

## Simplifying Trig Expressions WS

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

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

$$3) \frac{1 - \cos^2 x}{\sin x} = \frac{\sin^2 x}{\sin x} = \frac{(\sin x)(\sin x)}{\sin x} = \boxed{1}$$

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

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

$$6) \sin^4 x + 2\sin^2 x \cos^2 x + \cos^4 x$$

let  $a = \sin x$  and  $b = \cos x$

$$\rightarrow a^4 + 2a^2b^2 + b^4 = (a^2 + b^2)(a^2 + b^2) = (a^2 + b^2)^2$$

then  $(\sin^2 x + \cos^2 x)^2 = (1)^2 = \boxed{1}$

$$7) \sin^2 x - 1 = \boxed{-\cos^2 x}$$

$$8) \cos^3 y + \cos y \sin^2 y = \cos y (\cos^2 y + \sin^2 y) = \boxed{\cos y}$$

$$9) \tan^2 x - \sec^2 x = \boxed{-1}$$

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

$$11) \frac{1 + \tan^2 \theta}{1 + \cot^2 \theta} = \frac{\sec^2 \theta}{\csc^2 \theta} = \frac{\sin^2 \theta}{\cos^2 \theta} = \boxed{\tan^2 \theta}$$

$$12) (1 + \sin x)(1 - \sin x) = 1 - \sin^2 x = \boxed{\cos^2 x}$$

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

$$\rightarrow 14) \sin \theta (\csc \theta - \sin \theta) = \sin \theta \cdot \frac{1}{\sin \theta} - \sin^2 \theta = 1 - \sin^2 \theta = \boxed{\cos^2 \theta}$$

$$\rightarrow 15) \cos x + \tan x \cdot \sin x = \frac{\cos^2 x}{\cos x} + \frac{\sin^2 x}{\cos x} = \frac{1}{\cos x} = \boxed{\sec x}$$

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

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

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

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

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

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

$$\rightarrow 22) \frac{a^4 + 2a^2 + 1}{(a^2 + 1)(a^2 + 1)} = (\tan^2 x + 1)^2 = (\sec^2 x)^2 = \boxed{\sec^4 x}$$

$$23) \tan x - \frac{\sec^2 x}{\tan x} = \frac{\tan^2 x - \sec^2 x}{\tan x} = \frac{-1}{\tan x} = \boxed{-\cot x}$$

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

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

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