

4.3...RIGHT TRIANGLE TRIGONOMETRY (DAY TWO)

TRIGONOMETRIC IDENTITIES

RECIPROCAL TRIGONOMETRIC 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 TRIGONOMETRIC IDENTITIES	
$\tan \theta = \frac{\sin \theta}{\cos \theta}$	$\cot \theta = \frac{\cos \theta}{\sin \theta}$

PYTHAGOREAN TRIGONOMETRIC IDENTITIES		
$\sin^2 \theta + \cos^2 \theta = 1$	$\tan^2 \theta + 1 = \sec^2 \theta$	$\cot^2 \theta + 1 = \csc^2 \theta$
$\sin^2 \theta = 1 - \cos^2 \theta$	$\tan^2 \theta = \sec^2 \theta - 1$	$\cot^2 \theta = \csc^2 \theta - 1$
$\cos^2 \theta = 1 - \sin^2 \theta$	$1 = \sec^2 \theta - \tan^2 \theta$	$1 = \csc^2 \theta - \cot^2 \theta$
	$\tan^2 \theta - \sec^2 \theta = -1$	$\cot^2 \theta - \csc^2 \theta = -1$

EXAMPLE #1...Let θ be an acute angle such that $\sin \theta = 0.6$. Find $\tan \theta$.

EXAMPLE #2...Use trigonometric identities to transform one side of the equation into the other.

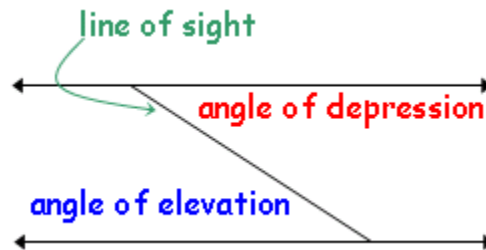
A. $\cos \theta \sec \theta = 1$

B. $(\sec \theta + \tan \theta)(\sec \theta - \tan \theta) = 1$

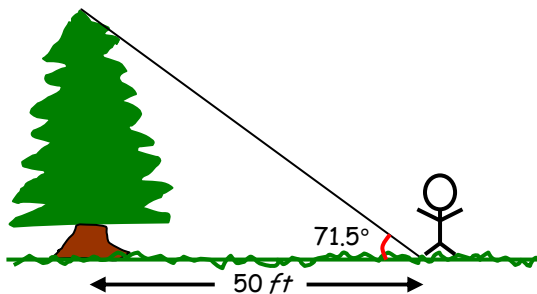
C. $\frac{\csc \theta - \sin \theta}{\sin \theta} = \cot^2 \theta$

APPLICATIONS INVOLVING RIGHT TRIANGLES

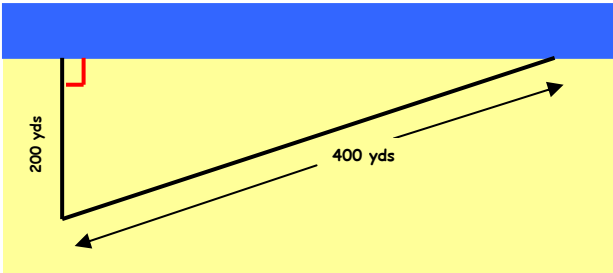
- **ANGLE OF ELEVATION** is the angle from the horizontal **UPWARD**.
- **ANGLE OF DEPRESSION** is the angle from the horizontal **DOWNWARD**.



EXAMPLE #3...A surveyor is standing 50 feet from the base of a large tree. The surveyor measures the angle of elevation to the top of the tree as 71.5° . How tall is the tree?



EXAMPLE #4...A person is 200 yards from a river. Rather than walk directly to the river, the person walks 400 yards along a straight path to the river's edge. Find the acute angle θ between this path and the river's edge.



EXAMPLE #5...A 10 foot ladder leans against the side of a house. The ladder makes an angle of 60° with the ground. How far up the side of the house does the ladder reach?