Accelerated Pre-Calculus Name _____

APC 4.10 Unit 4A Test Review

Simplify each expression and match it to one of the expressions in the given answer bank.

a. sinx	b. cosx	c. tanx	d. $\sin^2 x$	e. $\cos^2 x$	f. $\sin^4 x$	g. $\tan^2 x$

1. $\frac{1+\tan^2 x}{\csc^2 x}$

$\frac{\sec^2 x}{\csc^2 x} \rightarrow \frac{\frac{1}{\cos^2 x}}{\frac{1}{\sin^2 x}}$

$\frac{1}{\cos^2 x} \cdot \frac{\sin^2 x}{1} \rightarrow \frac{\sin^2 x}{\cos^2 x} \rightarrow \tan^2 x$

2. $\sin x - \tan x \cos x + \cos\left(\frac{\pi}{2} - x\right)$

$\sin x - \frac{\sin x}{\cos x} \cdot \cos x + \sin x$

$\sin x - \sin x + \sin x$

$\sin x$

3. $1 - 2\cos^2 x + \cos^4 x$

$\cos^4 x - 2\cos^2 x + 1$

$x^4 - 2x^2 + 1$

$(x^2 - 1)(x^2 - 1)$

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

$(-\sin^2 x)(-\sin^2 x)$

$\sin^4 x$

Verify each.

4. $\frac{\cos^2 x}{1-\sin x} = 1 + \sin x$

$\frac{1-\sin^2 x}{1-\sin x} \rightarrow \frac{(1-\sin x)(1+\sin x)}{(1-\sin x)}$

$1+\sin x$

5. $\frac{\tan^2 x(\sin^2 x - \cos^2 x)}{(\sin x - \cos x)(\sec^2 x - 1)} = \sin x + \cos x$

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

6. $\frac{\cos(-x)}{\sec(-x)+\tan(-x)} = 1 + \sin x$

$\frac{\cos x}{\sec x - \tan x}$

$\frac{\cos x}{\frac{1}{\cos x} - \frac{\sin x}{\cos x}} \rightarrow \frac{\cos x}{\frac{1-\sin x}{\cos x}} \rightarrow$

$\cos x \cdot \frac{\cos x}{1-\sin x} \rightarrow \frac{\cos^2 x}{1-\sin x}$

$\frac{1-\sin^2 x}{1-\sin x} \rightarrow \frac{(1-\sin x)(1+\sin x)}{(1-\sin x)} \rightarrow 1+\sin x$

7. $2\cos^2\left(\frac{x}{2}\right) - \cos x = 1$ skip

8. $\cos x \sin x \tan x + \cos x \sin x \cot x = 1$

$\cos x \cdot \sin x \cdot \frac{\sin x}{\cos x} + \cos x \sin x \cdot \frac{\cos x}{\sin x}$

$\sin^2 x + \cos^2 x = 1$ ✓

9. $\frac{\tan^3 x + \tan x}{\sec^2 x} = \tan x$

$\frac{\tan^3 x}{\tan x} + \frac{\tan x}{\tan x}$ over $\sec^2 x$

$\frac{\tan x(\tan^2 x + 1)}{\sec^2 x} \rightarrow \frac{\tan x(\sec^2 x)}{\sec^2 x} \rightarrow \tan x$

10. $\frac{\csc x + 1}{\cot x} = \frac{\cot x}{\csc x - 1}$

$\frac{\csc x + 1}{\cot x} \cdot \frac{\cot x}{\cot x}$

$\frac{(\csc x + 1)\cot x}{\cot^2 x}$

$\frac{(\csc x + 1)\cot x}{\csc^2 x - 1}$

$\frac{(\csc x + 1)\cot x}{(\csc x + 1)(\csc x - 1)}$

$\frac{\cot x}{\csc x - 1}$

11. $\sec^2 x \cot x - \cot x = \tan x$

* GCF

$\cot x(\sec^2 x - 1)$

$\cot x \cdot \tan^2 x$

$\frac{1}{\tan x} \cdot \frac{\tan^2 x}{1} \rightarrow \tan x$

12. $(\sin x + \cos x)^2 - 1 = \sin 2x$

$(\sin x + \cos x)(\sin x + \cos x) - 1$

$\sin^2 x + \sin x \cos x + \sin x \cos x + \cos^2 x - 1$

$2 \sin x \cos x + 1 - 1$

$2 \sin x \cos x = \sin 2x$

Double Angle Identity

13. $\cos B \cot B = \csc B - \sin B$

$\frac{\cos B}{1} \cdot \frac{\cos B}{\sin B} \rightarrow \frac{\cos^2 B}{\sin B} \rightarrow \frac{1 - \sin^2 B}{\sin B}$

split into 2 fractions

$\frac{1}{\sin B} - \frac{\sin^2 B}{\sin B}$

$\csc B - \sin B$ ✓