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Math Math World

It's Magic!

Take a look at the square below:

4	9	2
3	5	7
8	1	6

What do you notice when you add all of the numbers along each column, row and diagonal?

You should find that they all add to 15 - as if by magic. Hence the name, "Magic Square" was given to this type of configuration.

Try creating your own magic square using the numbers 1 - 9. Remember the total should add to 15.

Reflecting and Rotating

This 3 x 3 magic square, as shown as the front page, is called a third-order magic square.

There are several techniques for creating your own magic squares. For example, every 3 x 3 magic square has eight different rotations and reflections. Starting with the 3 x 3 magic square shown above, create eight others.

One has been done for you.

4	9	2
3	5	7
8	1	6

2	9	4
7	5	3
6	1	8

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Magic Square Investigation

- What happens if you double each number on the magic square?
- Do all of the rows, columns and diagonals still add to the same amount?
- Add five to each number in the magic square and note what happens.
- Predict what will happen if you add ten to each number.
- Verify your prediction by trying some.
- Investigate what happens if you multiply or divide by a constant.

Maths in Art

The magic square has popped up in various cultures and places over many centuries; for example in 1514, German artist Albrecht Durer incorporated a 4 x 4 magic square into an engraving which he called 'Melencolia' or 'Melancholia'.

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

Look up Durer or his famous engraving on the internet. You can see the magic square in the top right of the engraving.

The magic square from 'Melencolia' is reproduced. Note how Durer managed to incorporate the date of the engraving (1514) into the magic square.

What is the magic number that all the rows, columns and diagonals add up to?

Colour in any four squares containing numbers that add to 34. You will need to be systematic. What do you notice?

Magic Shapes

Look for other groups of four numbers that add up to 34.

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

Square

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

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

The magic square is made up of the numbers 1 - 16. Look for groups of four numbers that add to 34. There are 86 different groupings. See how many you can find. Some other examples:

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

Rhombus

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

Trapezium

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

Parallelogram

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

Chevron

Answers

It's Magic!

See examples below

Reflecting and Rotating

2	9	4
7	5	3
6	1	8

6	7	2
1	5	9
8	3	4

8	1	6
3	5	7
4	9	2

4	3	8
9	5	1
2	7	6

4	9	2
3	5	7
8	1	6

2	7	6
9	5	1
4	3	8

6	1	8
7	5	3
2	9	4

8	3	4
1	5	9
6	7	2

Magic Square Investigation

Doubling each number results in a magic square with a total of 30.

Adding 5 to each number results in a magic square with a total of 30.

Adding 10 to each number results in a magic square with a total of 45.

Maths in Art

The magic number is 34.

Magic Shapes

Did you get the four numbers in each corner?

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