$S^2+C^2=1$

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

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

Simplifying Trig Expressions WS 1 NAME Key

Simplify each of the following.

1. $(\tan\theta)(\cos\theta) = \frac{\sin\theta}{\cos\theta}\cdot\cos\theta = \sin\theta$

2. $(\cot A)(\sec A)(\sin A)$
$\frac{\cos A}{\sin A}\cdot\frac{1}{\cos A}\cdot\sin A = 1$

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

4. $(\cos x)(\csc x)(\tan x)$
$\cos x\cdot\frac{1}{\sin x}\cdot\frac{\sin x}{\cos x} = 1$

5. $(\cos y)(\sec y) = \cos y\cdot\frac{1}{\cos y} = 1$

6. $\sin^4 x+2\sin^2 x\cos^2 x+\cos^4 x$
$(\sin^2 x+\cos^2 x)(\sin^2 x+\cos^2 x)$
$(1)(1) = 1$

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

8. $\cos^3 y+\cos y\sin^2 y$
$\cos y(\cos^2 y+\sin^2 y)$
$\cos y(1) = \cos y$

9. $\tan^2 x-\sec^2 x = -1$

10. $\frac{\sin^4\theta-\cos^4\theta}{\sin^2\theta-\cos^2\theta} = \frac{(\sin^2\theta+\cos^2\theta)(\sin^2\theta-\cos^2\theta)}{\sin^2\theta-\cos^2\theta}$
$= \sin^2\theta+\cos^2\theta = 1$

11. $\frac{1+\tan^2\theta}{1+\cot^2\theta} = \frac{\sec^2\theta}{\csc^2\theta} = \frac{1/\cos^2\theta}{1/\sin^2\theta} =$
$\frac{1}{\cos^2\theta}\cdot\frac{\sin^2\theta}{1} = \frac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta$

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

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

14. $\sin\theta(\csc\theta-\sin\theta)$
$\sin\theta\left(\frac{1}{\sin\theta}-\sin\theta\right) = 1-\sin^2\theta = \cos^2\theta$

15. $\cos x+\tan x\sin x = \cos x+\frac{\sin x}{\cos x}\cdot\sin x =$
$\frac{\cos x}{1}+\frac{\sin^2 x}{\cos x} = \frac{\cos^2 x}{\cos x}+\frac{\sin^2 x}{\cos x} = \frac{\cos^2 x+\sin^2 x}{\cos x} = \frac{1}{\cos x} = \sec x$
(mult. by $\cos x$)

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

17. $\frac{\sec^2 x-1}{\sec x+1}+1 = \frac{(\sec x+1)(\sec x-1)}{\sec x+1}+1$
$= \sec x-1+1 = \sec x$

18. $\cot^2 x(\sec^2 x-1)$
$\cot^2 x\cdot\tan^2 x$
$\frac{1}{\tan^2 x}\cdot\tan^2 x = 1$

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

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

21. $\frac{1}{\tan^2 x+1} = \frac{1}{\sec^2 x} = \cos^2 x$

22. $\tan^4 x+2\tan^2 x+1$
$(\tan^2 x+1)(\tan^2 x+1)$
$\sec^2 x\cdot\sec^2 x = \sec^4 x$

23. $\frac{\tan x}{1}-\frac{\sec^2 x}{\tan x} = \frac{\tan^2 x}{\tan x}-\frac{\sec^2 x}{\tan x} = \frac{\tan^2 x-\sec^2 x}{\tan x}$
(mult. by $\tan x$)
$= \frac{-1}{\tan x} = -\cot x$

24. $\frac{\tan\theta\csc\theta}{\sec\theta} = \frac{\frac{\sin\theta}{\cos\theta}\cdot\frac{1}{\sin\theta}}{\frac{1}{\cos\theta}} = \frac{\frac{1}{\cos\theta}}{\frac{1}{\cos\theta}} = 1$

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

26. $\sec x-\tan x\sin x$
$\sec x-\frac{\sin x}{\cos x}\cdot\sin x$
$\frac{1}{\cos x}-\frac{\sin^2 x}{\cos x} = \frac{1-\sin^2 x}{\cos x} = \frac{\cos^2 x}{\cos x} = \cos x$