SM2H Name: Key Date: _____ Period: _____

9.4 Trigonometric Identities 2019-20

Prove the identities, using opposite, adjacent and hypotenuse.

1. $\csc x = \frac{1}{\sin x}$

$\frac{hyp}{opp} = \frac{1}{\frac{opp}{hyp}}$

$1 \cdot \frac{hyp}{opp}$

$\frac{hyp}{opp} = \frac{hyp}{opp}$

2. $\cot x = \frac{1}{\tan x}$

$\frac{adj}{opp} = \frac{1}{\frac{opp}{adj}}$

$1 \cdot \frac{adj}{opp}$

$\frac{adj}{opp} = \frac{adj}{opp}$

3. $\cot \theta = \frac{\cos \theta}{\sin \theta}$

$\frac{adj}{opp} = \frac{\frac{adj}{hyp}}{\frac{opp}{hyp}}$

$\frac{adj}{\cancel{hyp}} \cdot \frac{\cancel{hyp}}{opp}$

$\frac{adj}{opp} = \frac{adj}{opp}$

Write each expression in terms of sines and/or cosines, then simplify.

4. $\sin x \cdot \sec x$

$\sin x \cdot \frac{1}{\cos x} = \frac{\sin x}{\cos x}$

$= \boxed{\tan x}$

5. $\frac{\csc x}{\cot x}$

$\frac{\frac{1}{\sin x}}{\frac{\cos x}{\sin x}} = \frac{1}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}}{\cos x}$

$= \frac{1}{\cos x}$

$= \boxed{\sec x}$

6. $\tan x \cdot \csc x \cdot \cos x$

$\frac{\cancel{\sin x}}{\cos x} \cdot \frac{1}{\cancel{\sin x}} \cdot \cos x$

$= \frac{\cos x}{\cos x} = \boxed{1}$

Prove the trigonometric identities.

7. $\sec x \cot x = \csc x$

$\frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{\sin x}$

$\frac{1}{\sin x}$

$\csc x = \csc x$

8. $\sin x \sec x = \tan x$

$\sin x \cdot \frac{1}{\cos x}$

$\frac{\sin x}{\cos x}$

$\tan x = \tan x$

9. $-\tan x \cos x = -\sin x$

$-\frac{\sin x}{\cancel{\cos x}} \cdot \cancel{\cos x}$

$-\sin x = -\sin x$

9. $\csc x \sin x = \cot x \tan x$

$\frac{1}{\cancel{\sin x}} \cdot \cancel{\sin x} \quad \frac{\cancel{\cos x}}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}}{\cancel{\cos x}}$

$1 = 1$

OR

$\frac{1}{\cancel{\sin x}} \cdot \cancel{\sin x} \quad \frac{1}{\cancel{\tan x}} \cdot \cancel{\tan x}$

$1 = 1$