Name : _____

Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 4x = 1 - 8 \sin^2 x \cos^2 x$

2) $\frac{2 \cos x}{\sin 2x} = \cs$

3) $\tan 3x = \frac{3 \ta}{1}$

Name : _____

Verify - Double & Half-Angle Identities

Verify the following.

4) $\sin 2x \tan x = 2 \sin^2 x$

5) $\cos^2 \frac{x}{2} \sec x$

6) $(\cos x + \sin x)$

Name : _____

Answer key

Sheet 3

Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 4x = 1 - 8 \sin^2 x \cos^2 x$

$\cos 4x = \cos 2(2x)$

$= 1 - 2 \sin^2 2x$ Using double-angle identity

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

$= 1 - 2 (2 \sin x \cos x)^2$ Using double-angle identity

$= 1 -$

2) $\frac{2 \cos x}{\sin 2x} = cs$

$\frac{2 co}{\sin 2}$ **ouble-angle identity**

the common factors

eciprocal identity

3) $\tan 3x = \frac{3 ta}{1}$

tan **um identity**

$= \frac{1 - \tan^2 x}{1 - \frac{2 \tan x}{1 - \tan^2 x} \tan x}$ Using double-angle identity

$= \frac{2 \tan x + \tan x(1 - \tan^2 x)}{\frac{1 - \tan^2 x}{1 - \tan^2 x - 2 \tan^2 x}}$ Cancel the common factors

$= \frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x}$

Name : _____

Answer key

Verify - Double & Half-Angle Identities

Verify the following.

4) $\sin 2x \tan x = 2 \sin^2 x$

$\sin 2x \tan x = 2 \sin x \cos x \tan x$ — Using double-angle identity

$= 2 \sin x \cancel{\cos x} \left(\frac{\sin x}{\cancel{\cos x}}\right)$ — Using quotient identity & cancel the common factors

$= 2 \sin^2 x$

5) $\cos^2 \frac{x}{2} \sec x$

$\cos^2 \frac{x}{2} \sec$ ...lf-angle identity

...ciprocal identity & ...e common factors

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

$(\cos x + \sin x)^2 = \cos^2 x + \sin^2 x + 2 \cos x \sin x$ — Using $(a + b)^2 = a^2 + b^2 + 2ab$

$= 1 + 2 \cos x \sin x$ — Using Pythagorean identity

$= 1 + \sin 2x$ — Using double-angle identity