Calc & Trig Name_____ ID: 1

Assignment

Date_____ Period____

Verify each identity.

1) $\dfrac{\sec x}{1 - \sec x} = \dfrac{1}{\cos x - 1}$

2) $\dfrac{\sin x}{\sec^2 x} = \dfrac{\cos^2 x}{\csc x}$

3) $\dfrac{\tan^2 x}{\sec^3 x} = \sin^2 x \cos x$

4) $\csc x \cdot (\csc x - 1) = \dfrac{1 - \sin x}{\sin^2 x}$

5) $\sec x \sin x = \tan x$

6) $\csc x \tan x = \dfrac{1}{\cos x}$

7) $\dfrac{\tan^2 x}{\cos^2 x} = \dfrac{\sec^2 x}{\cot^2 x}$

8) $\dfrac{1}{\cot^2 x} = \sec^2 x - 1$

9) $\sec^2 x - \csc^2 x = \tan^2 x - \cot^2 x$

10) $\cot^2 x \sin x = \dfrac{\cos^2 x}{\sin x}$

11) $\dfrac{\cos x + \sec x}{\sec x} = 1 + \cos^2 x$

12) $\dfrac{\csc x - \sin^2 x}{\csc x} = 1 - \sin^3 x$

13) $\dfrac{\tan^2 x}{\csc^2 x \sec^2 x} = \sin^4 x$

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

15) $\dfrac{\tan x + \cos x}{\sec x} = \cos^2 x + \sin x$

16) $\dfrac{\sin^2 x}{\cos^2 x} = \dfrac{\sec^2 x}{\csc^2 x}$

17) $\dfrac{1}{\tan^2 x \sec x} = \cos x \cot^2 x$

18) $\dfrac{1}{\csc^2 x \sec^2 x} = \cos^2 x \sin^2 x$

19) $\sec x + \tan x = \dfrac{1 + \sin x}{\cos x}$

20) $\tan x \cdot \left(\tan^2 x + 1\right) = \dfrac{\sec^2 x}{\cot x}$

21) $\sec^2 x - 1 = \dfrac{\tan x}{\cot x}$

22) $\dfrac{\cot^2 x}{\csc x} = \dfrac{\cos^2 x}{\sin x}$

23) $\dfrac{\cot x}{\csc^2 x} = \dfrac{\sin^2 x}{\tan x}$

24) $\sec x + \cos x = \dfrac{\cos^2 x + 1}{\cos x}$

25) $\dfrac{\sin x \cot x}{\sec^2 x} = \cos^3 x$

26) $\sin x \cot^2 x + \csc x = \dfrac{\cos^2 x + 1}{\sin x}$

27) $\dfrac{\cot x}{\cos x - \cot x} = \dfrac{1}{\sin x - 1}$

28) $\dfrac{\cos x}{\sin^2 x} = \dfrac{\csc^2 x}{\sec x}$

29) $-\cos x \tan x = -\sin x$

30) $\dfrac{\csc x + \cot^2 x}{\csc^2 x} = \sin x + \cos^2 x$

31) $\csc^2 x \tan^2 x + 1 = \dfrac{1 + \cos^2 x}{\cos^2 x}$

32) $\csc x \cos x = \dfrac{1}{\tan x}$

33) $\dfrac{\cos^2 x}{\cot x} = \dfrac{\tan x}{\sec^2 x}$

34) $-\cos x \csc x = -\cot x$

35) $\tan^2 x + \csc^2 x = \cot^2 x + \sec^2 x$

36) $\tan x - \sec x = \dfrac{\sin x - 1}{\cos x}$

37) $\csc^2 x \sin x \tan x = \dfrac{1}{\cos x}$

38) $\csc^2 x - \sec^2 x = -\tan^2 x + \cot^2 x$

39) $\dfrac{\csc x}{\cos^2 x} = \dfrac{\sec^2 x}{\sin x}$

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

41) $\cot x + \sin x \sec x = \dfrac{\sec x}{\sin x}$

42) $\cos x \sec x \cot^2 x = \csc^2 x - 1$

43) $\tan x \csc^2 x - \cot x = \dfrac{1}{\cot x}$

44) $\dfrac{1+\tan^2 x}{\sin^2 x} = \dfrac{\sec x \csc^2 x}{\cos x}$

45) $\dfrac{\sec^2 x}{\tan^2 x} = 1 + \cot^2 x$

46) $\dfrac{\tan^2 x}{\sin^2 x} = \tan^2 x + 1$

47) $\sin^2 x \sec x + \cos x = \sec x$

48) $\cot^2 x \sec^2 x = \cot^2 x + 1$

49) $\sin^2 x(\tan^2 x + 1) = \sec^2 x - 1$

50) $\sec^2 x + \csc^2 x = \dfrac{\csc^2 x}{\cos^2 x}$

51) $\cot x \csc x \cos x = \csc^2 x - 1$

52) $\sin^2 x \sec x + \cos x = \dfrac{1}{\cos x}$

53) $\cos x \tan x \csc^2 x = \dfrac{\cot^2 x + 1}{\csc x}$

54) $\sec^2 x - 1 = \sin x \tan x \sec x$

55) $\tan x \csc^2 x - \cot x = \tan x$

56) $\csc^2 x + \sec^2 x = \dfrac{\sec^2 x}{\sin^2 x}$

57) $\tan x \cot x - \csc^2 x = -\cot^2 x$

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

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

60) $\dfrac{\cot x + \tan x}{\tan^2 x} = \dfrac{\cot x}{\sin^2 x}$

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

62) $\dfrac{\cos x}{\sin 2x} = \dfrac{1}{2\sin x}$

