{5}}{5}$ $\cot\theta=\frac{\sqrt{5}}{2}$



7. $\csc\theta=\frac{13}{12}$ (hyp/opp) $\sin\theta=\frac{12}{13}$

$\sec\theta=\frac{13}{5}$ $\cos\theta=\frac{5}{13}$ $\tan\theta=\frac{12}{5}$ $\cot\theta=\frac{5}{12}$

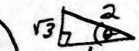
8. $\cos\theta=\frac{2}{7}$ (adj/hyp)



$\sin\theta=\frac{3\sqrt{5}}{7}$ $\sec\theta=\frac{7}{2}$ $\tan\theta=\frac{3\sqrt{5}}{2}$

$\csc\theta=\frac{7}{3\sqrt{5}}$ $\cot\theta=\frac{2\sqrt{5}}{15}$

9. $\tan\theta=\frac{\sqrt{3}}{1}$ (opp/adj)



$\cot\theta=\frac{\sqrt{3}}{3}$ $\sin\theta=\frac{\sqrt{3}}{2}$ $\csc\theta=\frac{2\sqrt{3}}{3}$

$\cos\theta=\frac{1}{2}$ $\sec\theta=2$

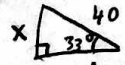
Draw a diagram and use a trigonometric ratio to answer each question below.

10. A ladder 14 feet long rests against the side of a building. The base of the ladder rests on level ground 2 feet from the side of the building. What angle does the ladder form with the ground?

$\cos\theta=\frac{2}{14}$

$\cos^{-1}\left(\frac{2}{14}\right)=\theta=81.787^\circ$

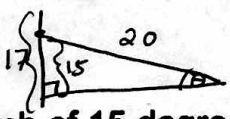
11. A kite is held by a taut string pegged to the ground. The string is 40 feet long and makes a 33 degree angle with the ground. Supposing that the ground is level, find the vertical distance from the ground to the kite.



$\sin 33^\circ=\frac{x}{40}$

$x=40\sin 33^\circ=21.786$ ft.

12. A wire anchored to the ground braces a 17 foot pole. The wire is 20 feet long and is attached to the pole 15 feet from the base of the pole. What angle does the wire make with the ground?



$\sin\theta=\frac{15}{20}$

$\theta=\sin^{-1}\left(\frac{3}{4}\right)=48.59^\circ$

13. A jet airplane begins a steady climb of 15 degrees and flies for 2 ground miles. What was its change in altitude?

$\tan 15^\circ=\frac{x}{2}$

$x=2\tan 15^\circ=.536$ mi