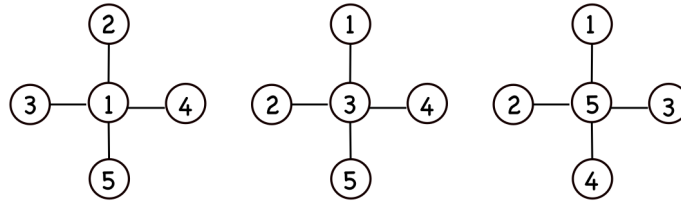


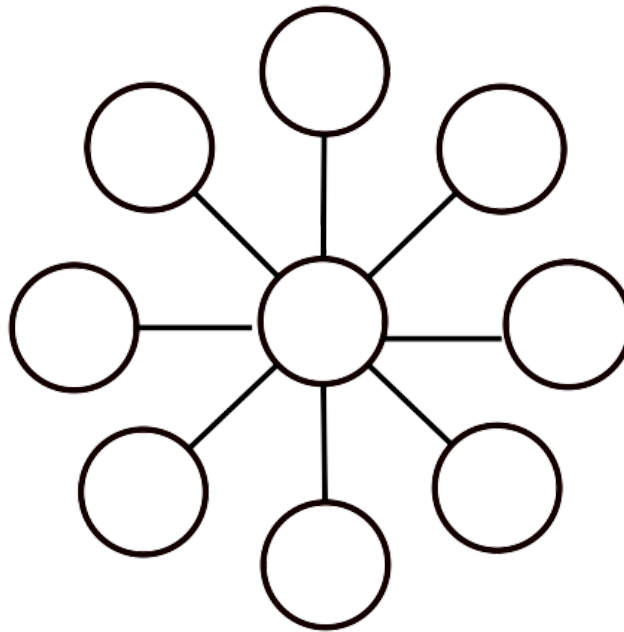
Puzzle of the Week

Magic Flowers – 2

The sums in a *Magic Flower* are the same for all straight lines. These Magic Flowers use numbers from 1 to 5.



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



1 2 3 4 5 6 7 8 9

EXPLORATION: Looking at the solutions for Magic Flowers 1 and 2, what do you expect the solutions to be for Magic Flowers with even more lines?

Puzzle of the Week

Magic Flowers – 2 – Notes

THE CHALLENGE: This, like many of these Puzzles of the Week, can be attacked by playing around with the numbers until a solution is found. Don't be tempted to think that a more structured approach is better for your students – a great deal will be learned about the mathematics involved and about problem solving by tenaciously working through many examples. Finding a solution, by any method, is always a wonderful reward.

Most of these “equal sum” puzzles can be attacked by adding up some of the straight lines. In the case of this puzzle, add up the four directions - this will include all the numbers once, plus the central circle's number three extra times. The sum of 1 to 9 is 45. So, the possible sums of the three lines are $45 + 3 \times 1$ through $45 + 3 \times 9$. Of those, only $48 = 45 + 3 \times 1$, $60 = 45 + 3 \times 5$, and $72 = 45 + 3 \times 9$ are divisible by 4. Dividing them by 4 tells us that the common sums are either $12 = 48 / 4$, $15 = 60 / 4$, or $18 = 72 / 4$.

Let's look at those three cases.

Common Sum of 12: The central circle will be 1. Making a sum of 12 with a 1 in the center means the other two numbers add up to 11. So, the four directions are: (2 1 9) - (3 1 8) - (4 1 7) - (5 1 6).

Common Sum of 15: The central circle will be 5. Making a sum of 15 with a 5 in the center means the other two numbers add up to 10. So, the four directions are: (1 5 9) - (2 5 8) - (3 5 7) - (4 5 6).

Common Sum of 18: The central circle will be 9. Making a sum of 18 with a 9 in the center means the other two numbers add up to 9. So, the four directions are (1 9 8) - (2 9 7) - (3 9 6) - (4 9 5).

EXPLORATION: For numbers that go from 1 to $2n-1$, the central circle has either 1, n , or $2n-1$. The sums will be $2n+2 = 1 + 2 + 2n-1$, $3n = 1 + n + 2n-1$, and $4n-2 = 1 + 2n-2 + 2n-1$.