

4.6 TRIG IDENTITIES
WORKSHEET #1

① a)

<u>LS</u>		<u>RS</u>
= $\sin \theta$		= $\cos \theta \tan \theta$
		= $\cos \theta \left(\frac{\sin \theta}{\cos \theta} \right)$
		= $\sin \theta$

LS = RS

b)

<u>LS</u>		<u>RS</u>
= $\csc \theta$		= $\sec \theta \cot \theta$
= $\frac{1}{\sin \theta}$		= $\frac{1}{\cos \theta} \left(\frac{1}{\tan \theta} \right)$
		= $\frac{1}{\cos \theta} \left(\frac{1}{\frac{\sin \theta}{\cos \theta}} \right)$
		= $\frac{1}{\cos \theta} \left(\frac{\cos \theta}{\sin \theta} \right)$
		= $\frac{1}{\sin \theta}$

LS = RS

c)

<u>LS</u>		<u>RS</u>
= $\cos \theta$		= $\sin \theta \cot \theta$
		= $\sin \theta \left(\frac{1}{\tan \theta} \right)$
		= $\sin \theta \left(\frac{1}{\frac{\sin \theta}{\cos \theta}} \right)$
		= $\sin \theta$ $\left(\frac{\cos \theta}{\sin \theta} \right)$
		= $\cos \theta$

LS = RS

d)

<u>LS</u>		<u>RS</u>
= $\sec \theta$		= $\csc \theta \tan \theta$
= $\frac{1}{\cos \theta}$		= $\left(\frac{1}{\sin \theta} \right) \left(\frac{\sin \theta}{\cos \theta} \right)$
		= $\frac{1}{\cos \theta}$

LS = RS

2) a)

$\begin{aligned} \underline{LS} \\ &= 1 + \csc \theta \end{aligned}$	$\begin{aligned} \underline{RS} \\ &= \csc \theta (1 + \sin \theta) \\ &= \csc \theta + \csc \theta \sin \theta \\ &= \csc \theta + \left(\frac{1}{\sin \theta}\right) \sin \theta \\ &= \csc \theta + 1 \end{aligned}$
$LS = RS$	

b)

$\begin{aligned} \underline{LS} \\ &= \cot \theta \sin \theta \sec \theta \\ &= \left(\frac{\cos \theta}{\sin \theta}\right) \sin \theta \left(\frac{1}{\cos \theta}\right) \\ &= \frac{\cos \theta}{\cos \theta} \\ &= 1 \end{aligned}$	$\begin{aligned} \underline{RS} \\ &= 1 \end{aligned}$
$LS = RS$	

c)

$\begin{aligned} \underline{LS} \\ &= \cos \theta (\sec \theta - 1) \\ &= \cos \theta \sec \theta - \cos \theta \\ &= \cos \theta \left(\frac{1}{\cos \theta}\right) - \cos \theta \\ &= 1 - \cos \theta \end{aligned}$	$\begin{aligned} \underline{RS} \\ &= 1 - \cos \theta \end{aligned}$
$LS = RS$	

d)

$\begin{aligned} \underline{LS} \\ &= 1 + \sin \theta \end{aligned}$	$\begin{aligned} \underline{RS} \\ &= \sin \theta (1 + \csc \theta) \\ &= \sin \theta + \sin \theta \csc \theta \\ &= \sin \theta + \sin \theta \left(\frac{1}{\sin \theta}\right) \\ &= \sin \theta + 1 \end{aligned}$
$LS = RS$	

$$\begin{array}{l|l}
 \textcircled{3} & \\
 \hline
 \text{LS} & \text{RS} \\
 \hline
 = 1 - \sin^2 \theta & = \sin \theta \cos \theta \cot \theta \\
 = \sin^2 \theta + \cos^2 \theta - \sin^2 \theta & = \sin \theta \cos \theta \left(\frac{\cos \theta}{\sin \theta} \right) \\
 = \cos^2 \theta & = \cos^2 \theta \\
 \hline
 & \text{LS} = \text{RS}
 \end{array}$$

$$\begin{array}{l|l}
 \textcircled{4} & \\
 \hline
 \text{LS} & \text{RS} \\
 \hline
 = \csc^2 \theta & = \cot^2 \theta + 1 \\
 = \frac{1}{\sin^2 \theta} & = \frac{\cos^2 \theta}{\sin^2 \theta} + \frac{\sin^2 \theta}{\sin^2 \theta} \\
 & = \frac{\cos^2 \theta + \sin^2 \theta}{\sin^2 \theta} \\
 & = \frac{1}{\sin^2 \theta} \\
 \hline
 & \text{LS} = \text{RS}
 \end{array}$$

$$\begin{array}{l|l}
 \textcircled{5} & \\
 \hline
 \text{LS} & \text{RS} \\
 \hline
 = \frac{\cos \theta}{1 + \sin \theta} & = \frac{1 - \sin \theta}{\cos \theta} \\
 = \frac{\cos \theta}{1 + \sin \theta} \times \frac{1 - \sin \theta}{1 - \sin \theta} & \\
 = \frac{\cos \theta (1 - \sin \theta)}{1 - \sin^2 \theta} & \\
 = \frac{\cos \theta (1 - \sin \theta)}{\cos^2 \theta} & \\
 = \frac{1 - \sin \theta}{\cos \theta} & \\
 \hline
 & \text{LS} = \text{RS}
 \end{array}$$

$$\begin{array}{l|l}
 \textcircled{6} & \\
 \hline
 \text{LS} & \text{RS} \\
 \hline
 = \frac{\cos \theta}{1 - \sin \theta} + \frac{\cos \theta}{1 + \sin \theta} & = \frac{2}{\cos \theta} \\
 = \frac{\cos \theta (1 + \sin \theta) + \cos \theta (1 - \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)} & \\
 = \frac{\cos \theta + \cos \theta \sin \theta + \cos \theta - \cos \theta \sin \theta}{1 - \sin^2 \theta} & \\
 = \frac{2 \cos \theta}{\cos^2 \theta} & \\
 = \frac{2}{\cos \theta} & \\
 \hline
 & \text{LS} = \text{RS}
 \end{array}$$

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LS

$$= \csc^2 \theta \cos^2 \theta$$

$$= \frac{1}{\sin^2 \theta} (\cos^2 \theta)$$

$$= \frac{\cos^2 \theta}{\sin^2 \theta}$$

RS

$$= \csc^2 \theta - 1$$

$$= \frac{1}{\sin^2 \theta} - \frac{\sin^2 \theta}{\sin^2 \theta}$$

$$= \frac{1 - \sin^2 \theta}{\sin^2 \theta}$$

$$= \frac{\cos^2 \theta}{\sin^2 \theta}$$

LS = RS

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LS

$$= \tan^2 \theta - \sin^2 \theta$$

$$= \frac{\sin^2 \theta}{\cos^2 \theta} - \frac{\sin^2 \theta \cos^2 \theta}{\cos^2 \theta}$$

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

$$= \tan^2 \theta (1 - \cos^2 \theta)$$

$$= \tan^2 \theta \sin^2 \theta$$

RS

$$= \sin^2 \theta \tan^2 \theta$$

LS = RS