

November 8

SWBAT:

Use trig identities to
verify equations



Reciprocal Identities

$$\sin(\theta) = \frac{1}{\csc(\theta)} \quad \csc(\theta) = \frac{1}{\sin(\theta)}$$

$$\cos(\theta) = \frac{1}{\sec(\theta)} \quad \sec(\theta) = \frac{1}{\cos(\theta)}$$

$$\tan(\theta) = \frac{1}{\cot(\theta)} \quad \cot(\theta) = \frac{1}{\tan(\theta)}$$

Quotient Identities

$$\cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$$

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

Pythagorean Identities

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

$$1 + \cot^2(\theta) = \csc^2(\theta)$$

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

Cofunction Identities

$$\sin(\alpha) = \cos(90 - \alpha) \quad \tan(\alpha) = \cot(90 - \alpha) \quad \sec(\alpha) = \csc(90 - \alpha)$$

$$\cos(\alpha) = \sin(90 - \alpha) \quad \cot(\alpha) = \tan(90 - \alpha) \quad \csc(\alpha) = \sec(90 - \alpha)$$

Cofunction Identities

$$\begin{aligned}\sin(\alpha) &= \cos(90 - \alpha) \\ \cos(\alpha) &= \sin(90 - \alpha) \\ \tan(\alpha) &= \cot(90 - \alpha) \\ \cot(\alpha) &= \tan(90 - \alpha) \\ \sec(\alpha) &= \csc(90 - \alpha) \\ \csc(\alpha) &= \sec(90 - \alpha)\end{aligned}$$

Reciprocal Identities

$$\begin{aligned}\sin(\theta) &= \frac{1}{\csc(\theta)} & \csc(\theta) &= \frac{1}{\sin(\theta)} \\ \cos(\theta) &= \frac{1}{\sec(\theta)} & \sec(\theta) &= \frac{1}{\cos(\theta)} \\ \tan(\theta) &= \frac{1}{\cot(\theta)} & \cot(\theta) &= \frac{1}{\tan(\theta)}\end{aligned}$$

Pythagorean Identities

$$\begin{aligned}\sin^2(\theta) + \cos^2(\theta) &= 1 \\ 1 + \cot^2(\theta) &= \csc^2(\theta) \\ \tan^2(\theta) + 1 &= \sec^2(\theta)\end{aligned}$$

Quotient Identities

$$\begin{aligned}\cot(\theta) &= \frac{\cos(\theta)}{\sin(\theta)} \\ \tan(\theta) &= \frac{\sin(\theta)}{\cos(\theta)}\end{aligned}$$

show:

$$\cos(\beta)\sec(\beta)=1$$

reciprocal
identity

$$\cos\beta \sec\beta = 1$$

$$\cos(\theta) = \frac{1}{\sec(\theta)}$$

$$\frac{1}{\sec\beta} \cdot \sec\beta = 1$$

$$\frac{\sec\beta}{\sec\beta} = 1$$

$$1 = 1$$

Cofunction Identities

$$\begin{aligned}\sin(\alpha) &= \cos(90 - \alpha) \\ \cos(\alpha) &= \sin(90 - \alpha) \\ \tan(\alpha) &= \cot(90 - \alpha) \\ \cot(\alpha) &= \tan(90 - \alpha) \\ \sec(\alpha) &= \csc(90 - \alpha) \\ \csc(\alpha) &= \sec(90 - \alpha)\end{aligned}$$

Reciprocal Identities

$$\begin{aligned}\sin(\theta) &= \frac{1}{\csc(\theta)} & \csc(\theta) &= \frac{1}{\sin(\theta)} \\ \cos(\theta) &= \frac{1}{\sec(\theta)} & \sec(\theta) &= \frac{1}{\cos(\theta)} \\ \tan(\theta) &= \frac{1}{\cot(\theta)} & \cot(\theta) &= \frac{1}{\tan(\theta)}\end{aligned}$$

Pythagorean Identities

$$\begin{aligned}\sin^2(\theta) + \cos^2(\theta) &= 1 \\ 1 + \cot^2(\theta) &= \csc^2(\theta) \\ \tan^2(\theta) + 1 &= \sec^2(\theta)\end{aligned}$$

Quotient Identities

$$\begin{aligned}\cot(\theta) &= \frac{\cos(\theta)}{\sin(\theta)} \\ \tan(\theta) &= \frac{\sin(\theta)}{\cos(\theta)}\end{aligned}$$

show:

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

Pythagorean
identity

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

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

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

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

$$(\sin^2\theta + \cos^2\theta) - \cos^2\theta = \sin^2\theta$$

$$\sin^2\theta = \sin^2\theta$$

Cofunction Identities

$$\begin{aligned}\sin(\alpha) &= \cos(90 - \alpha) \\ \cos(\alpha) &= \sin(90 - \alpha) \\ \tan(\alpha) &= \cot(90 - \alpha) \\ \cot(\alpha) &= \tan(90 - \alpha) \\ \sec(\alpha) &= \csc(90 - \alpha) \\ \csc(\alpha) &= \sec(90 - \alpha)\end{aligned}$$

