Math 12 Name: _____

Quiz: Pythagorean, Quotient and Reciprocal Identities

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1. Determine an expression equivalent to $\dfrac{\tan\theta\csc^2\theta}{\sec^2\theta}$.

A. $\tan\theta$
B. $\cot\theta$
C. $\tan^2\theta$
D. $\tan^3\theta$

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

2. Determine an expression equivalent to $\tan\theta+\cot\theta$.

A. 1
B. $\sin\theta\cos\theta$
C. $\sec\theta\csc\theta$
D. $\sin\theta+\cos\theta$

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

3. Which expression is equivalent to $\dfrac{\sin\theta+\cos\theta\cot\theta}{\cot\theta}$?

A. $\csc\theta$
B. $\cos\theta$
C. $\sin\theta$
D. $\sec\theta$

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

4. Determine the restriction(s) for the expression $\dfrac{\tan\theta}{2\cos\theta-1}$

$\sin\theta \neq 0$
$\cos\theta \neq 1/2$

A. $\cos\theta\neq\dfrac{1}{2}$
B. $\sin\theta\neq 0$
C. $\sin\theta\neq 0,\ \cos\theta\neq\dfrac{1}{2}$
D. $\cos\theta\neq 0,\ \cos\theta\neq\dfrac{1}{2}$

5. Prove each trig identity. Describe when trig identities are used in each proof. (3 marks each)

(a) $-\cot x = \dfrac{1-\cot x}{1-\tan x}$

$-\cot x$	$\dfrac{1-\cot x}{1-\tan x}$
	$\dfrac{1-\frac{1}{\tan x}}{1-\tan x}$ ← RECIPROCAL
	$\dfrac{\tan x - 1}{\tan x - \tan^2 x}$ REMOVE DENOM.
	$\dfrac{1\tan x - 1}{\tan x(1-\tan x)}$ SIMPLIFY.
	$-\cot x$ ← RECIPROCAL

(b) $\dfrac{\sin x}{1+\cos x} + \dfrac{\sin x}{1-\cos x} = 2\csc x$

$\dfrac{\sin x}{1+\cos x} + \dfrac{\sin x}{1-\cos x}$	$2\csc x$
common den. $\dfrac{\sin x(1-\cos x) + \sin x(1+\cos x)}{1-\cos^2 x}$	
pythag. $\dfrac{\sin x(1-\cos x) + \sin x(1+\cos x)}{\sin^2 x}$	
simplify $\dfrac{2}{\sin x}$	
reciprocal $2\left(\dfrac{1}{\sin x}\right)$	
$2\csc x$	

(c) $\dfrac{\cos\theta}{1-\sin\theta} = \dfrac{1+\sin\theta}{\cos\theta}$

$\dfrac{\cos\theta}{1-\sin\theta}$	$\dfrac{1+\sin\theta}{\cos\theta}$
conjugate $\dfrac{\cos\theta(1+\sin\theta)}{1-\sin^2\theta}$	
pythag. $\dfrac{\cos\theta(1+\sin\theta)}{\cos^2\theta}$	
$\dfrac{1+\sin\theta}{\cos\theta}$	
LS = RS.	