Honors Precalculus - Unit 3 Name KEY

Proofs With Double-Angles

Date_____ Period____

Verify each identity.

1) $\sin 2x + 1 - \cos 2x = 2\sin x \cdot (\sin x + \cos x)$

$2\sin x\cos x + 1 - \cos 2x = 2\sin x(\sin x + \cos x)$ GIVEN

$2\sin x\cos x + 1 - (1 - 2\sin^2 x) = 2\sin x(\sin x + \cos x)$ DOUBLE-ANGLE ID.

$2\sin x\cos x + 1 - 1 + 2\sin^2 x = 2\sin x(\sin x + \cos x)$ DOUBLE-ANGLE ID.

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

$2\sin x(\cos x + \sin x) = 2\sin x(\sin x + \cos x)$ ■ ADD|SUBTRACT FACTOR (GCF)

2) $\dfrac{1}{\csc^2 x} = \cos^2 x - \cos 2x$

GIVEN

$\sin^2 x = \cos^2 x - \cos 2x$ RECIPROCAL ID.

$-\cos 2x + \cos^2 x = \cos^2 x - \cos 2x$ DOUBLE-ANGLE ID.

3) $\dfrac{2\cos^2 x}{\csc^2 x} = \sin^2 x(1 + \cos 2x)$

GIVEN

$\sin^2 x \cdot 2\cos^2 x = \sin^2 x(1 + \cos 2x)$ RECIPROCAL ID.

$\sin^2 x(\cos 2x + 1) = \sin^2 x(1 + \cos 2x)$ ■ DOUBLE-ANGLE ID.

4) $\dfrac{1+\cos 2x}{\sin^2 x} = \dfrac{2}{\tan^2 x}$ GIVEN

$\dfrac{1+2\cos^2 x-1}{\sin^2 x} = \dfrac{2}{\tan^2 x}$ DOUBLE-ANGLE ID.

$\dfrac{2\cos^2 x}{\sin^2 x} = \dfrac{2}{\tan^2 x}$ ADD/SUBTRACT

$2\cot^2 x = \dfrac{2}{\tan^2 x}$ QUOTIENT ID.

$\dfrac{2}{\tan^2 x} = \dfrac{2}{\tan^2 x}$ ■ RECIPROCAL ID.

5) $\dfrac{\sin 2x}{\csc^2 x} = 2\sin^3 x\cos x$ GIVEN

$\dfrac{2\sin x\cos x}{\csc^2 x} = 2\sin^3 x\cos x$ DOUBLE-ANGLE ID.

$\sin^2 x \cdot 2\sin x\cos x = 2\sin^3 x\cos x$ RECIPROCAL ID.

$2\sin^3 x\cos x = 2\sin^3 x\cos x$ ■ MULTIPLY.

6) $\dfrac{2\sin x\cos x}{\cot x} = \tan x\sin 2x$ GIVEN

$\tan x \cdot 2\sin x\cos x = \tan x \sin 2x$ RECIPROCAL ID.

$\tan x \cdot \sin 2x = \tan x \sin 2x$ ■ DOUBLE-ANGLE ID.

7) $\dfrac{\sin 4x}{\sin 2x} = 2\cos 2x$ GIVEN

$\dfrac{\sin 4x}{2\sin x\cos x} = 2\cos 2x$ DOUBLE-ANGLE ID.

$\dfrac{\sin(2(2x))}{2\sin x\cos x} = 2\cos 2x$ FACTOR/DIVIDE

$\dfrac{2\sin 2x\cos 2x}{2\sin x\cos x} = 2\cos 2x$ DOUBLE-ANGLE ID.

$\dfrac{\sin 2x\cos 2x}{\sin x\cos x} = 2\cos 2x$ DIVIDE/REDUCE

$\dfrac{2\sin x\cos x\cdot\cos 2x}{\sin x\cos x} = 2\cos 2x$ DOUBLE-ANGLE ID.

$2\cos 2x = 2\cos 2x$ ■ DIVIDE/REDUCE