hree main types of trigonometric identities. Reciprocal, Quotient, Pythagorean

eciprocal Identities

Sin θ = $\frac{1}{\csc\theta}$	Csc θ = $\frac{1}{\sin\theta}$
Cos θ = $\frac{1}{\sec\theta}$	Sec θ = $\frac{1}{\cos\theta}$
Tan θ = $\frac{1}{\cot\theta}$	Cot θ = $\frac{1}{\tan\theta}$

uotient Identities

ven	Rewrite with opp, adj, and hyp	Simplify fraction	Rewrite as one trig function
$\frac{\sin\theta}{\cos\theta}$	$\frac{\frac{opp}{hyp}}{\frac{adj}{hyp}}$	$\frac{opp}{hyp} \cdot \frac{hyp}{adj}$	$\frac{opp}{adj} = \tan\theta$

Tan θ = $\frac{\sin\theta}{\cos\theta}$	Cot θ = $\frac{\cos\theta}{\sin\theta}$

ype III: Pythagorean Identities

ythagorean Theorem: $a^2+b^2=c^2$

ewrite using x,y,r: $x^2+y^2=r^2$

ewrite using trig: $\cos^2\theta+\sin^2\theta=1$ **1st identity

ivide by $\sin^2\theta$: $\cot^2\theta+1=\csc^2\theta$ **2nd identity

ivide 1st identity by $\cos^2\theta$: $1+\tan^2\theta=\sec^2\theta$ **3rd identity

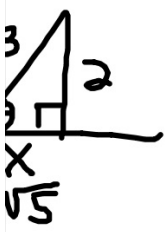
$\frac{\cos^2\theta}{\cos^2\theta}+\frac{\sin^2}{\cos^2\theta}$

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

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

e for the values
e 1st quadrant.

$\sin\theta = \frac{2}{3}$, find $\cos\theta$.



$x^2+4=9$

$x=\sqrt{5}$

$\frac{\sqrt{5}}{3}$

Express each as a function of a 1st quadrant angle.

2. cos 892° =

$\cos 172^\circ$

$-\cos 8^\circ$

Simplify to one trig fu

3. $\frac{\sin^2\theta\cot\theta}{\cos\theta} =$

$\frac{\sin^2\theta \cdot \frac{\cos\theta}{\sin\theta}}{\cos\theta}$

$\frac{\sin\theta\cos\theta}{\cos\theta}$

$\sin\theta$

e Problems:

r the values in the 1st quadrant.

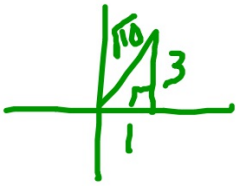
$\theta = 2$, find $\cot\theta$.

$\frac{1}{2}$

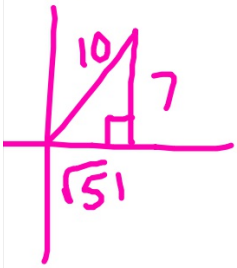
5. If $\cos\theta = \frac{1}{4}$, find $\tan\theta$.

$\sqrt{15}$

6. If $\tan\theta = 3$, find sec

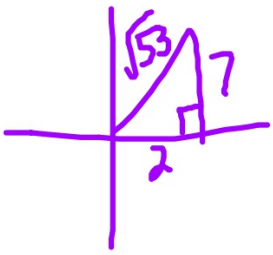


$\theta = \frac{7}{10}$, find $\cot\theta$.



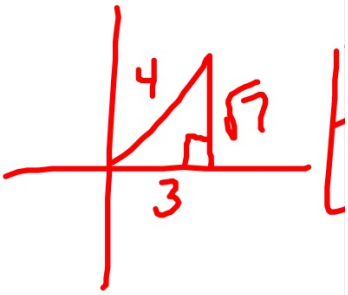
$\frac{\sqrt{51}}{7}$

8. If $\tan\theta = \frac{7}{2}$, find $\sin\theta$.



$\frac{7\sqrt{53}}{53}$

9. If $\sec\theta = \frac{4}{3}$, find si



ss each function as a function of a 1st quadrant angle.

