

## Mazes

G'Day!

This is your math friend James. Today I am answering a question from Ollie.

### Can you do something with Math and Mazes?

Oh, I love this question. Why? Because I love mazes!

As a young kid I was obsessed with drawing mazes. And I'd draw them in a very organic way.

I'd start by writing the word START, encircle it, but leave one path leading out.



Next I'd split the path into two paths that "hug" what I had drawn that far. And then I'd keep drawing and splitting paths.

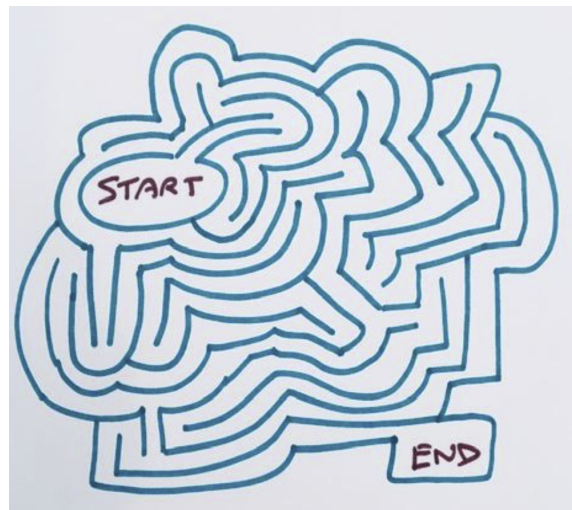
I would also start to close off paths too. I usually did that by connecting the ends of two paths.



But I had to also make sure that I always kept at least one path open and available.



And when I felt ready, I made one path head to an END.



### puzzle #1

**Can you draw a maze that fills up the whole page of paper you are using?**

**Can you draw a maze that uses BOTH sides of a piece of paper?**

**Can you put holes in your paper and draw a maze that has you following those holes back and forth between the two sides of the paper?**

People often say that it is easier to solve a maze by starting at the END and doing it backwards. (Can you design a maze that is just as hard to solve backwards as it is to solve forwards?)

This leads to a good strategy for solving math problems.

If you have a problem and you know what the answer should be (or at least have a good guess for the answer), perhaps try starting with the answer and working backwards!

This is a strategy mathematicians often use.

For example, consider this math puzzle.

Katya thought of a number. She added 3 to it and got a second number. When she multiplied her two numbers together she got the answer 70. What was the first number she thought of?

You could try to answer this question just by guessing.

"Maybe she chose 5 and 8?"

"Maybe she chose 11 and 14?"

Or you could try algebra or some other tricky math.

But I bet your brain went straight to the answer—the number 70—and thought  $70 = 7 \times 10$  and could see the answer to the puzzle!

Check out [MATHICAL](#) for award-winning math books for middle-schoolers and teens, the YouTube channel [NUMBERPHILE](#) for math videos galore, and [MORE MATH!](#) for even more resources. Wowza!

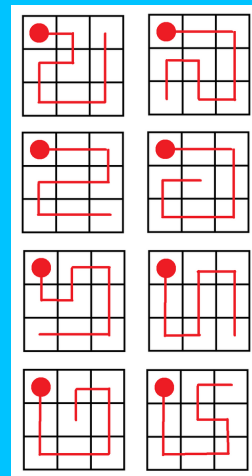
The [52 Master Pieces](#) experience from [MORE MATH!](#) often has maze puzzles.

## puzzle #2

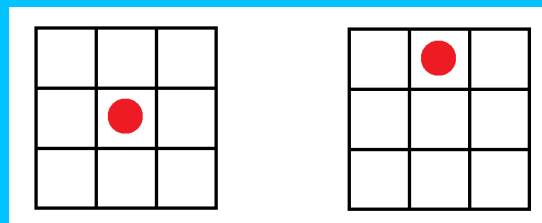
The maze I drew on the previous page has a number of different solutions. Counting how many would be hard! (Don't include solutions that repeat a section of path.)

But here is a counting puzzle that is manageable.

There are 8 ways to walk through a 3x3 grid of squares starting at the top left corner and taking only vertical and horizontal steps. (Each path visits each and every square exactly once.)



How many different ways are there to walk through the grid starting at the middle square? How many starting at an edge square different from a corner?



**Do you have a math question for me to answer, or try to answer?**

**Write to me at the website. Each week I'll pick a new question and give my thoughts on it!**

### About the Author: Dr. James Tanton

The NMF Weekly is written by mathematician Dr. James Tanton as a resource for friends and fans of the 2021 National Math Festival.

Learn more at [globalmathproject.org/nmf-weekly](https://globalmathproject.org/nmf-weekly) & [nationalmathfestival.org](https://nationalmathfestival.org)

