ALL POSSIBLE

U8LT1 Proving Trig Identities

1. $secx\ cotx\ sinx = 1$

$\frac{1}{\cos x}\ \frac{\cos x}{\sin x}\ \frac{\sin x}{1}$ Fundamental & Ratio identities

Multiplication $\frac{\cos x \sin x}{\cos x \sin x} = \boxed{1}$ Simplification

2. $\cos x(\csc x - \sec x) = \cot x - 1$

$\cos x\left(\frac{1}{\sin x} - \frac{1}{\cos x}\right)$ Reciprocal Identity

$\cos x\left(\frac{\cos x - \sin x}{\sin x \cos x}\right)$ Common denom to add fractions

$\frac{\cos x - \sin x}{\sin x}$ Cos cancel on top & bottom

$\frac{\cos x}{\sin x} - \frac{\sin x}{\sin x}$ Split fractions

$\boxed{\cot x - 1}$ Ratio Identity

3. $\cos^2 x(1 + \tan^2 x) = 1$

$\cos^2 x(\sec^2 x)$ (Queen) Pythag. Identity

$\cos^2 x\left(\frac{1}{\cos^2 x}\right)$ Reciprocal Identity

$\boxed{1}$ Simplify □

4. $\cos^2 x \sin x - \cos^4 x \sin x = \cos^2 x \sin^3 x$

$\sin x(\cos^2 x - \cos^4 x)$ Factor GCF: $\sin x$

~~$\sin x(\cos x - \cos^2 x)$~~

$\sin x \cos^2 x(1 - \cos^2 x)$ Factor GCF: $\cos^2 x$

$\sin x \cos^2 x(\sin^2 x)$ Pythag. Identity (KING)

$\sin^3 x \cos^2 x = RHS$ Combine Sine □

5. $\sin^3 x - \sin^5 x = \sin^3 x \cos^2 x$

$\sin^3 x(1 - \sin^2 x)$ GCF: $\sin^3 x$

$\sin^3 x(\cos^2 x)$ Pythagorean Identity (KING)

□

6. $\cot x + \tan x = \csc x \sec x$

$\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}$ Ratio Identities

$\frac{\cos^2 x + \sin^2 x}{\sin x \cos x}$ Common denom, adding Fractions

$\frac{1}{\sin x \cos x}$ Pythag. Identity (KING)

$\frac{1}{\sin x} \cdot \frac{1}{\cos x} = \csc x \sec x$ □

Split Fractions

Tips & Tricks

1) ALWAYS work on only one side
2) Try to get things in terms of sine / cosine
3) Watch for factoring / distributing
4) Adding fractions with common denominators
5) Try something, anything.

Pythag:

KING $\sin^2 x + \cos^2 x = 1$

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

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

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

disguised $\tan^2 x = \sec^2 x - 1$

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

(named depending on how) $1 + \cot^2 x = \csc^2 x$

disguised $\cot^2 x = \csc^2 x - 1$

$1 = \csc^2 x - \cot^2 x$