The Weekly Rigor

No. 246 "A mathematician is a machine for turning coffee into theorems." March 9, 2019

15 Problems in Solving Right Triangles (Part 3 of 4)

(Part 3)

12.

$\sin(\theta) = \frac{\sqrt{x^2-1}}{x}$	$\cos(\theta) = \frac{1}{x}$	$\tan(\theta) = \frac{\sqrt{x^2-1}}{1}$
$\sec(\theta) = \frac{x}{1}$	$\csc(\theta) = \frac{x}{\sqrt{x^2-1}}$	$\cot(\theta) = \frac{1}{\sqrt{x^2-1}}$

13.

$\sin(\theta) = \frac{\sqrt{25x^2-4}}{5x}$	$\cos(\theta) = \frac{2}{5x}$	$\tan(\theta) = \frac{\sqrt{25x^2-4}}{2}$
$\sec(\theta) = \frac{5x}{2}$	$\csc(\theta) = \frac{5x}{\sqrt{25x^2-4}}$	$\cot(\theta) = \frac{2}{\sqrt{25x^2-4}}$

14.

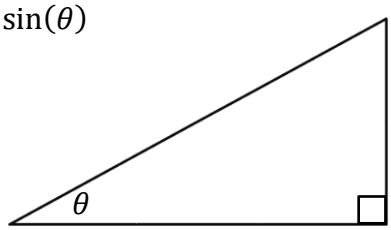
$\sin(\theta) = \frac{\sqrt{x^4-4}}{x^2}$	$\cos(\theta) = \frac{2}{x^2}$	$\tan(\theta) = \frac{\sqrt{x^4-4}}{2}$
$\sec(\theta) = \frac{x^2}{2}$	$\csc(\theta) = \frac{x^2}{\sqrt{x^4-4}}$	$\cot(\theta) = \frac{2}{\sqrt{x^4-4}}$

15.

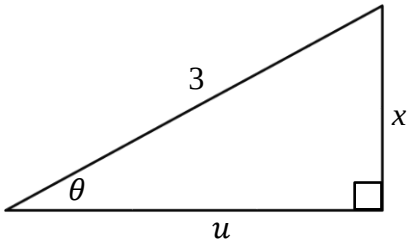
$\sin(\theta) = \frac{\sqrt{x^2-a^2}}{x}$	$\cos(\theta) = \frac{a}{x}$	$\tan(\theta) = \frac{\sqrt{x^2-a^2}}{a}$
$\sec(\theta) = \frac{x}{a}$	$\csc(\theta) = \frac{x}{\sqrt{x^2-a^2}}$	$\cot(\theta) = \frac{a}{\sqrt{x^2-a^2}}$

SELECTED SOLUTIONS

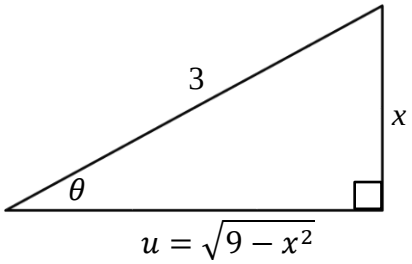
1. $x = 3\sin(\theta)$



$$x = 3\sin(\theta) \quad \Longrightarrow \quad \frac{x}{3} = \sin(\theta)$$



$$x^2 + u^2 = 3^2 \quad \Longrightarrow \quad u = \sqrt{9 - x^2}$$



$\sin(\theta) = \frac{x}{3}$ $\qquad$ $\csc(\theta) = \frac{3}{x}$

$\cos(\theta) = \frac{\sqrt{9-x^2}}{3}$ $\qquad$ $\sec(\theta) = \frac{3}{\sqrt{9-x^2}}$

$\tan(\theta) = \frac{x}{\sqrt{9-x^2}}$ $\qquad$ $\cot(\theta) = \frac{\sqrt{9-x^2}}{x}$