Leslie E. Shader's Christmas Card

Les Shader created this Christmas card puzzle around 1986. It was originally submitted and accepted by GAMES magazine before the magazine stopped production.

Permission is granted to reprint this card for personal use, provided that you leave his name on the card.

 If you don't want to use MERRY CHRISTMAS, you will have the same solution with HAPPY TRIANGLES.

Leslie E. Shader was a G4G1 through G4G11 attendee.   He was a professor of mathematics at the University of Wyoming.

Christmas 1980, Les gave his daughter, Soni, a copy of Martin Gardner's AHA! INSIGHT book.

Soni Shader Huffman introduced this puzzle on the last day of classes before Christmas break to her high school students and taught the counting method found in Martin Gardner's AHA! INSIGHT, pages 9-11. Students in Geometry, Algebra 2, and advanced courses were able to succeed with this puzzle. She was a G4G 11,12,and 14 attendee. She was formerly a high school math teacher, director of the math tutoring center at Northwestern College of Iowa, and a homeschool parent. She now works for AptarePrep.com. Her current interests are antique advertising puzzles and rattleback spinning toys.

Timothy Huffman is a math and actuarial science professor at Northwestern College of Iowa and owns AptarePrep.com. He was a G4G 12 and 14 attendee. He currently collects antique computational devices.

A Christmas Card by Leslie E. Shader, circa 1986.

How do I wish thee a Merry Christmas?

Let thee count the ways.

Count the different paths to say "MERRY CHRISTMAS!" The path may travel UP, DOWN, LEFT, RIGHT, or DIAGONAL.

M
MEM
MEREM
MERRREM
MERRYRREM
MERRY YRREM
MERRY C YRREM
MERRY CHC YRREM
MERRY CHRHC YRREM
MERRY CHRIRHC YRREM
MERRY CHRISIRHC YRREM
MERRY CHRISTSIRHC YRREM
MERRY CHRISTMTSIRHC YRREM
MERRY CHRISTMAMTSIRHC YRREM
MERRY CHRISTMASAMTSIRHC YRREM
!

Leslie Shader's Christmas Card Solution

This solution uses the counting method from Martin Gardner's **AHA! INSIGHT**, pages 9-11. While a combinatorical solution may be more elegant, I have chosen to use this method because it doesn't require advanced skills and is accessible to high school students.

The solution matrix has been abbreviated for space, but it is obviously symmetric.

1. Start by numbering the M's with a 1.
2. Proceed with the method from **AHA!** counting the number of ways to get to E and R.
3. The difficulty of this puzzle increases because of the double R's. A letter R may appear as the first R or the second R. The solution has two numbers listed for the R's. The first number is the number of ways to arrive at that R as the first R in MERRY. The second number is the number of ways to arrive at that R as the second R in MERRY.
4. 3 R's have a second number of 0 because they are not adjacent to a Y.
5. Proceed with the **AHA!** method; there are no further complications without more double letters.

Beginning of the solution matrix using step 1

		M 1		
	M 1	E	M 1	
M 1	E		E	M 1

Beginning of the solution matrix using step 2. Getting to E

		M 1		
	M 1	E 1+1+1=3	M 1	
M 1	E 1+1=2		E 1+1=2	M 1

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Beginning of the solution matrix using step 2. Getting to R, as the first R.

			M 1			
		M 1	E 3	M 1		
	M 1	E 2	R 2+3+2=7	E 2	M 1	
M 1	E 2	R 2+2=4		R 2+2=4	E 2	M 1

Beginning of the solution matrix using step 3. Getting to R, as the second R.

				M 1				
			M 1	E 3	M 1			
		M 1	E 2	R 70	E 2	M 1		
	M 1	E 2	R 4 7+4+4+2=17	R 4 2+4+7+4+2=19	R 4 7+4+4+2=17	E 2	M 1	
M 1	E 2	R 4 4+2+4+2=12	R 2 4+4+4+2=14		R 2 4+4+4+2=14	R 4 4+2+4+2=12	E 2	M 1

=

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								M 1
							M 1	E 2
						M 1	E 2	R 4 12
					M 1	E 2	R 4 12	R 2 12
				M 1	E 2	R 4 12	R 2 12	Y 36
			M 1	E 2	R 4 12	R 2 12	Y 36	72
		M 1	E 2	R 4 12	R 2 12	Y 36	72	C 144
	M 1	E 2	R 4 12	R 2 12	Y 36	72	C 144	H 288
M 1	E 2	R 4 0	R 2 10	Y 34	70	C 142	H 286	R 574

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Solution Matrix, page 2

					M 1	
				M 1	E 3	M 1
			M 1	E 2	R 70	E 2
		M 1	E 2	R 4 17	R 4 19	R 4 17
	M 1	E 2	R 4 12	R 2 14	Y 81	R 2 14
M 1	E 2	R 4 12	R 2 12	Y 38	157	Y 38
E 2	R 4 12	R 2 12	Y 36	74	C 305	74
R 4 12	R 2 12	Y 36	72	C 146	H 597	C 146
R 2 12	Y 36	72	C 144	H 290	R 1177	H 290
Y 36	72	C 144	H 288	R 578	I 2333	R 578
72	C 144	H 288	R 576	I 1154	S 4641	I 1154
C 144	H 288	R 576	I 1152	S 2306	T 9253	S 2306
H 288	R 576	I 1152	S 2304	T 4610	M 18473	T 4610
R 576	I 1152	S 2304	T 4608	M 9218	A 36909	M 9218
I 1150	S 2302	T 4606	M 9214	A 18432	S 73773	A 18432

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