Reciprocal Identities

$$\begin{aligned}\sin(\theta) &= \frac{1}{\csc(\theta)} & \csc(\theta) &= \frac{1}{\sin(\theta)} \\ \cos(\theta) &= \frac{1}{\sec(\theta)} & \sec(\theta) &= \frac{1}{\cos(\theta)} \\ \tan(\theta) &= \frac{1}{\cot(\theta)} & \cot(\theta) &= \frac{1}{\tan(\theta)}\end{aligned}$$

Pythagorean Identities

$$\begin{aligned}\sin^2(\theta) + \cos^2(\theta) &= 1 \\ 1 + \cot^2(\theta) &= \csc^2(\theta) \\ \tan^2(\theta) + 1 &= \sec^2(\theta)\end{aligned}$$

Quotient Identities

$$\begin{aligned}\cot(\theta) &= \frac{\cos(\theta)}{\sin(\theta)} \\ \tan(\theta) &= \frac{\sin(\theta)}{\cos(\theta)}\end{aligned}$$

show:

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

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

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

$$\sin^2 \alpha - \cos^2 \alpha = 2\sin^2 \alpha - (\sin^2 \alpha + \cos^2 \alpha)$$

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

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

Cofunction Identities

$$\begin{aligned}\sin(\alpha) &= \cos(90 - \alpha) \\ \cos(\alpha) &= \sin(90 - \alpha) \\ \tan(\alpha) &= \cot(90 - \alpha) \\ \cot(\alpha) &= \tan(90 - \alpha) \\ \sec(\alpha) &= \csc(90 - \alpha) \\ \csc(\alpha) &= \sec(90 - \alpha)\end{aligned}$$

Reciprocal Identities

$$\begin{aligned}\sin(\theta) &= \frac{1}{\csc(\theta)} & \csc(\theta) &= \frac{1}{\sin(\theta)} \\ \cos(\theta) &= \frac{1}{\sec(\theta)} & \sec(\theta) &= \frac{1}{\cos(\theta)} \\ \tan(\theta) &= \frac{1}{\cot(\theta)} & \cot(\theta) &= \frac{1}{\tan(\theta)}\end{aligned}$$

Pythagorean Identities

$$\begin{aligned}\sin^2(\theta) + \cos^2(\theta) &= 1 \\ 1 + \cot^2(\theta) &= \csc^2(\theta) \\ \tan^2(\theta) + 1 &= \sec^2(\theta)\end{aligned}$$

Quotient Identities

$$\begin{aligned}\cot(\theta) &= \frac{\cos(\theta)}{\sin(\theta)} \\ \tan(\theta) &= \frac{\sin(\theta)}{\cos(\theta)}\end{aligned}$$

show:

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

$$\begin{aligned}\cot^2 x + \cot^4 x &= \csc^4 x - \csc^2 x \\ \cot^2 x (1 + \cot^2 x) &= \csc^4 x - \csc^2 x\end{aligned}$$

$$1 + \cot^2(\theta) = \csc^2(\theta)$$

$$\begin{aligned}\cot^2 x (\csc^2 x) &= \csc^4 x - \csc^2 x \\ \cot^2 x (\csc^2 x) &= \csc^2 x (\csc^2 x - 1) \\ \cot^2 x (\csc^2 x) &= \csc^2 x ((1 + \cot^2 x) - 1) \\ \cot^2 x (\csc^2 x) &= \csc^2 x (\cot^2 x)\end{aligned}$$

$$\tan(\alpha)\cot(\alpha) = 1$$

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

$$\sin^2 y - \sin^4 y = \cos^2 y - \cos^4 y$$

$$\cot^2 x (\sec^2 x - 1) = 1$$

$$\tan(\alpha)\cot(\alpha) = 1$$

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

$$\tan \alpha \cdot \frac{1}{\tan \alpha}$$

$$\frac{1}{\cot \alpha} \cdot \cot \alpha$$

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

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

$$\underbrace{(\cos^2 x + \sin^2 x)}_{=1} = 1$$

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

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

$$\cos^2 x - \sin^2 x = (\cos^2 x - \sin^2 x)$$

$$\sin^2 y - \sin^4 y = \cos^2 y - \cos^4 y$$

$$\sin^2 y (1 - \sin^2 y) = \cos^2 y - \cos^4 y$$

$$\sin^2 y (\cos^2 y) = \cos^2 y - \cos^4 y$$

$$\sin^2 y (\cos^2 y) = \cos^2 y (1 - \cos^2 y)$$

$$\sin^2 y (\cos^2 y) = \cos^2 y (\sin^2 y)$$

$$\text{Identity: } \sin^2 y + \cos^2 y = 1$$

$$- \cos^2 y - \cos^2 y$$

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

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

$$- \sin^2 y$$

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

$$\cot^2 x (\sec^2 x - 1) = 1$$

$$\cot^2 x (\sec^2 x - 1) = 1$$

$$\cot^2 x (\tan^2 x) = 1$$

$$\cot^2 x \left(\frac{1}{\cot^2 x} \right) = 1$$

$$\frac{\cot^2 x}{\cot^2 x} = 1$$

$$1 = 1$$

$$\begin{aligned} 1 + \tan^2 x &= \sec^2 x \\ -1 \quad \tan^2 x &= \sec^2 x - 1 \end{aligned}$$

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

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

$$\frac{1}{\sin^2 x} - \cot^2 x = 1$$

$$\csc^2 x - \cot^2 x = 1$$

$$1 + \cot^2 x - \cot^2 x = 1$$

$$1 = 1$$