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

64) $\csc^2 x - 2\cos^2 x = \cot^2 x - \cos 2x$

65) $\cos 2x + \sin 2x + \sin^2 x = \cos x \cdot (\cos x + 2\sin x)$

66) $\dfrac{2}{\sec^2 x} = 1 + \cos 2x$

67) $2\sin x\cos^2 x = \dfrac{1 + \cos 2x}{\csc x}$

68) $\dfrac{1-\cos 2x}{\sec x} = 2\cos x \sin^2 x$

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

70) $\dfrac{\sin x}{\sin 2x} = \dfrac{1}{2\cos x}$

71) $2\cos^3 x \tan^2 x = \sin 2x \sin x$

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

73) $\sin^2 x \csc^2 x(1 + \cos 2x) = 2\cos^2 x$

74) $\sec^2 x(1 - \cos 2x) = 2\tan^2 x$

75) $\dfrac{\cos x}{\sin 2x} = \dfrac{\csc x}{2}$

76) $\dfrac{2\sin x\cos x\tan x}{\sin 2x} = \dfrac{1}{\cot x}$

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

78) $\dfrac{\sin 2x}{\sin^2 x} = \dfrac{2}{\tan x}$

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

80) $2\cot x \sin x \cos x = 1 + \cos 2x$

81) $\sin^2 2x\tan^2 x = 2\sin^2 x(1 - \cos 2x)$

82) $1 - \tan^2 x = \cos 2x\sec^2 x$

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

84) $2\sin^2 x - \tan^2 x = \tan^2 x \cos 2x$

85) $2\cos x \tan^2 x = \sec x \cdot (1 - \cos 2x)$

86) $\dfrac{\tan x}{\sin^2 x} = \dfrac{2}{\sin 2x}$

87) $\sin 2x - \tan x = \tan x \cos 2x$

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

89) $\csc x \cdot (1 - \cos 2x) = 2\sin x \cos x \sec x$

90) $\dfrac{2\sin x\cos x}{\tan 2x} = 1 - (1 - \cos 2x)$

Calc & Trig Name_____ ID: 1

Assignment

Date_____ Period____

Verify each identity.

1) $\dfrac{\sec x}{1-\sec x} = \dfrac{1}{\cos x - 1}$

$\dfrac{\sec x}{1-\sec x}$

$\dfrac{\frac{1}{\cos x}}{1-\frac{1}{\cos x}}$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{1}{\cos x - 1}$ Simplify

■

2) $\dfrac{\sin x}{\sec^2 x} = \dfrac{\cos^2 x}{\csc x}$

$\dfrac{\sin x}{\sec^2 x}$ Decompose into sine and cosine

$\cos^2 x \sin x$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\cos^2 x}{\csc x}$

■

3) $\dfrac{\tan^2 x}{\sec^3 x} = \sin^2 x \cos x$

$\dfrac{\tan^2 x}{\sec^3 x}$ Decompose into sine and cosine

$\dfrac{\left(\frac{\sin x}{\cos x}\right)^2}{\left(\frac{1}{\cos x}\right)^3}$ Simplify

$\sin^2 x \cos x$

■

4) $\csc x \cdot (\csc x - 1) = \dfrac{1-\sin x}{\sin^2 x}$

$\csc x \cdot (\csc x - 1)$ Decompose into sine and cosine

$\dfrac{1}{\sin x}\left(\dfrac{1}{\sin x} - 1\right)$ Simplify

$\dfrac{1-\sin x}{\sin^2 x}$

■

5) $\sec x \sin x = \tan x$

$\sec x \sin x$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\sin x}{\cos x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\tan x$

■

6) $\csc x\tan x = \dfrac{1}{\cos x}$

$\csc x\tan x$ Decompose into sine and cosine

$\dfrac{1}{\sin x} \cdot \dfrac{\sin x}{\cos x}$ Simplify

$\dfrac{1}{\cos x}$ ■

7) $\dfrac{\tan^2 x}{\cos^2 x} = \dfrac{\sec^2 x}{\cot^2 x}$

$\dfrac{\tan^2 x}{\cos^2 x}$

$\dfrac{1}{\cos^2 x \cot^2 x}$

$\dfrac{\sec^2 x}{\cot^2 x}$ ■

8) $\dfrac{1}{\cot^2 x} = \sec^2 x - 1$

Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{1}{\cot^2 x}$ Use $\sec^2 x = \dfrac{1}{\cos x}$ Use $\cot x = \dfrac{1}{\tan x}$

$\tan^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$\sec^2 x - 1$ ■

9) $\sec^2 x - \csc^2 x = \tan^2 x - \cot^2 x$

$\sec^2 x - \csc^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$\tan^2 x + 1 - \csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\tan^2 x - \cot^2 x$ ■

