



Problem of the Week

Problem C and Solution

Flower Powers

Problem

Mr. Digne planted five rose plants in a row along one side of his property. He then planted one tulip plant in each of the spaces in the row between the roses. Next, he planted one daffodil plant in each of the spaces between the plants already in the row. He then repeated this procedure with daisies, then marigolds, and finally with lilies. Determine the total number of plants in the row.

Solution

After planting 5 roses, there were four spaces between the plants. So, Mr. Digne then plants 4 tulips. At this point he has planted $5 + 4 = 9$ plants.

Since there are now 9 plants, there are 8 spaces between plants. So, Mr. Digne plants 8 daffodil plants. At this point he has planted $9 + 8 = 17$ plants.

Since there are now 17 plants, there are 16 spaces between plants. So, Mr. Digne plants 16 daisies. At this point he has planted $17 + 16 = 33$ plants.

Since there are now 33 plants, there are 32 spaces between plants. So, Mr. Digne plants 32 marigold plants. At this point he has planted $33 + 32 = 65$ plants.

Finally, since there are now 65 plants, there are 64 spaces between plants. So, Mr. Digne plants 64 lily plants. At this point he has planted $65 + 64 = 129$ plants.

Therefore, Mr. Digne planted a total of 129 plants in the row.

Extension:

You may have noticed a pattern in the total number of plants after each new plant is introduced. If Mr. Digne plants flowers in this way using n different types of flowers, there will be a total of $2^{n+1} + 1$ plants in the row.

Can you see why? In Mr. Digne's garden there were 6 different types of plants. Verify that the formula is correct when $n = 6$.

