

# **Math Virtual Learning**

# **Precalculus with Trigonometry**

Students will verify Trigonometric Identities using the Double Angle Identities

May 1st, 2020



### Precalculus with Trigonometry Lesson: May 1st, 2020

### **Objective/Learning Target:**

Students will verify Trigonometric Identities using the Double Angle Identities

Today's lesson will cover how to use the Double Angle Identities to verify trigonometric identities. A reminder that we covered verifying identities in the Friday, April 24th and Monday, April 27th lesson.

## Let's Get Started! Watch Video: <u>Verifying Identities Using</u> <u>Double Angle Formula</u>

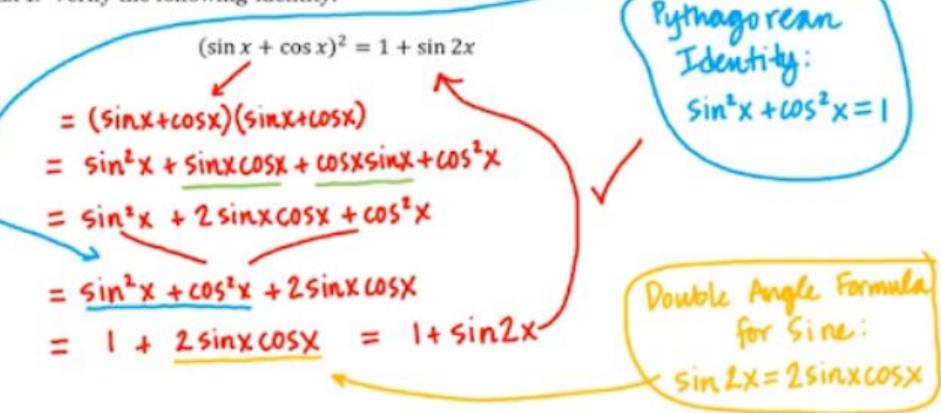
<b>Double Angle Identities</b>
$\sin 2x = 2\sin x \cos x$
$\cos 2x = \cos^2 x - \sin^2 x$
$=2\cos^2 x-1$
$=1-2\sin^2 x$
$\tan 2x = \frac{2\tan x}{1-\tan^2 x}$

# **Example:** Verify that $\cot x \sin 2x = 1 + \cos 2x$ is an identity.

$$\cot x \sin 2x = \frac{\cos x}{\sin x} \sin 2x \quad \text{Quotient identity}$$
$$= \frac{\cos x}{\sin x} (2\sin x \cos x) \quad \begin{array}{c} \text{Double-angle} \\ \text{identity} \end{array}$$
$$= 2\cos^2 x$$
$$= 1 + \cos 2x \quad \begin{array}{c} \cos 2x = 2\cos^2 x - 1 \Rightarrow \\ 2\cos^2 x = 1 + \cos 2x \end{array}$$

### Example

Ex 1. Verify the following identity.



# Practice

Use the Double Angle Identities to verify the following equations.

Verify the identity  $1 - \cos 2x = \tan x \sin 2x$ .

2 Prove that 
$$\frac{\sin\theta + \sin 2\theta}{1 + \cos \theta + \cos 2\theta} = \tan \theta$$
.

Prove the identity: 
$$\tan 2x + \frac{1}{\cos 2x} = \frac{\sin x + \cos x}{\cos x - \sin x}$$

## Practice - **ANSWERS**

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

$$1 - \cos 2x = \left(\frac{\sin x}{\cos x}\right) (2 \sin x \cos x)$$
  

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

$$1 - \left(1 - 2 \sin^2 x\right) = 2 \sin^2 x$$
  

$$2 \sin^2 x = 2 \sin^2 x$$

 $LHS = \frac{\sin \theta + 2 \sin \theta \cos \theta}{1 + \cos \theta + (2\cos^2 \theta - 1)}$  $= \frac{\sin \theta (1 + 2 \cos \theta)}{\cos \theta (1 + 2 \cos \theta)} \quad \text{(factorise)}$  $= \frac{\sin \theta}{\cos \theta}$  $= \tan \theta$ = RHS

1
$LHS = \tan 2x + \frac{1}{\cos 2x}$
$\sin 2x$ 1
$=\frac{1}{\cos 2x}+\frac{1}{\cos 2x}$
$-\frac{\sin 2x+1}{2}$
$-\cos 2x$
$2\sin x\cos x + \cos^2 x + \sin^2 x$
$=$ $\frac{\cos^2 x - \sin^2 x}{\cos^2 x}$
$(\cos x + \sin x)^2$
$=\frac{1}{(\cos x - \sin x)(\cos x + \sin x)}$
$\cos x + \sin x$
$=\frac{1}{\cos x-\sin x}$
= RHS

#### **Additional Practice and Resources:**

Additional Resource Videos: Verifying Identities with Double Angle

Additional example of verifying with Double Angle

Additional Practice: <u>Verify with Double Angle Identities - Kuta</u> *Try problems #13-16*