PARTNER ACTIVITY – USE YOUR KNOWLEDGE OF THE TRIGONOMETRIC IDENTITIES TO SIMPLIFY OR VERIFY THE FOLLOWING PROBLEMS.
PARTNER A: SHOULD DO ALL THE EVEN NUMBERED PROBLEMS
PARTNER B: SHOULD DO ALL THE ODD NUMBERED PROBLEMS

Partner A: _____ **Partner B:** _____

Part 1: Simplify the following to a single expression.

1. $\dfrac{2}{\csc x} + \sin x$

$2 \cdot \sin x + \sin x$

$\boxed{3\sin x}$

2. $\dfrac{\sin\theta}{\cos\theta} + \dfrac{1}{\cot\theta}$

$\tan\theta + \tan\theta$

$\boxed{2\tan\theta}$

3. $\dfrac{1-\sec^2 x}{1-\cos^2 x}$

$\dfrac{-\tan^2 x}{\sin^2 x}$

$\dfrac{\sin^2 x}{\cos^2 x} \cdot \dfrac{1}{\sin^2 x} = \boxed{\sec^2 x}$

4. $\dfrac{-\cos(-x)\sin(-x)}{-\tan(x)}$

$\dfrac{-\cos x(-\sin x)}{-\tan x}$ $\cdot \dfrac{\sin x}{\cos x}$

$\cos x \sin x \cdot -\dfrac{\cos x}{\sin x}$

$\boxed{-\cos^2 x}$

5. $\dfrac{\sec^2 x - \cot^2\left(\frac{\pi}{2} - x\right)}{\cos^2\left(\frac{\pi}{2} - x\right) + \cos^2 x}$

$\dfrac{\sec^2 x - \tan^2 x}{\sin^2 x + \cos^2 x}$

$(1 + \tan^2 x) - \tan^2 x$

$\dfrac{1}{1} = \boxed{1}$

6. $\tan\theta + \cos(-\theta) + \tan(-\theta)$

$\tan\theta + \cos\theta - \tan\theta$

$\boxed{\cos\theta}$

Part 2: Verify the following trigonometric equations.

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

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

$\tan x$

8. $\cot u \sec u \sin u = 1$

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

$1 = 1$

9. $\frac{\sin(-y)}{\cos(-y)} = -\tan y$

$\frac{-\sin y}{\cos y}$

$-\tan y$

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

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

$= \sin\theta$

11. $\cot x + 1 = (\csc x)(\cos x + \sin x)$

$= \csc x \cos x + \csc x \sin x$

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

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

$= \cot x + 1$

12. $\frac{\cos v - \sin v}{\sin v \cos v} = \csc v - \sec v$

$\frac{\cos v}{\sin v \cos v} - \frac{\sin v}{\sin v \cos v}$

$\frac{1}{\sin v} - \frac{1}{\cos v}$

$\csc v - \sec v$

13. $\frac{\sin^2 t}{\cos t} + \frac{\cos t}{1} = \sec t$

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

$\frac{1}{\cos t} = \sec t$

$\sec t = \sec t$

14. $(1 - \cos u)(1 + \cos u) = \sin^2 u$

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

$\sin^2 u = \sin^2 u$

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

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

$1 - 2\sin^2 x$

16. $(\sec y + 1)(\sec y - 1) = \tan^2 y$

$\sec^2 y - 1 =$

$\tan^2 y =$

17. $\csc^2 x - \cot^2 x = 1$

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

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

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

$1 = 1$

18. $\cot x + \sec x = \frac{\cos x + \tan x}{\sin x}$

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

$= \cot x + \frac{1}{\cos x}$

$= \cot x + \sec x$

19. $\frac{1 - (\sin x - \cos x)^2}{\sin x} = 2\cos x$

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

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

$2\cos x =$

20. $\cos\theta + \sin\theta = \frac{1 - \cot(-\theta)}{\csc\theta}$

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

$= \frac{\left(1 + \frac{\cos\theta}{\sin\theta}\right)}{\frac{1}{\sin\theta}} \cdot \frac{\sin\theta}{1}$

$= \sin\theta + \cos\theta$

21. $\dfrac{1+\cos y}{1-\cos y} = \dfrac{\sin^2 y}{(1-\cos y)^2}$

$\dfrac{(1+\cos y)(1-\cos y)}{(1-\cos y)(1-\cos y)} =$

$\dfrac{1-\cos^2 y}{(1-\cos y)^2} =$

$\dfrac{\sin^2 y}{(1-\cos y)^2}$

22. $\sin^4 w - \cos^4 w = 1 - 2\cos^2 w$

$(\sin^2 w - \cos^2 w)(\sin^2 w + \cos^2 w)$

$(1-\cos^2 w) - \cos^2 w = 1$

$1 - 2\cos^2 w =$

23. $\sin\left(\dfrac{\pi}{2} - \theta\right)\sec\theta - \cos^2\theta = \sin^2\theta$

$\cos\theta \cdot \dfrac{1}{\cos\theta} - \cos^2\theta =$

$1 - \cos^2\theta =$

$\sin^2\theta =$

24. $1 - \dfrac{\sin^4\theta}{\cos^4\theta - \cos^2\theta} = \sec^2\theta$

$1 - \dfrac{\sin^4\theta}{\cos^2\theta(\cos^2\theta - 1)}$

$1 - \dfrac{\sin^4\theta}{\cos^2\theta(\sin^2\theta)}$

$1 - \dfrac{(-\sin^2\theta)}{\cos^2\theta}$

$1 + \tan^2\theta =$

$\sec^2\theta$

25. $\dfrac{\tan x}{1+\sec x} + \dfrac{1+\sec x}{\tan x} = 2\csc x$

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

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

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

$\dfrac{2\sec x(\sec x + 1)}{(1+\sec x)\tan x)} \rightarrow 2 \cdot \dfrac{1}{\cos x} \cdot \dfrac{\cos x}{\sin x}$

$= 2\csc x$

26. $\dfrac{1-\sec\left(\dfrac{\pi}{2} - x\right)}{\cos(-x) + \cot(-x)} = \sec x$

$\dfrac{1 - \csc x}{\cos x - \cot x} =$

$\dfrac{1 - \frac{1}{\sin x}}{\cos x - \frac{\cos x}{\sin x}} =$

$\dfrac{\left(1 - \frac{1}{\sin x}\right) \cdot \frac{1}{\cos x\left(1 - \frac{1}{\sin x}\right)}}{\cos x\left(1 - \frac{1}{\sin x}\right)}$

$= \dfrac{1}{\cos x} = \sec x$