10) $\cot^2 x\sin x = \dfrac{\cos^2 x}{\sin x}$

$\cot^2 x\sin x$ Decompose into sine and cosine

$\left(\dfrac{\cos x}{\sin x}\right)^2 \sin x$ Simplify

$\dfrac{\cos^2 x}{\sin x}$ ■

11) $\dfrac{\cos x + \sec x}{\sec x} = 1 + \cos^2 x$

$\dfrac{\cos x + \sec x}{\sec x}$ Decompose into sine and cosine

$\dfrac{\cos x + \dfrac{1}{\cos x}}{\dfrac{1}{\cos x}}$ Simplify

$1 + \cos^2 x$ ■

12) $\dfrac{\csc x - \sin^2 x}{\csc x} = 1 - \sin^3 x$

$\dfrac{\csc x - \sin^2 x}{\csc x}$ Decompose into sine and cosine

$\dfrac{\dfrac{1}{\sin x} - \sin^2 x}{\dfrac{1}{\sin x}}$ Simplify

$1 - \sin^3 x$ ■

13) $\dfrac{\tan^2 x}{\csc^2 x \sec^2 x} = \sin^4 x$

$\dfrac{\tan^2 x}{\csc^2 x \sec^2 x}$ Decompose into sine and cosine

$\dfrac{\left(\dfrac{\sin x}{\cos x}\right)^2}{\left(\dfrac{1}{\sin x}\right)^2 \cdot \left(\dfrac{1}{\cos x}\right)^2}$ Simplify

$\sin^4 x$ ■

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

$\dfrac{\csc^2 x + \sin x}{\csc^2 x}$ Decompose into sine and cosine

$\dfrac{\left(\dfrac{1}{\sin x}\right)^2 + \sin x}{\left(\dfrac{1}{\sin x}\right)^2}$ Simplify

$1 + \sin^3 x$ ■

15) $\dfrac{\tan x + \cos x}{\sec x} = \cos^2 x + \sin x$

$\dfrac{\tan x + \cos x}{\sec x}$ Decompose into sine and cosine

$\dfrac{\dfrac{\sin x}{\cos x} + \cos x}{\dfrac{1}{\cos x}}$ Simplify

$\cos^2 x + \sin x$ ■

16) $\dfrac{\sin^2 x}{\cos^2 x} = \dfrac{\sec^2 x}{\csc^2 x}$

$\dfrac{\sin^2 x}{\cos^2 x}$

$\sin^2 x \sec^2 x$ Use $\csc^2 x = \dfrac{1}{\sin^2 x}$

$\dfrac{\sec^2 x}{\csc^2 x}$ ■

17) $\dfrac{1}{\tan^2 x \sec^2 x} = \cos x \cot^2 x$

Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{1}{\tan^2 x \dfrac{1}{\sin^2 x}}$ Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{\cot^2 x}{\sec x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\cos x \cot^2 x$ ■

18) $\dfrac{1}{\csc^2 x \sec^2 x} = \cos^2 x \sin^2 x$

$\dfrac{1}{\csc^2 x \sec^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\cos^2 x}{\csc^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\cos^2 x \sin^2 x$ ■

19) $\sec x + \tan x = \dfrac{1 + \sin x}{\cos x}$

$\sec x + \tan x$ Decompose into sine and cosine

$\dfrac{1}{\cos x} + \dfrac{\sin x}{\cos x}$ Simplify

$\dfrac{1 + \sin x}{\cos x}$ ■

20) $\tan x \cdot (\tan^2 x + 1) = \dfrac{\sec^2 x}{\cot x}$

$\tan x \cdot (\tan^2 x + 1)$ Use $\tan^2 x + 1 = \sec^2 x$

$\tan x \sec^2 x$ Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{\sec^2 x}{\cot x}$ ■

21) $\sec^2 x - 1 = \dfrac{\tan x}{\cot x}$

$\sec^2 x - 1$ Use $\tan^2 x + 1 = \sec^2 x$

$\tan^2 x$ Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{\tan x}{\cot x}$ ■

22) $\dfrac{\cot^2 x}{\csc x} = \dfrac{\cos^2 x}{\sin x}$

$\dfrac{\cot^2 x}{\csc x}$

$\dfrac{\left(\dfrac{\cos x}{\sin x}\right)^2}{\dfrac{1}{\sin x}}$

$\dfrac{\cos^2 x}{\sin x}$

23) $\dfrac{\cot x}{\csc^2 x} = \dfrac{\sin^2 x}{\tan x}$

$\dfrac{\cot x}{\csc^2 x}$ Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{1}{\csc^2 x \tan x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\sin^2 x}{\tan x}$ ■

24) $\sec x + \cos x = \dfrac{\cos^2 x + 1}{\cos x}$

$\sec x + \cos x$ Decompose into sine and cosine

$\dfrac{1}{\cos x} + \cos x$ Simplify

$\dfrac{\cos^2 x + 1}{\cos x}$ ■

25) $\dfrac{\sin x\cot x}{\sec^2 x} = \cos^3 x$

$\dfrac{\sin x\cot x}{\sec^2 x}$ Decompose into sine and cosine

$\dfrac{\sin x \cdot \dfrac{\cos x}{\sin x}}{\left(\dfrac{1}{\cos x}\right)^2}$ Simplify

