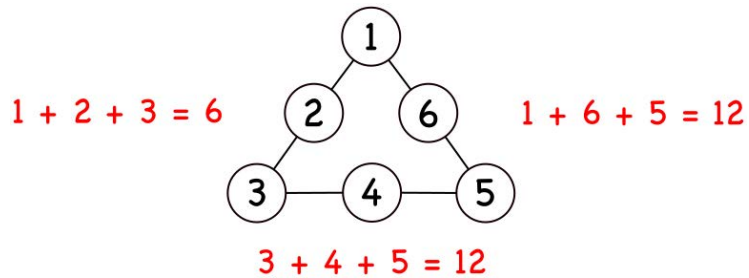


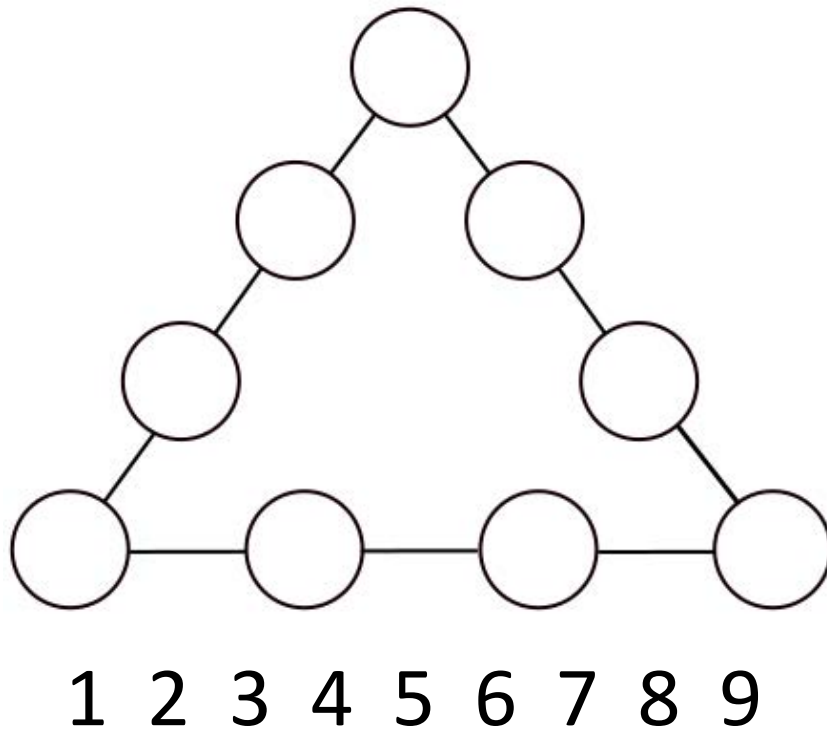
Puzzle of the Week

Magic Triangles – 2

The sums of the sides of a *Magic Triangle* are all the same. This example is **NOT** a Magic Triangle.



THE CHALLENGE: Use the numbers from 1 to 9 to make Magic Triangles.



EXPLORATION: What are the different sums that are possible for Magic Triangles that use 1 to 9?

Puzzle of the Week

Magic Triangles – 2 – Notes

THE CHALLENGE & EXPLORATION: Let your students play with this. If they pay attention to what they're doing, they'll discover interesting relationships and get a lot out of it. For young students, there is absolutely no need to go into any kind of careful analysis.

To be more analytical, add up the three sides. This sum will be the sum of the numbers from 1 to 9 plus the three corners an extra time. The sum of the numbers from 1 to 9 is 45. So, three times the common sum is 45 plus the sum of the three corners. Looked at another way, the common sum will be 15 plus one third of the sum of the corners. The smallest possible sum of three corner numbers is $1 + 2 + 3 = 6$, and the largest is $7 + 8 + 9 = 24$. So, the common sum might be anything from $15 + (6 / 3) = 17$ to $15 + (24 / 3) = 23$. The Common Sum can be 17 to 23.

As noted at the end of the Notes on Magic Triangles – 1, we can cut our work in half by using the answers from 17, 18, 19 and 20 to give us answers for 20, 21, 22, and 23 by subtracting all the entries from 10.

Common Sum = 17. The corners are (1 2 3). The sides of one solution are (1 5 9 2), (1 6 7 3), and (2 4 8 3). Another solution is (1 6 8 2), (1 4 9 3), and (2 5 7 3).

Common Sum = 18. The corners add up to 9. The corners can be (1 2 6), (1 3 5), and (2 3 4), but none of them work out.

Common Sum = 19. The corners add up to 12. The corners can be (1 2 9), (1 3 8), (1 4 7), (1 5 6), (2 3 7), (2 4 6), and (3 4 5). (1 2 9) and (1 3 8) do not work. For (1 4 7) we have the solution (1 6 8 4), (1 2 9 7), and (4 3 5 7). Needless to say, there is a lot to look at if you want to look through every possibility.

Common Sum = 20. The corners add up to 15. There are even more possibilities here, with no obvious way to shorten the search list.