Name : _____

Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 3x = 4\cos^3 x - 3\cos x$

2) $\dfrac{1 + \cos 2x}{2 \cot x} =$

3) $\dfrac{\sin 2x}{\sin^2 x} = 2\,c$

Name : _____

Verify - Double & Half-Angle Identities

Verify the following.

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

5) $2 \tan x \sin^2 \frac{x}{2}$

6) $\cos^4 x - \sin^4 x$

Name : _____

Answer key

Sheet 2

Verify - Double & Half-Angle Identities

Verify the following.

1) $\cos 3x = 4\cos^3 x - 3\cos x$

$\cos 3x = \cos(2x + x)$

$= \cos 2x \cos x - \sin 2x \sin x$ — Using sum identity

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

$= 2\cos^3 x - \cos x - 2\cos x \sin^2 x$ — Multiply

=

=

=

2) $\dfrac{1 + \cos 2x}{2 \cot x} =$

$\dfrac{1 + \cos 2x}{2 \cot x}$ =

=

=

=

3) $\dfrac{\sin 2x}{\sin^2 x} = 2 \cc$

$\dfrac{\sin 2x}{\sin^2 x} = \dfrac{2 \sin x \cos x}{\sin^2 x}$ — Using double-angle identity

$= 2 \cot x$ — Using quotient identity

Name : _____

Answer key

Verify - Double & Half-Angle Identities

Verify the following.

4) $\dfrac{\tan 2x}{2 \tan x} = \dfrac{1}{1 - \tan^2 x}$

$\dfrac{\tan 2x}{2 \tan x} = \left(\dfrac{2 \tan x}{1 - \tan^2 x}\right)\left(\dfrac{1}{2 \tan x}\right)$ Using double-angle identity

$= \left(\dfrac{\cancel{2 \tan x}}{1 - \tan^2 x}\right)\left(\dfrac{1}{\cancel{2 \tan x}}\right)$ Cancel the common factors

5) $2 \tan x \sin^2 \dfrac{x}{2}$

$2 \tan x \sin^2$ ... half-angle identity

... the common factors

... quotient identity & the common factors

6) $\cos^4 x - \sin^4 x$ =

$\cos^4 x - \sin^4$ ... $(a^2 - b^2) = (a + b)(a - b)$

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

$= \cos 2x$ Using double-angle identity