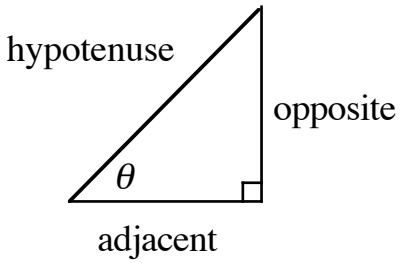
§4.3 Right Triangle Trigonometry

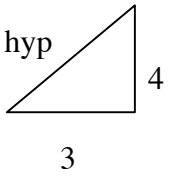


Right Triangle Definitions of Trigonometric Functions

Let θ be an <u>acute</u> angle of a right triangle. Then:

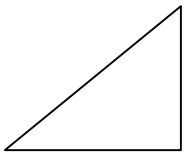
$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc\theta = \frac{\text{hyp}}{\text{opp}} \qquad \sec\theta = \frac{\text{hyp}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

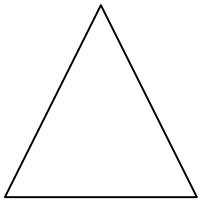


Example 1 Evaluate the six trig functions for this triangle

Example 2: Find the values of $\sin 45^\circ$, $\cos 45^\circ$, and $\tan 45^\circ$ using right triangle trigonometry.



Example 3: Find the values of $\sin 30^\circ$, $\cos 30^\circ$, $\sin 60^\circ$, and $\cos 60^\circ$ using right triangle trigonometry.



Trigonometric Identities

Reciprocal Identities		
$\sin\theta = \frac{1}{\csc\theta}$	$\cos\theta = \frac{1}{\sec\theta}$	$\tan\theta = \frac{1}{\cot\theta}$
$\csc\theta = \frac{1}{\sin\theta}$	$\sec\theta = \frac{1}{\cos\theta}$	$\cot\theta = \frac{1}{\tan\theta}$

Quotient or Ratio Identities	
$\tan\theta = \frac{\sin\theta}{\cos\theta}$	$\cot\theta = \frac{\cos\theta}{\sin\theta}$

Pythagorean Identities		
$\sin^2\theta + \cos^2\theta = 1$	$\tan^2\theta + 1 = \sec^2\theta$	$1 + \cot^2\theta = \csc^2\theta$

Example 4: Let θ be an acute angle such that $\sin\theta = .6$. Find the values of the following using trig identities.

a) $\cos\theta$

b) $\tan\theta$

Example 5: Let θ be an acute angle such that $\tan\theta = 3$. Find the values of the following using trig identities.

a) $\cot\theta$

b) $\sec\theta$

Example 6: Use a calculator to evaluate $\sec(5°\,40'12")$

Applications Involving Right Triangles

Example 7: A surveyor is standing 115 feet from the base of the Washington Monument. The surveyor measures the angle of elevation to the top of the monument as 78.3º. How tall is the Washington Monument?

Example 8: You are 200 yards from a river. Rather than walking directly to the river, you walk 400 yards along a straight path to the rivers edge. Find the acute angle θ between this path and the river's edge.