$\cos^3 x$ ■

26) $\sin x\cot^2 x + \csc x = \dfrac{\cos^2 x + 1}{\sin x}$

$\sin x\cot^2 x + \csc x$ Decompose into sine and cosine

$\sin x \cdot \left(\dfrac{\cos x}{\sin x}\right)^2 + \dfrac{1}{\sin x}$ Simplify

$\dfrac{\cos^2 x + 1}{\sin x}$ ■

27) $\dfrac{\cot x}{\cos x - \cot x} = \dfrac{1}{\sin x - 1}$

$\dfrac{\cot x}{\cos x - \cot x}$ Decompose into sine and cosine

$\dfrac{\dfrac{\cos x}{\sin x}}{\cos x - \dfrac{\cos x}{\sin x}}$ Simplify

$\dfrac{1}{\sin x - 1}$ ■

28) $\dfrac{\cos x}{\sin^2 x} = \dfrac{\csc^2 x}{\sec x}$

$\dfrac{\cos x}{\sin^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\csc^2 x\cos x$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\csc^2 x}{\sec x}$ ■

29) $-\cos x\tan x = -\sin x$

$-\cos x\tan x$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$-\dfrac{\cos x\sin x}{\cos x}$ Cancel common factors

$-\sin x$ ■

30) $\dfrac{\csc x + \cot^2 x}{\csc^2 x} = \sin x + \cos^2 x$

$\dfrac{\csc x + \cot^2 x}{\csc^2 x}$ Decompose into sine and cosine

$\dfrac{\dfrac{1}{\sin x} + \left(\dfrac{\cos x}{\sin x}\right)^2}{\left(\dfrac{1}{\sin x}\right)^2}$ Simplify

$\sin x + \cos^2 x$ ■

31) $\csc^2 x \tan^2 x + 1 = \dfrac{1 + \cos^2 x}{\cos^2 x}$

$\csc^2 x \tan^2 x + 1$ Decompose into sine and cosine

$\left(\dfrac{1}{\sin x}\right)^2 \cdot \left(\dfrac{\sin x}{\cos x}\right)^2 + 1$ Simplify

$\dfrac{1 + \cos^2 x}{\cos^2 x}$ ■

32) $\csc x \cos x = \dfrac{1}{\tan x}$

$\csc x \cos x$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\cos x}{\sin x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{1}{\tan x}$ ■

33) $\dfrac{\cos^2 x}{\cot x} = \dfrac{\tan x}{\sec^2 x}$

$\dfrac{\cos^2 x}{\cot x}$ Use sec

$\dfrac{1}{\sec^2 x \cot x}$ Use cot

$\dfrac{\tan x}{\sec^2 x}$ ■

34) $-\cos x \csc x = -\cot x$

$-\cos x \csc x$ Use $\csc x = \dfrac{1}{\sin x}$

$-\dfrac{\cos x}{\sin x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$-\cot x$ ■

35) $\tan^2 x + \csc^2 x = \cot^2 x + \sec^2 x$

$\tan^2 x + \csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\tan^2 x + \cot^2 x + 1$ Use $\tan^2 x + 1 = \sec^2 x$

$\cot^2 x + \sec^2 x$ ■

36) $\tan x - \sec x = \dfrac{\sin x - 1}{\cos x}$

$\tan x - \sec x$ Decompose into sine and cosine

$\dfrac{\sin x}{\cos x} - \dfrac{1}{\cos x}$ Simplify

$\dfrac{\sin x - 1}{\cos x}$ ■

37) $\csc^2 x \sin x \tan x = \dfrac{1}{\cos x}$

$\csc^2 x \sin x \tan x$ Decompose into sine and cosine

$\left(\dfrac{1}{\sin x}\right)^2 \sin x \cdot \dfrac{\sin x}{\cos x}$ Simplify

$\dfrac{1}{\cos x}$ ■

38) $\csc^2 x - \sec^2 x = -\tan^2 x + \cot^2 x$

$\csc^2 x - \sec^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\cot^2 x + 1 - \sec^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$-\tan^2 x + \cot^2 x$ ■

39) $\dfrac{\csc x}{\cos^2 x} = \dfrac{\sec^2 x}{\sin x}$

$\dfrac{\csc x}{\cos^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sec^2 x \csc x$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\sec^2 x}{\sin x}$ ■

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

$\csc x \cdot (\cot x + 1)$ Decompose into sine and cosine

$\dfrac{1}{\sin x}\left(\dfrac{\cos x}{\sin x} + 1\right)$ Simplify

$\dfrac{\sin x + \cos x}{\sin^2 x}$ ■

41) $\cot x + \sin x \sec x = \dfrac{\sec x}{\sin x}$

$\cot x + \sin x \sec x$ Decompose into sine and cosine

$\dfrac{\cos x}{\sin x} + \sin x \cdot \dfrac{1}{\cos x}$ Simplify

$\dfrac{\cos^2 x + \sin^2 x}{\sin x \cos x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\sin x \cos x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\sec x}{\sin x}$ ■

