Name: Key

# 5.1 More Trig Identity Practice

Use Identities!

**Simplify:**

1) $\frac{\tan^2 x+1}{1+\cot^2 x}$ $= \sec^2 x$ $= \csc^2 x$

$\frac{\sec^2 x}{\csc^2 x}$

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

$\tan^2 x$

Common denominators

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

$\frac{\sec x+\tan x-\sec x+\tan x}{\sec^2 x-\tan^2 x}$

$\frac{2\tan x}{1}$

$2\tan x$

Identities

3) $\frac{\tan^2 x}{1-\sec^2 x}$

$\frac{\tan^2 x}{-\tan^2 x}$

$-1$

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

$1+\tan^2 x=\sec^2 x$ $-\sec^2 x$ $-\sec^2 x$ $1+\tan^2 x+\sec^2 x=0$ $-\tan^2 x$ $-\tan^2 x$ $1=-\tan^2 x-\sec^2 x$

Identities

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

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

$\cos^2 x-1+\sin^2 x=0$ $-\sin^2 x$ $-\sin^2 x$ $\cos^2 x-1=-\sin^2 x$ similar!

$\tan^2 x$

A1 skills

5) $\frac{\tan x+\cot x}{\cot x}$ think $\frac{3+1}{8}=\frac{3}{8}+\frac{1}{8}$

$\frac{\tan x}{\cot x}+\frac{\cot x}{\cot x}$

$\tan x\cdot\tan x+1$

$\tan^2 x+1$

$\sec^2 x$

sines + cosines

6) $\sec\theta\cot\theta - \cot\theta\cos\theta$

$\left(\frac{1}{\cos\theta}\right)\left(\frac{\cos\theta}{\sin\theta}\right)-\left(\frac{\cos\theta}{\sin\theta}\right)\frac{\cos\theta}{1}$

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

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

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

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

$\sin\theta$

sines + cosines

7) $\frac{\cot^2 x\cos^2 x}{\cot^2 x-\cos^2 x}$

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

$\frac{\frac{\cos^4 x}{\sin^2 x}}{\cos^2 x-\cos^2 x\cdot\sin^2 x}$

$\frac{\cos^4 x}{\sin^2 x}$

$\frac{\cos^4 x}{\cos^2 x(1-\sin^2 x)}$

$\frac{\cos^4 x}{\cos^2 x(\cos^2 x)}$

$\frac{\cos^4 x}{\cos^4 x}$

$1$

Identities

8) $\frac{(\sin x+\tan x)^2+\cos^2 x-\sec^2 x}{\tan x}$

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

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

$\frac{1-1+2\sin x\tan x}{\tan x}$

$\frac{2\tan x\cdot\sin x}{\tan x}$

$2\sin x$

sines + cosines

9) $(\sin\theta)(\cos\theta)(\sec\theta)(\csc\theta)$

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

$1$

sines + cosines

11) $\frac{\cot x}{\csc x}$

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

$\cos x$

Think...

$\frac{\frac{4}{2}}{\frac{1}{2}}$

4

Common Denom.

12) $\cot x + \tan x$

$\frac{1}{\tan x} + \frac{\tan x(\tan x)}{1(\tan x)}$

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

$\frac{\sec^2 x}{\tan x}$

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

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

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

$\sec x \cdot \csc x$

Identities

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

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

$-\cos^2 x \quad -\cos^2 x$

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

$\frac{\csc x(\sin^2 x)}{\sin x \cdot \cos x}$

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

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

$\frac{1}{\cos x}$

$\sec x$

Common Denom

14) $\frac{\tan x + \cot x}{\sec x}$

$\frac{\tan x}{\sec x} + \frac{\cot x}{\sec x}$

$\frac{\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}}{\frac{1}{\cos x}}$ Keep. Change. Flip.

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

$\sin x \quad \sin x$

$\tan x \quad 1$

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

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

$\frac{1}{\sin x}$

$\csc x$

Identities

17) $\frac{\sec^2 x - 1}{\tan^2 x}$

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

$-1 \qquad -1$

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

$\frac{\tan^2 x}{\tan^2 x}$

1

Identities

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

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

$-\cos^2 x \quad -\cos^2 x$

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

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

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

$\sin x$

Sines & Cosines

15) $\cot\theta \cdot \sec\theta$

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

$\frac{1}{\sin\theta}$

$\csc\theta$

Identities

16) $\sin^2\theta + \tan^2\theta + \cos^2\theta$

Rearrange!

$\sin^2\theta + \cos^2\theta + \tan^2\theta$

$1 + \tan^2\theta$

$\sec^2\theta$

sines + cosines

19) $\cos\theta \cdot \csc\theta \cdot \tan\theta$

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

1

Factor!

20) $\sin^2\theta - \cos^2\theta \cdot \sin^2\theta$

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

$\sin^2\theta(\sin^2\theta)$

$\boxed{\sin^4\theta}$

Sines & Cosines

21) $\cos x + \sin x \cdot \tan x$

$\sin^2\theta + \cos^2\theta = 1$

$-\cos^2\theta \quad -\cos^2\theta$

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

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

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

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

$\frac{1}{\cos x}$

$\boxed{\sec x}$

common denom

22) $\frac{1}{1+\cos x} - \frac{1}{1-\cos x}$ $(1-\cos x)(1+\cos x)$ $(1+\cos x)$

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

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

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

Conjugate!

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

$\frac{\sin x - \sin x\cos x}{1-\cos^2 x}$ Didn't have to distribute

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

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

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

$\boxed{\csc x - \cot x}$

Conjugate

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

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

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

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

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

$\boxed{\sec x - \tan x}$

conjugate!

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

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

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

$\boxed{1+\sin x}$

26) $\cos^2\theta - \sin^2\theta - 2\cos\theta + 1$

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

Think $x^2 - 2x + 1$

$(x-1)(x-1)$

$(x-1)^2$

maybe not! $(\cos\theta - 1)^2$ $(1-\cos^2\theta)$

$\cos^2\theta - 2\cos\theta + 1 - 1 + \cos^2\theta$

$2\cos^2\theta - 2\cos\theta$

$\boxed{2\cos\theta(\cos\theta - 1)}$

Factor

27) $\sin^2\theta \cdot \sec^2\theta - \sin^2\theta$

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

$\sin^2\theta(\tan^2\theta)$

$\frac{\sin^2\theta}{1}\left(\frac{\sin^2\theta}{\cos^2\theta}\right)$

$\boxed{\frac{\sin^4\theta}{\cos^2\theta}}$

Factor

28) $\tan^4\theta + 2\tan^2\theta + 1$

Think Factor $x^4 + 2x^2 + 1$

$(x^2+1)(x^2+1)$

$(\tan^2\theta + 1)^2$

$(\sec^2\theta)^2$

$\boxed{\sec^4\theta}$