458° =

n 98°

sin 82°

11. tan (-876°) =

tan 204°

tan 24°

12. csc 495° =

Csc 135°

Csc 45°

fy to one trig function.

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

$\frac{\cot\theta}{1}$

$\frac{\cot\theta}{\tan\theta}$

$\cot\theta \cdot \cot\theta$

$\cot^2\theta$

$\frac{\cos\theta}{\sin\theta} \cdot \frac{\cos\theta}{\sin\theta}$

$\frac{\cos^2\theta}{\sin^2\theta}$

$\cot^2\theta$

14. $\sin^2\theta\cos^2\theta - \cos^2\theta$

$\cos^2\theta(\sin^2\theta - 1)$

$\cos^2\theta(1 - \cos^2\theta - 1)$

$\cos^2\theta(-\cos^2\theta)$

$-\cos^4\theta$

15. $\cos\theta + \sin\theta\tan\theta$

$\cos\theta + \frac{\sin\theta}{1} \cdot \frac{\sin\theta}{\cos\theta}$

$\frac{\cos\theta}{\cos\theta}\cdot\frac{\cos\theta}{1} + \frac{\sin^2\theta}{\cos\theta}$

$\frac{\cos^2\theta}{\cos\theta} + \frac{\sin^2\theta}{\cos\theta}$

$\frac{\cos^2\theta + \sin^2\theta}{\cos\theta} = \frac{1}{\cos}$

q #15-20

(15) $\sec\theta \cdot \cos\theta$

$\frac{1}{\cos\theta} \cdot \cos\theta$

1

(16) $\tan\theta \cdot \csc\theta$

$\frac{\sin\theta}{\cos\theta} \cdot \frac{1}{\sin\theta}$

$\frac{1}{\cos\theta}$

$\sec\theta$

(17) $\cot^2\theta - \csc^2\theta$

$\cot^2\theta - (\cot^2\theta + 1)$

$\cot^2\theta - \cot^2\theta - 1$

-1

(18) $(1-\cos^2\theta)\csc\theta$

$\sin^2\theta \cdot \frac{1}{\sin\theta}$

$\sin\theta$

(19) $\frac{\sin(-x)}{\cos(-x)}$

$\frac{-\sin(x)}{\cos(x)}$

$-\tan(x)$

(20) $\frac{\sin(\pi/2 - x)}{\cos(\pi/2 - x)}$

$\frac{\cos(x)}{\sin(x)} = \cot($

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(27) $\cot\theta \csc\theta$

$\frac{\cos\theta}{\sin\theta} \cdot \frac{1}{\cos\theta}$

$\frac{1}{\sin\theta}$

$\csc\theta$

(29) $\sin\theta(\csc\theta - \sin\theta)$

$\sin\theta\csc\theta - \sin^2\theta$

$\sin\theta \cdot \frac{1}{\sin\theta} - \sin^2\theta$

$1 - \sin^2\theta$

$\cos^2\theta$

(31) $\frac{\cot\theta}{\csc\theta}$

$\frac{\frac{\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta}}$

$\frac{\cos\theta}{\sin\theta} \cdot \frac{\sin\theta}{1}$

$\cos\theta$

(33) $\frac{1-\sin^2\theta}{\csc^2\theta - 1}$

$\frac{\cos^2\theta}{\cot^2\theta}$

$\frac{\cos^2\theta}{\frac{\cos^2\theta}{\sin^2\theta}}$

$\cos^2\theta \cdot \frac{\sin^2\theta}{\cos^2\theta}$

$\sin^2\theta$

5) $\sec\theta \cdot \frac{\sin\theta}{\tan\theta}$

$\frac{1}{\cos\theta} \cdot \sin\theta \cdot \cot\theta$

$\frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta}$

1

37) $\cos\left(\frac{\pi}{2} - \theta\right) \cdot \sec\theta$

$\sin\theta \cdot \frac{1}{\cos\theta}$

$\tan\theta$

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28-44 even