42) $\cos x \sec x \cot^2 x = \csc^2 x - 1$

$\cos x \sec x \cot^2 x$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\cos x \cot^2 x}{\cos x}$ Cancel common factors

$\cot^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\csc^2 x - 1$ ■

43) $\tan x \csc^2 x - \cot x = \dfrac{1}{\cot x}$

$\tan x \csc^2 x - \cot x$ Use $\cot^2 x + 1 = \csc^2 x$

$\tan x \cot^2 x + \tan x - \cot x$ Decompose into sine and cosine

$\dfrac{\sin x}{\cos x} \cdot \left(\dfrac{\cos x}{\sin x}\right)^2 + \dfrac{\sin x}{\cos x} - \dfrac{\cos x}{\sin x}$ Simplify

$\dfrac{\sin x}{\cos x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$\dfrac{1}{\cot x}$ ■

44) $\dfrac{1+\tan^2 x}{\sin^2 x} = \dfrac{\sec x \csc^2 x}{\cos x}$

$\dfrac{1+\tan^2 x}{\sin^2 x}$ Use $\tan^2 x + 1 = \sec^2 x$

$\dfrac{\sec^2 x}{\sin^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\sec^2 x \csc^2 x$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\sec x \csc^2 x}{\cos x}$ ■

45) $\dfrac{\sec^2 x}{\tan^2 x} = 1 + \cot^2 x$

$\dfrac{\sec^2 x}{\tan^2 x}$ Decompose into sine and cosine

$\dfrac{\left(\dfrac{1}{\cos x}\right)^2}{\left(\dfrac{\sin x}{\cos x}\right)^2}$ Simplify

$\dfrac{1}{\sin^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$1 + \cot^2 x$ ■

46) $\dfrac{\tan^2 x}{\sin^2 x} = \tan^2 x + 1$

$\dfrac{\tan^2 x}{\sin^2 x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{\sin^2 x}{\sin^2 x \cos^2 x}$ Cancel common factors

$\dfrac{1}{\cos^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sec^2 x$ Use $\tan^2 x + 1 = \sec^2 x$

$\tan^2 x + 1$ ■

47) $\sin^2 x \sec x + \cos x = \sec x$

$\sin^2 x \sec x + \cos x$ Decompose into sine and cosine

$\sin^2 x \cdot \dfrac{1}{\cos x} + \cos x$ Simplify

$\dfrac{\cos^2 x + \sin^2 x}{\cos x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\cos x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sec x$ ■

48) $\cot^2 x \sec^2 x = \cot^2 x + 1$

$\cot^2 x \sec^2 x$	Decompose into sine and cosine
$\left(\frac{\cos x}{\sin x}\right)^2 \cdot \left(\frac{1}{\cos x}\right)^2$	Simplify
$\frac{1}{\sin^2 x}$	Use $\csc x = \frac{1}{\sin x}$
$\csc^2 x$	Use $\cot^2 x + 1 = \csc^2 x$
$\cot^2 x + 1$	■

49) $\sin^2 x(\tan^2 x + 1) = \sec^2 x - 1$

$\sin^2 x(\tan^2 x + 1)$	Use $\tan^2 x + 1 = \sec^2 x$
$\sin^2 x \sec^2 x$	Use $\sec x = \frac{1}{\cos x}$
$\frac{\sin^2 x}{\cos^2 x}$	Use $\tan x = \frac{\sin x}{\cos x}$
$\tan^2 x$	Use $\tan^2 x + 1 = \sec^2 x$
$\sec^2 x - 1$	■

50) $\sec^2 x + \csc^2 x = \dfrac{\csc^2 x}{\cos^2 x}$

$\sec^2 x + \csc^2 x$ Decompose into sine and cosine

$\left(\dfrac{1}{\cos x}\right)^2 + \left(\dfrac{1}{\sin x}\right)^2$ Simplify

$\dfrac{\sin^2 x + \cos^2 x}{\cos^2 x \sin^2 x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\sin^2 x \cos^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\csc^2 x}{\cos^2 x}$ ■

51) $\cot x \csc x \cos x = \csc^2 x - 1$

$\cot x \csc x \cos x$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\cot x \cos x}{\sin x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$\cot^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\csc^2 x - 1$ ■

52) $\sin^2 x\sec x + \cos x = \dfrac{1}{\cos x}$

$\sin^2 x\sec x + \cos x$ Decompose into sine and cosine

$\sin^2 x \cdot \dfrac{1}{\cos x} + \cos x$ Simplify

$\dfrac{\cos^2 x + \sin^2 x}{\cos x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\cos x}$ ■

53) $\cos x\tan x\csc^2 x = \dfrac{\cot^2 x + 1}{\csc x}$

$\cos x\tan x\csc^2 x$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{\cos x\csc^2 x\sin x}{\cos x}$ Cancel common factors

$\sin x\csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\sin x \cdot \left(\cot^2 x + 1\right)$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\cot^2 x + 1}{\csc x}$ ■

54) $\sec^2 x - 1 = \sin x \tan x \sec x$

$\sec^2 x - 1$ Use $\tan^2 x + 1 = \sec^2 x$

$\tan^2 x$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{\sin x \tan x}{\cos x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sin x \tan x \sec x$ ■

