Warm Up

Prove the following identities...

1. $\sec x - \tan x \sin x = \dfrac{1}{\sec x}$

2. $\dfrac{\sec\theta \sin\theta}{\tan\theta + \cot\theta} = \sin^2\theta$

3. $\csc^4 x - \cot^4 x = \csc^2 x + \cot^2 x$

4. $\dfrac{\cos x + 1}{\sin^3 x} = \dfrac{\csc x}{1 - \cos x}$

New Identities

$$\cos\theta = \sin(90-\theta)$$

$$\sin\theta = \cos(90-\theta)$$

$$\sin(x+y) = \sin x\cos y + \cos x\sin y$$

$$\sin(x-y) = \sin x\cos y - \cos x\sin y$$

$$\cos(x+y) = \cos x\cos y - \sin x\sin y$$

$$\cos(x-y) = \cos x\cos y + \sin x\sin y$$

Double Angle Identities

If θ=α:

$$\sin(\theta+\alpha)=\sin(\theta+\theta)$$

$$\cos(\theta+\alpha)=\cos(\theta+\theta)$$

$$\sin(2\theta)=2\sin\theta\cos\theta$$

$$\cos 2\theta=\cos^2\theta-\sin^2\theta$$

$$=1-2\sin^2\theta$$

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

Double Angle Identities

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

$$= 1 - 2\sin^2\theta$$

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

Prove... $\dfrac{1-\sin 2\theta}{\cos 2\theta} = \dfrac{\cos 2\theta}{1+\sin 2\theta}$

LS

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

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

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

$$\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$$

RS

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

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

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

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

RS

$$\frac{\cos 2\theta\,(1-\sin 2\theta)}{(1+\sin 2\theta)(1-\sin 2\theta)}$$

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

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

Prove...

$$\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}=\sec 2\theta-\tan 2\theta$$

$(a-b)^2$
$a^2-2ab+b^2$

RS

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

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

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

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

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

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

$$\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$$