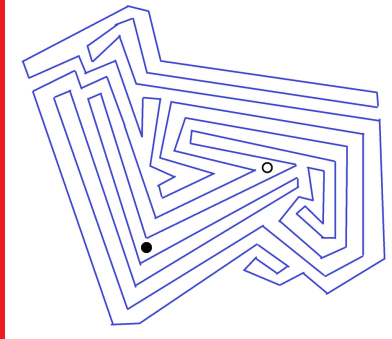


Math and Outer Space: Solutions

puzzle #1

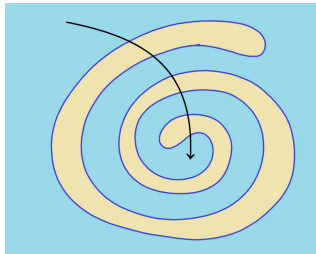
Is the solid dot
inside or
outside?
Is the hollow
dot inside or
outside?



Is there a quick way to tell?

ANSWERS TO PUZZLES 1 and 2:

Imagine each picture is the picture of an island in water. If you walk a path from the outside water and cross the boundary of the loop you alternately cross from water to land, then from land to water. If you stop after an even number of crossings you must be in water again. If you stop after an odd number of crossings, you must be on land.



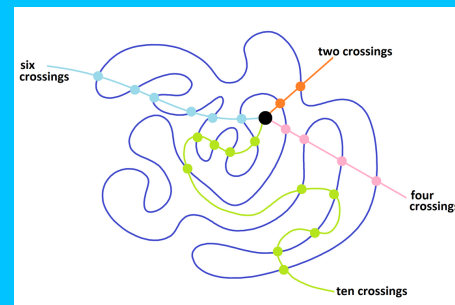
This means that all paths that start in the outside ocean end at the same final point either all cross the loop an **even number of times** or all cross the loop an **odd number of times**. (Make sure you actually cross the loop each time!) It also means in puzzle 1 that the solid dot is in water (outside) and hollow dot is on land (inside).

puzzle #2

Here's a messy complicated picture.

There is one big, dark blue loop.
There is one solid black dot.

And there are some paths from that dot each going to the "outer space" of the loop. And on each path, we've counted the number of times that path crosses the dark blue loop.



The count of crossings each time is an even number.

Is that a coincidence? Or is there a path from the black dot to "outer space" that crosses the blue curve an odd number of times?

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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 & nationalmathfestival.org

