Magic Square – Trig Identities

by David Pleacher

Solve each of the problems and then find the letter which matches the answer from the choices listed below. All angles are measured in degrees.
Write the number of the problem corresponding to the letter in each box of the magic square. For example, if the answer to problem #1 were V, locate box V and place a 1 in it.

When you are finished, you should have a Magic Square. Check to see that your answers are correct by finding the sum of each row, the sum of each diagonal, and the sum of each column. They should all equal the same number.

What is the Magic Sum? _____

V	A	H	Q
F	L	J	N
K	M	D	I
G	T	R	B

Questions

1. Which values of u are not permissible in the expression csc(u) tan(u) ?
2. Which values of u are not permissible in the expression sin(u) cot(u) ?
3. Simplify sin(90 - u)
4. Simplify $2\sin^2\left(\frac{u}{2}\right)$
5. Simplify cos(6u) cos(2u) - sin(6u) sin(2u)
6. Simplify cos(u) + sin(u) tan(u)
7. Simplify $\frac{-\sin(-u)}{-\cos(-u)}$
8. Simplify $\frac{1+\tan^2 u}{1+\cot^2 u}$
9. Simplify cos(u) tan(u)
10. Simplify (1 - sin(u)) (1+ sin(u))
11. Simplify $\sin^4(u) + \cos^2(u)\sin^2(u)$
12. Simplify $\frac{\csc^2 u - 1}{\cos^2 u}$
13. Given $\sin u = \frac{-1}{4}$ and $180 < u < 270$
    Determine the exact value of $\cos 2u$
14. Given $\tan u = \frac{1}{2}$ and $\tan x = \frac{1}{3}$
    Determine the exact value of $\tan(u+x)$
15. Given $\sin u = \frac{-3}{5}$ and $270 < u < 360$
    Determine the exact value of $\cos\frac{u}{2}$
16. Given $\cos u = \frac{2}{3}$ and $0 < u < 90$
    Determine the exact value of $\sin 2u$

Answers:

A. 180k	B. 90k	C. 90 + 180k
D. sec(u)	E. cos(4u)	F. cos(8u)
G. 1 - cos(u)	H. cos(u)	I. $\csc^2 u$
J. $\cos^2 u$	K. sin(u)	L. $\sin^2 u$
M. - tan(u)	N. $\tan^2 u$	O. $\sec^2 u$
P. $\frac{\sqrt{15}}{8}$	Q. $\frac{7}{8}$	R. $\frac{-3\sqrt{10}}{10}$
S. $\frac{\sqrt{10}}{10}$	T. 1	U. 2
V. $\frac{4\sqrt{5}}{9}$	W. 3	X. 0