55) $\tan x \csc^2 x - \cot x = \tan x$

$\tan x \csc^2 x - \cot x$ Use $\cot^2 x + 1 = \csc^2 x$

$\tan x \cot^2 x + \tan x - \cot x$ Decompose into sine and cosine

$\dfrac{\sin x}{\cos x} \cdot \left(\dfrac{\cos x}{\sin x}\right)^2 + \dfrac{\sin x}{\cos x} - \dfrac{\cos x}{\sin x}$ Simplify

$\dfrac{\sin x}{\cos x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\tan x$ ■

56) $\csc^2 x + \sec^2 x = \dfrac{\sec^2 x}{\sin^2 x}$

$\csc^2 x + \sec^2 x$ Decompose into sine and cosine

$\left(\dfrac{1}{\sin x}\right)^2 + \left(\dfrac{1}{\cos x}\right)^2$ Simplify

$\dfrac{\cos^2 x + \sin^2 x}{\sin^2 x \cos^2 x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{1}{\cos^2 x \sin^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{\sec^2 x}{\sin^2 x}$ ■

57) $\tan x \cot x - \csc^2 x = -\cot^2 x$

$\tan x \cot x - \csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\tan x \cot x - \cot^2 x - 1$ Decompose into sine and cosine

$\dfrac{\sin x}{\cos x} \cdot \dfrac{\cos x}{\sin x} - \left(\dfrac{\cos x}{\sin x}\right)^2 - 1$ Simplify

$-\dfrac{\cos^2 x}{\sin^2 x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$-\cot^2 x$ ■

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

$\dfrac{1}{\tan^2 x \cos^2 x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{\cos^2 x}{\cos^2 x \sin^2 x}$ Cancel common factors

$\dfrac{1}{\sin^2 x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\csc^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$1 + \cot^2 x$ ■

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

$\dfrac{1}{1 + \tan^2 x}$ Use $\tan^2 x + 1 = \sec^2 x$

$\dfrac{1}{\sec^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\cos^2 x$ Create a common factor

$\dfrac{\cos^2 x \cot x}{\cot x}$ Use $\cot x = \dfrac{1}{\tan x}$

$\cos^2 x \cot x \tan x$ ■

60) $\dfrac{\cot x + \tan x}{\tan^2 x} = \dfrac{\cot x}{\sin^2 x}$

$\dfrac{\cot x + \tan x}{\tan^2 x}$ Decompose into sine and cosi

$\dfrac{\dfrac{\cos x}{\sin x} + \dfrac{\sin x}{\cos x}}{\left(\dfrac{\sin x}{\cos x}\right)^2}$ Simplify

$\dfrac{\cos x \cdot \left(\cos^2 x + \sin^2 x\right)}{\sin^3 x}$ Use $\sin^2 x + \cos^2 x = 1$

$\dfrac{\cos x}{\sin^3 x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$\dfrac{\cot x}{\sin^2 x}$ ■

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

$\dfrac{1}{2\sin^2 x \cos x}$ Use $\sin 2x = 2\sin x \cos x$

$\dfrac{1}{\sin x \sin 2x}$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\csc x}{\sin 2x}$ ■

62) $\dfrac{\cos x}{\sin 2x} = \dfrac{1}{2\sin x}$

$\dfrac{\cos x}{\sin 2x}$ Use $\sin 2x = 2\sin x \cos x$

$\dfrac{\cos x}{2\sin x \cos x}$ Cancel common factors

$\dfrac{1}{2\sin x}$ ■

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

$\dfrac{1 - \cos 2x}{1 + \cos 2x}$ Use $\tan^2 x = \dfrac{1 - \cos 2x}{1 + \cos 2x}$

$\tan^2 x$ Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{\tan x}{\cot x}$ ■

64) $\csc^2 x - 2\cos^2 x = \cot^2 x - \cos 2x$

$\csc^2 x - 2\cos^2 x$ Use $\cot^2 x + 1 = \csc^2 x$

$\cot^2 x + 1 - 2\cos^2 x$ Use $\cos 2x = 2\cos^2 x - 1$

$\cot^2 x - \cos 2x$ ■

65) $\cos 2x + \sin 2x + \sin^2 x = \cos x \cdot (\cos x + 2\sin x)$

$\cos 2x + \sin 2x + \sin^2 x$ Use $\sin 2x = 2\sin x\cos x$

$\cos 2x + 2\sin x\cos x + \sin^2 x$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\cos x \cdot (\cos x + 2\sin x)$ ■

66) $\dfrac{2}{\sec^2 x} = 1 + \cos 2x$

$\dfrac{2}{\sec^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

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

$1 + \cos 2x$ ■

67) $2\sin x\cos^2 x = \dfrac{1 + \cos 2x}{\csc x}$

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

$\sin x \cdot (1 + \cos 2x)$ Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{1 + \cos 2x}{\csc x}$ ■

