

## Maths Investigation: Magic Constants

This is a 4 x 4 Magic Square made from the numbers 1 to 16.

|    |    |    |    |
|----|----|----|----|
| 15 | 10 | 3  | 6  |
| 4  | 5  | 16 | 9  |
| 14 | 11 | 2  | 7  |
| 1  | 8  | 13 | 12 |

In a Magic Square all the rows, columns and diagonals add to the same number. This number is called the 'Magic Constant'.

1. What is the Magic Constant of this Magic Square?
2. ***This particular square is especially 'magic' as some 2 x 2 squares within it also add to that number.*** How many of these squares can you find?
3. What happens to the Magic Constant if you add 2 to each number in the square?
4. What happens if you double each number?
5. Can you make a square in which the Magic Constant is 17?
6. Can you make a square in which the Magic Constant is 38?
7. What other numbers under 100 can you make into the Magic Constant by changing all the numbers in the square in the same way as the first square? Can some be made in more than one way?
8. Are there some numbers you really cannot make?