Trig Identities Name:_____ Period:_____

Verify each identity.

1. $\sin x \sec x = \tan x$

$\sin x \cdot \frac{1}{\cos x} = \tan x$

$\frac{\sin x}{\cos x} = \tan x$

$\tan x = \tan x$ ✓

2. $\cos x \csc x = \cot x$

$= \cos x \cdot \frac{1}{\sin x}$

$= \frac{\cos x}{\sin x}$

$= \cot x = \cot x$ ✓

3. $\tan x \cos x = \sin x$

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

$\sin x = \sin x$ ✓

4. $\cot x \sin x = \cos x$

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

$\cos x = \cos x$ ✓

5. $\sin x \tan x \cos x = \sin^2 x$

$\sin x \cdot \frac{\sin x}{\cos x} \cdot \cos x = \sin^2 x$

$\sin x \cdot \sin x = \sin^2 x$

$\sin^2 x = \sin^2 x$ ✓

6. $\sin x \cot x \cos x = \cos^2 x$

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

$= \cos x \cdot \cos x$

$\cos^2 x = \cos^2 x$ ✓

7. $\sec x - \sec x \sin^2 x = \cos x$

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

$\sec x(\cos^2 x)$

$\frac{1}{\cos x} \cdot \cos^2 x$

$\cos x = \cos x$ ✓

8. $\csc x - \csc x \cos^2 x = \sin x$

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

$= \frac{1}{\sin x} \cdot \sin^2 x$

$\sin x = \sin x$

Trig Identities Name:_____ Period:_____

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

$= (1-\sin^2 x) - \sin^2 x$

$= 1 - 2\sin^2 x = 1 - 2\sin^2 x$ ✓

10. $\csc\theta - \sin\theta = \cot\theta\cos\theta$

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

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

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

$= \csc\theta - \sin\theta$ ✓

11. $\frac{\tan\theta\cot\theta}{\csc\theta} = \sin\theta$

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

$= \frac{1}{\csc\theta}$

$= \sin\theta = \sin\theta$ ✓

$\cot^2 + 1 = \csc^2$

12. $\sin^2 x\,(1 + \cot^2 x) = 1$

$= \sin^2 x(\csc^2 x)$

$= \sin^2 x\left(\frac{1}{\sin^2 x}\right)$

$= 1 = 1$ ✓

13. $\sin t \tan t = \frac{1-\cos^2 t}{\cos t}$

$= \frac{\sin^2 t}{\cos t}$

$= \frac{\sin t}{\cos t} \cdot \sin t$

$\sin t \cdot \tan t = \tan t \cdot \sin t$

14. $\frac{\csc^2 t}{\cot t} = \csc t \sec t$

$\frac{\cot^2 t + 1}{\cot t}$

$\frac{\cot^2 t}{\cot t} + \frac{1}{\cot t}$

$\cot t + \tan t$

$= \frac{\cos t}{\sin t} + \frac{\sin t}{\cos t}$

$= \frac{\cos^2 t + \sin^2 t}{\sin t \cdot \cos t}$

$= \frac{1}{\sin t \cdot \cos t} = \csc t \cdot \sec t$ ✓

15. $\cos x(\tan x + \sin x \cot x) = \sin x + \cos^2 x$

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

$= \sin x + \cos^2 x = \sin x + \cos^2 x$ ✓

16. $\frac{1-\sin\theta}{\cos\theta} = \sec\theta - \tan\theta$

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

$= \sec\theta - \tan\theta = \sec\theta - \tan\theta$ ✓

Trig Identities Name:_____ Period:_____

17. $\frac{\sin t}{\tan t} + \frac{\cos t}{\cot t} = \sin t + \cos t$

$= \frac{\sin t}{\frac{\sin t}{\cos t}} + \frac{\cos t}{\frac{\cos t}{\sin t}}$

$= \sin t \cdot \frac{\cos t}{\sin t} + \cos t \cdot \frac{\sin t}{\cos t}$

$= \cos t + \sin t = \sin t + \cos t$

18. $1 - \frac{\sin^2 x}{1+\cos x} = \cos x$

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

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

$= \frac{\cos^2 x + \cos x}{1+\cos x}$

$= \frac{\cos x(\cos x + 1)}{1+\cos x}$

$= \cos x = \cos x$ ✓

19. $\csc^2 x \sec x = \sec x + \csc x \cot x$

$(\cot^2 x + 1)\sec x = \sec x + \frac{1}{\sin x}$

$= \cot^2 x \cdot \sec x + \sec x$

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

$= \frac{\cos x}{\sin^2 x} + \sec x$

$= \frac{\cos x}{\sin x} \cdot \frac{1}{\sin x} + \sec x$

$= \cot x \csc x + \sec x$ ✓

20. $\sin^2\beta(1 + \cot^2\beta) = 1$

$= \sin^2\beta(\csc^2\beta)$

$= \sin^2\beta\left(\frac{1}{\sin^2\beta}\right)$

$= 1 = 1$ ✓

$1+\tan^2 = \sec^2$

21. $(\sec\theta + 1)(\sec\theta - 1) = \tan^2\theta$

$= \sec^2\theta - 1$

$= \cancel{1} + \tan^2\theta - \cancel{1}$

$= \tan^2\theta = \tan^2\theta$

22. $\frac{(1-\cos u)(1+\cos u)}{\cos^2 u} = \tan^2 u$

$= \frac{1-\cos^2 u}{\cos^2 u}$

$= \frac{\sin^2 u}{\cos^2 u}$

$= \tan^2 u = \tan^2 u$ ✓

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

$= \frac{\sec^2 x}{1}$

$= \sec^2 x = \sec^2 x$ ✓

24. $\tan^2\theta - \sin^2\theta = \tan^2\theta\sin^2\theta$

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

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

$= \frac{1-\sin^2\theta - \sin^4\theta}{\sin^2\theta}$

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

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

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

$\frac{\sin^2}{\cos^2} - \sin^2 = \frac{\sin^2 - \sin^2\cos^2}{\cos^2}$

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

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