

Identities

Prove the following identities

$$1. \frac{\tan x}{\sin x} = \sec x$$

$$2. \frac{\sec x}{\csc x} = \tan x$$

$$3. \sec^2 x(1 - \sin^2 x) = 1$$

$$4. \sec^2 x(1 - \cos^2 x) = \tan^2 x$$

$$5. \cos^2 x - \sin^2 x = 1 - 2\sin^2 x$$

$$6. 2\cos^2 x - 1 = \cos^2 x - \sin^2 x$$

$$7. \tan^2 x \cdot \cos^2 x = 1 - \cos^2 x$$

$$8. \sec^2 x - \csc^2 x = \tan^2 x - \cot^2 x$$

$$9. \frac{\sin^2 x}{1 - \cos x} = 1 + \cos x$$

$$10. \frac{\csc x}{\sin x} - \frac{\sec x}{\cos x} = \cot^2 x - \tan^2 x$$

$$11. \tan x + \cot x = \sec x \csc x$$

$$12. \tan x \cos x = \cot x(\sec x - \cos x)$$

$$13. (\tan x - 1)^2 = \sec^2 x - 2 \tan x$$

$$14. \sin^2 x \sec^2 x = \sec^2 x - 1$$

$$15. \cos x \cot x = \csc x - \sin x$$

$$16. \frac{1 + \sec x}{\csc x} = \sin x + \tan x$$

$$17. \frac{\csc x}{\cot x} - \frac{\cot x}{\csc x} = \tan x \sin x$$

$$18. \frac{\sec^3 x - \sec x}{\sec x + 1} = \frac{1 - \cos x}{\cos^2 x}$$

$$19. \frac{\sec^4 x - 1}{\tan^2 x} = \tan^2 x + 2$$

$$20. \frac{\sin^3 x + \cos^3 x}{\sin x + \cos x} = 1 - \sin x \cos x$$

$$21. \frac{\tan^3 x - \cot^3 x}{\tan x - \cot x} = \tan^2 x + \csc^2 x$$

$$22. \frac{\sec x}{\sin x} - \frac{2 \sin x}{\cos x} = \cot x - \tan x$$

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

$$24. \frac{\cos^2 x}{1 + 2 \sin x - 3 \sin^2 x} = \frac{1 + \sin x}{1 + 3 \sin x}$$

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

$$26. \frac{1}{\sec x + \tan x} = \frac{1 - \sin x}{\cos x}$$

$$27. \frac{\cot^2 x}{\csc^2 x + 4 \csc x - 5} = \frac{1 + \sin x}{1 + 5 \sin x}$$

$$28. \frac{\sin x \cos y}{\sin y \cos x} = \frac{\tan x}{\tan y}$$