

Corollary. *The Magic Hexagram puzzle has precisely eighty non-equivalent solutions.*

Acknowledgments. The authors wish to thank John Barton who wrote a program that verified all 960 solutions to the Magic Hexagram and thus gave us plenty of data to work with. We also wish to thank Amy Niemeyer who pointed out the term out-shuffle, Stephanie Wong who brought this wonderful puzzle to our attention, and Lowell Beineke for suggesting the name Magic Hexahedron.

References

1. H. E. Dudeney, *536 Puzzles & Curious Problems*, Charles Scribner's Sons, 1967.
2. M. Gardner, *Mathematical Carnival*, MAA, 1989.
3. F. Goodman, *Algebra Abstract and Concrete*, Prentice Hall, 1998.
4. E. Weisstein, Out-Shuffle Mathworld webpage, <http://mathworld.wolfram.com/Out-Shuffle.html>

Proof Without Words: Geometric Series Formula

$$\frac{1}{9} + \frac{1}{9^2} + \frac{1}{9^3} + \cdots = \frac{1}{8}$$

The general result $\frac{1}{N} + \frac{1}{N^2} + \frac{1}{N^3} + \cdots = \frac{1}{N-1}$ can be proved using this construction with a regular $(N-1)$ -gon (or even a circle).

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