Name : _____

Verify - Sum & Difference Identities

Verify the following.

1) $\cos\left(x - \frac{\pi}{6}\right) = \frac{\sqrt{3}\cos x - \sin x}{2}$

2) $\tan(60^0 - x)(1 + \sqrt{3}$

3) $\sin(x + y)\sin(x - y)$

Name : _____

Verify - Sum & Difference Identities

Verify the following.

4) $\tan(30^0 + x) = \dfrac{1 + \sqrt{3}\tan x}{\sqrt{3} - \tan x}$

5) $\sin\left(x + \dfrac{\pi}{6}\right) - \sin\left(x -$

6) $\dfrac{\cos(x + y) + \cos(x -}{\sin x \cos y}$

Name : _____

Answer key

Sheet 1

Verify - Sum & Difference Identities

Verify the following.

1) $\cos\left(x - \frac{\pi}{6}\right) = \frac{\sqrt{3}\cos x - \sin x}{2}$

$\cos\left(x - \frac{\pi}{6}\right) = \cos x \cos\frac{\pi}{6} + \sin x \sin\frac{\pi}{6}$ — Using difference identity

$= \frac{\sqrt{3}}{2}\cos x - \frac{1}{2}\sin x$ — Substitute the values for trig ratios

= — Simplify

2) $\tan(60^0 - x)(1 + \sqrt{3}$

$\tan(60^0 - x)(1 + \sqrt{3}$ — Using difference identity

…stitute the values for trig ratios

Cancel the common factors

3) $\sin(x + y)\sin(x - y)$

$\sin(x + y)\sin(x - y) =$ — Using sum and difference identities

$= \sin^2 x \cos^2 y + \sin x \cos y \cos x \sin y - \sin x \cos y \cos x \sin y - \cos^2 x \sin^2 y$ — Simplify

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

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

$= \cos^2 y - \cos^2 x \cos^2 y - \cos^2 x + \cos^2 y \cos^2 x$ — Simplify

$= \cos^2 y - \cos^2 x$

Name : _____

Answer key

Verify - Sum & Difference Identities

Verify the following.

4) $\tan(30^\circ + x) = \dfrac{1 + \sqrt{3}\tan x}{\sqrt{3} - \tan x}$

$\tan(30^\circ + x) = \dfrac{\tan 30^\circ + \tan x}{1 - \tan 30^\circ \tan x}$ — Using sum identity

$= \dfrac{\frac{\sqrt{3}}{3} + \tan x}{1 - \frac{\sqrt{3}}{3}\tan x}$ — Substitute the values for trig ratios

$\sqrt{3} + 3\tan x$ — Simplify

Cancel the common factors

5) $\sin\left(x + \dfrac{\pi}{6}\right) - \sin\left(x -$

$\sin\left(x + \dfrac{\pi}{6}\right) - \sin\left(x -$ — $x \sin \dfrac{\pi}{3}$

…g sum and difference identities

…stitute the values for trig ratios

Simplify

6) $\dfrac{\cos(x + y) + \cos(x -}{\sin x \cos y}$

$\dfrac{\cos(x + y) + \cos(x - y)}{\sin x \cos y} = \dfrac{\cos x \cos y - \sin x \sin y + \cos x \cos y + \sin x \sin y}{\sin x \cos y}$

Using sum and difference identities

$= \dfrac{2 \cos x \cos y - \sin x \sin y + \sin x \sin y}{\sin x \cos y}$ — Simplify

$= \dfrac{2 \cos x \cancel{\cos y}}{\sin x \cancel{\cos y}}$ — Cancel the common factors

$= 2 \cot x$ — Using quotient identity