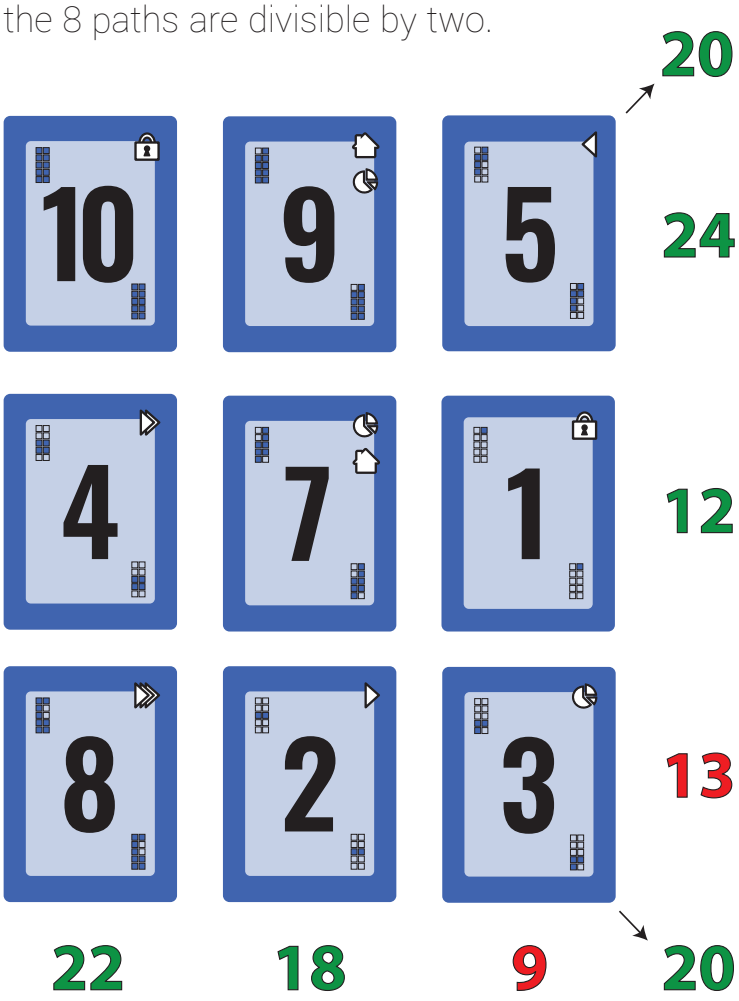
MAGIC DIVISIBILITY SQUARES

Use the numbers 1-10 to create a 3x3 grid so the sum of every row, column and diagonal is divisible by two.

Below is an example in which 6 out of the 8 paths are divisible by two.



Notice that unlike a traditional magic square these paths don't need to add to the same thing, they just need to be divisible by our chosen number (in this case 2).

Also, notice that there is one number left out (the six). Being able to leave out a number of your choice provides flexibility and allows you to solve magic divisibility squares that would be impossbile otherwise.

After finding a solution which is divisible by two, I wondered how many other numbers this would work perfectly for.

There are perfect solutions (8/8 paths) for the numbers 2, 3, 5, 6, 9 and 10. Can you find perfect solutions for these numbers?

It is possible to get 7/8 paths to work when dividing by the numbers 4, 7 and 8. Can you prove why it's impossible to get all 8 paths divisible for these numbers?

THINK SQUARE
Intentional Fun

Magic (Zero) Square

Instructions:

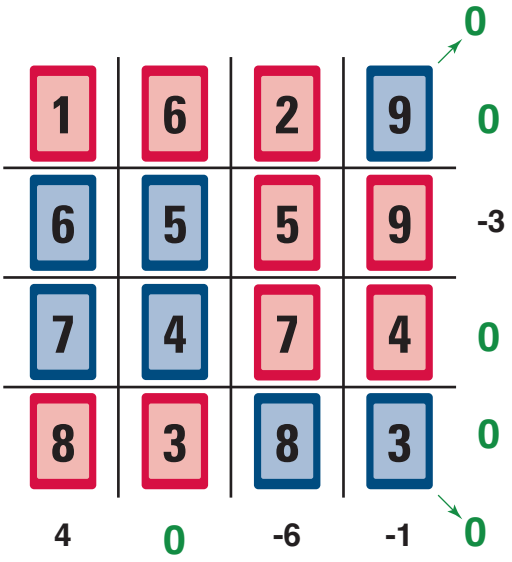
The aim is to be the first team/individual to place 16 numbers in a 4 × 4 square, where all the rows, columns and diagonals add to 0.

You may choose from 1 -10 in both Red and Blue. Use red cards (1 - 10) to represent negative integers and blue cards (1 - 10) to represent positive integers. You may only use each number once.

Alternatively, you can write the integers in the 4 × 4 squares below.

[Small hint: Complete the diagonals first so the numbers add to 0.]

EXAMPLE



For example, in this grid, 6 of 10 paths are working:

Top row: *-1 + -6 + -2 + 9 = 0*
Third row: *7 + 4 + -7 + -4 = 0*
Fourth row: *-8 + -3 + 8 + 3 = 0*
Second column: *-6 + 5 + 4 + -3 = 0*
Main diagonal: *-1 + 5 + -7 + 3 = 0*
Second diagonal: *9 + -5 + 4 + -8 = 0*

Your goal is to get all 10 paths.