68) $\dfrac{1-\cos 2x}{\sec x} = 2\cos x\sin^2 x$

$\dfrac{1-\cos 2x}{\sec x}$ Use $\cos 2x = 1 - 2\sin^2 x$

$\dfrac{2\sin^2 x}{\sec x}$ Use $\sec x = \dfrac{1}{\cos x}$

$2\cos x\sin^2 x$ ■

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

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

$2\sin x\cos^2 x$ Use $\sin 2x = 2\sin x\cos x$

$\cos x\sin 2x$ ■

70) $\dfrac{\sin x}{\sin 2x} = \dfrac{1}{2\cos x}$

$\dfrac{\sin x}{\sin 2x}$ Use $\sin 2x = 2\sin x\cos x$

$\dfrac{\sin x}{2\sin x\cos x}$ Cancel common factors

$\dfrac{1}{2\cos x}$ ■

71) $2\cos^3 x\tan^2 x = \sin 2x\sin x$

$2\cos^3 x\tan^2 x$ Decompose into sine and cosine

$2\cos^3 x \cdot \left(\dfrac{\sin x}{\cos x}\right)^2$ Simplify

$2\sin^2 x\cos x$ Use $\sin 2x = 2\sin x\cos x$

$\sin 2x\sin x$ ■

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

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

$\dfrac{\cot^2 x}{2\cos^2 x}$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$\dfrac{\cos^2 x}{2\sin^2 x \cos^2 x}$ Cancel common factors

$\dfrac{1}{2\sin^2 x}$ ■

73) $\sin^2 x \csc^2 x(1+\cos 2x) = 2\cos^2 x$

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

$\dfrac{\csc^2 x(1+\cos 2x)}{\csc^2 x}$ Cancel common factors

$1+\cos 2x$ Use $\cos 2x = 2\cos^2 x - 1$

$2\cos^2 x$ ■

74) $\sec^2 x(1-\cos 2x) = 2\tan^2 x$

$\sec^2 x(1-\cos 2x)$ Use $\sec x = \dfrac{1}{\cos x}$

$\dfrac{1-\cos 2x}{\cos^2 x}$ Use $\cos^2 x = \dfrac{1+\cos 2x}{2}$

$\dfrac{2(1-\cos 2x)}{1+\cos 2x}$ Use $\tan^2 x = \dfrac{1-\cos 2x}{1+\cos 2x}$

$2\tan^2 x$ ■

75) $\dfrac{\cos x}{\sin 2x} = \dfrac{\csc x}{2}$

$\dfrac{\cos x}{\sin 2x}$

Use $\sin 2x = 2\sin x\cos x$

$\dfrac{\cos x}{2\sin x\cos x}$

Cancel common factors

$\dfrac{1}{2\sin x}$

Use $\csc x = \dfrac{1}{\sin x}$

$\dfrac{\csc x}{2}$ ■

76) $\dfrac{2\sin x\cos x\tan x}{\sin 2x} = \dfrac{1}{\cot x}$

$\dfrac{2\sin x\cos x\tan x}{\sin 2x}$

Use $\sin 2x = 2\sin x\cos x$

$\dfrac{2\sin x\cos x\tan x}{2\sin x\cos x}$

Cancel common factors

$\tan x$

Use $\cot x = \dfrac{1}{\tan x}$

$\dfrac{1}{\cot x}$ ■

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

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

Decompose into sine and cosine

$\dfrac{\sin x}{\left(\dfrac{\sin x}{\cos x}\right)^2}$

Simplify

$\dfrac{\cos^2 x}{\sin x}$

Use $\cos^2 x = \dfrac{1 + \cos 2x}{2}$

$\dfrac{1 + \cos 2x}{2\sin x}$ ■

78) $\dfrac{\sin 2x}{\sin^2 x} = \dfrac{2}{\tan x}$

$\dfrac{\sin 2x}{\sin^2 x}$ Use $\sin 2x = 2\sin x\cos x$

$\dfrac{2\sin x\cos x}{\sin^2 x}$ Cancel common factors

$\dfrac{2\cos x}{\sin x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{2}{\tan x}$ ■

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

$\dfrac{1 - \tan^2 x}{\cos 2x}$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\dfrac{1 - \tan^2 x}{\cos^2 x - \sin^2 x}$ Decompose into sine and cosine

$\dfrac{1 - \left(\dfrac{\sin x}{\cos x}\right)^2}{\cos^2 x - \sin^2 x}$ Simplify

$\dfrac{1}{\cos^2 x}$ ■

80) $2\cot x\sin x\cos x = 1 + \cos 2x$

$2\cot x\sin x\cos x$ Use $\cot x = \dfrac{\cos x}{\sin x}$

$\dfrac{2\sin x\cos^2 x}{\sin x}$ Cancel common factors

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

$1 + \cos 2x$ ■

81) $\sin^2 2x\tan^2 x = 2\sin^2 x(1 - \cos 2x)$

$\sin^2 2x\tan^2 x$ Use $\sin 2x = 2\sin x\cos x$

$4\sin^2 x\cos^2 x\tan^2 x$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{4\sin^4 x\cos^2 x}{\cos^2 x}$ Cancel common factors

