Simplifying Trig Expressions
Matching WS

Name Key

Simplify each of the following expressions using substitution of basic trig identities.
Match each number with its simplified form. Place the letter of the simplified form above the question number **to discover something to look forward to ...**

Hint: the easiest/shortest are #3, 4, 6, 7, 8 and the toughest/longest are #1, 2, 5 ... work them in any order you want ☺

1	$\frac{1}{\cot\theta}+\frac{1}{\tan\theta}$	I	$\cos\theta$
2	$\frac{\csc\theta}{\tan\theta+\cot\theta}$	T	$\cos^4\theta$
3	$\frac{\sin^2\theta}{\sec^2\theta-1}$	H	$\sec\theta$
4	$\cos^2\theta-\sin^2\theta\cos^2\theta$	Y	$1+\sin\theta$
5	$\frac{\tan\theta}{\csc\theta}+\frac{\sin\theta}{\tan\theta}$	D	$\sin\theta-1$
6	$\frac{1-\csc\theta}{\csc\theta}$	B	$\sec\theta\csc\theta$
7	$\sin^2\theta\cot^2\theta+\sin^2\theta$	A	1
8	$\frac{\cos^2\theta}{1-\sin\theta}$	R	$\cos^2\theta$

Answer:

1	2	3	4	5	6	7	8
B	I	R	T	H	D	A	Y

Simplifying Trig Expressions Matching WS

1. $\frac{1}{\cot\theta} + \frac{1}{\tan\theta} = \tan\theta + \cot\theta$

$= \frac{(\sin\theta)}{\sin\theta}\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}\frac{(\cos\theta)}{(\cos\theta)}$

$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{\sin\theta\cos\theta} = \csc\theta\sec\theta$

$= \boxed{\sec\theta\csc\theta}$ 1-B

2. $\frac{\csc\theta}{\tan\theta + \cot\theta}$ ← Denominator: $\tan\theta + \cot\theta$

$\frac{(\sin\theta)}{(\sin\theta)}\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}\frac{(\cos\theta)}{(\cos\theta)}$

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

$\csc\theta\sec\theta$

$\frac{\csc\theta}{\csc\theta\sec\theta}$

$= \frac{1}{\sec\theta} = \boxed{\cos\theta}$

2-I

3. $\frac{\sin^2\theta}{\sec^2 - 1} = \frac{\sin^2\theta}{\tan^2\theta} = \frac{\sin^2\theta}{\sin^2\theta/\cos^2\theta} = \frac{\sin^2\theta}{1}\cdot\frac{\cos^2\theta}{\sin^2\theta}$

$= \boxed{\cos^2\theta}$ 3-R

4. $\cos^2\theta - \sin^2\theta\cos^2\theta = \cos^2\theta(1 - \sin^2\theta)$

$= \cos^2\theta(\cos^2\theta) = \cos^4\theta$ 4-T

5. $\frac{(\tan\theta)}{(\tan\theta)}\frac{\tan\theta}{\csc\theta} + \frac{\sin\theta}{\tan\theta}\frac{(\csc\theta)}{(\csc\theta)}$

$$\frac{\tan^2\theta}{\tan\theta\csc\theta} + \frac{\sin\theta\csc\theta}{\tan\theta\csc\theta} = \frac{\tan^2\theta}{\tan\theta\csc\theta} + \frac{\sin\theta\cdot\frac{1}{\sin\theta}}{\tan\theta\csc\theta}$$

$$= \frac{\tan^2\theta+1}{\tan\theta\csc\theta} = \frac{\sec^2\theta}{\frac{\sin\theta}{\cos\theta}\cdot\frac{1}{\sin\theta}} = \frac{\sec^2\theta}{1/\cos\theta} = \frac{\sec^2\theta}{\sec\theta} = \boxed{\sec\theta}$$

5-H

6. $$\frac{1-\csc\theta}{\csc\theta} = \frac{1}{\csc\theta} - \frac{\csc\theta}{\csc\theta} = \boxed{\sin\theta - 1}$$ 6-D

7. $\sin^2\theta\cot^2\theta + \sin^2\theta$

$\sin^2\theta(\cot^2\theta+1) = \sin^2\theta\csc^2\theta = \sin^2\theta\cdot\frac{1}{\sin^2\theta} = \boxed{1}$

7-A

8. $$\frac{\cos^2\theta}{1-\sin\theta}\cdot\frac{(1+\sin\theta)}{(1+\sin\theta)} = \frac{\cos^2\theta(1+\sin\theta)}{(1-\sin^2\theta)}$$

$$= \frac{\cos^2\theta(1+\sin\theta)}{\cos^2\theta} = \boxed{1+\sin\theta}$$ 8-Y