$4\sin^4 x$ Use $\cos 2x = 1 - 2\sin^2 x$

$2\sin^2 x(1 - \cos 2x)$ ■

82) $1 - \tan^2 x = \cos 2x\sec^2 x$

$1 - \tan^2 x$ Decompose into sine and cosine

$1 - \left(\dfrac{\sin x}{\cos x}\right)^2$ Simplify

$\dfrac{\cos^2 x - \sin^2 x}{\cos^2 x}$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\dfrac{\cos 2x}{\cos^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\cos 2x\sec^2 x$ ■

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

$\dfrac{\tan^2 x}{1 - \tan^2 x}$ Use $\tan^2 x = \dfrac{1 - \cos 2x}{1 + \cos 2x}$

$\dfrac{1 - \cos 2x}{(1 - \tan^2 x)(1 + \cos 2x)}$ Use $\cos 2x = 2\cos^2 x - 1$

$\dfrac{2(1 - \cos^2 x)}{2\cos^2 x(1 - \tan^2 x)}$ Decompose into sine and cosi

$\dfrac{2(1 - \cos^2 x)}{2\cos^2 x\left(1 - \left(\dfrac{\sin x}{\cos x}\right)^2\right)}$ Simplify

$\dfrac{1 - \cos^2 x}{\cos^2 x - \sin^2 x}$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\dfrac{1 - \cos^2 x}{\cos 2x}$ ■

84) $2\sin^2 x - \tan^2 x = \tan^2 x \cos 2x$

$2\sin^2 x - \tan^2 x$ Decompose into sine and cosine

$2\sin^2 x - \left(\frac{\sin x}{\cos x}\right)^2$ Simplify

$\frac{\sin^2 x(2\cos^2 x - 1)}{\cos^2 x}$ Use $\cos 2x = 2\cos^2 x - 1$

$\frac{\sin^2 x \cos 2x}{\cos^2 x}$ Use $\tan x = \frac{\sin x}{\cos x}$

$\tan^2 x \cos 2x$ ■

85) $2\cos x \tan^2 x = \sec x \cdot (1 - \cos 2x)$

$2\cos x \tan^2 x$ Use $\tan x = \frac{\sin x}{\cos x}$

$\frac{2\cos x \sin^2 x}{\cos^2 x}$ Cancel common factors

$\frac{2\sin^2 x}{\cos x}$ Use $\cos 2x = 1 - 2\sin^2 x$

$\frac{1 - \cos 2x}{\cos x}$ Use $\sec x = \frac{1}{\cos x}$

$\sec x \cdot (1 - \cos 2x)$ ■

86) $\frac{\tan x}{\sin^2 x} = \frac{2}{\sin 2x}$

$\frac{\tan x}{\sin^2 x}$ Use $\tan x = \frac{\sin x}{\cos x}$

$\frac{\sin x}{\sin^2 x \cos x}$ Cancel common factors

$\frac{1}{\cos x \sin x}$ Create a common factor

$\frac{2}{2\sin x \cos x}$ Use $\sin 2x = 2\sin x \cos x$

$\frac{2}{\sin 2x}$ ■

87) $\sin 2x - \tan x = \tan x \cos 2x$

$\sin 2x - \tan x$	Use $\sin 2x = 2\sin x\cos x$
$2\sin x\cos x - \tan x$	Decompose into sine and cosine
$2\sin x\cos x - \dfrac{\sin x}{\cos x}$	Simplify
$\dfrac{\sin x \cdot (2\cos^2 x - 1)}{\cos x}$	Use $\cos 2x = 2\cos^2 x - 1$
$\dfrac{\cos 2x \sin x}{\cos x}$	Use $\tan x = \dfrac{\sin x}{\cos x}$
$\tan x \cos 2x$	■

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

$\dfrac{\cos x}{1 + \cos 2x}$	Use $\cos 2x = 2\cos^2 x - 1$
$\dfrac{\cos x}{2\cos^2 x}$	Cancel common factors
$\dfrac{1}{2\cos x}$	Create a common factor
$\dfrac{\sin x}{2\sin x\cos x}$	Use $\sin 2x = 2\sin x\cos x$
$\dfrac{\sin x}{\sin 2x}$	■

89) $\csc x \cdot (1 - \cos 2x) = 2\sin x \cos x \sec x$

$\csc x \cdot (1 - \cos 2x)$	Use $\cos 2x = 1 - 2\sin^2 x$
$2\csc x \sin^2 x$	Use $\csc x = \dfrac{1}{\sin x}$
$\dfrac{2\csc x \sin x}{\csc x}$	Cancel common factors
$2\sin x$	Create a common factor
$\dfrac{2\sin x \sec x}{\sec x}$	Use $\sec x = \dfrac{1}{\cos x}$
$2\sin x \cos x \sec x$	■

90) $\dfrac{2\sin x\cos x}{\tan 2x} = 1 - (1 - \cos 2x)$

$\dfrac{2\sin x\cos x}{\tan 2x}$ Use $\sin 2x = 2\sin x\cos x$

$\dfrac{\sin 2x}{\tan 2x}$ Use $\tan 2x = \dfrac{\sin 2x}{\cos 2x}$

$\dfrac{\cos 2x\sin 2x}{\sin 2x}$ Cancel common factors

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

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

$1 - (1 - \cos 2x)$ ■