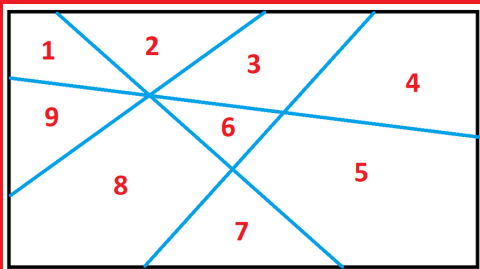# Do Straight Lines Exist? SOLUTIONS

Here are the answers to the puzzles.

puzzle #1

Draw FOUR straight lines across a blank sheet of paper. Have each line start and end on an edge of the paper. Count how many regions you get.

**In my picture here I count 9 regions.**

What is the biggest count of regions you can get? What is the smallest number of regions possible?

ANSWER TO PUZZLE 1:

As you experiment with this, you see that whenever you draw a new line for your diagram, each time that line intersects a previously drawn line, it splits a region in two (thereby adding to the count of regions) and then again splits a region in two when it reaches the edge of the paper. So then, to get the biggest count of regions possible, you need to make sure each line you draw intersects all the previously drawn lines. This gives you 11 regions.
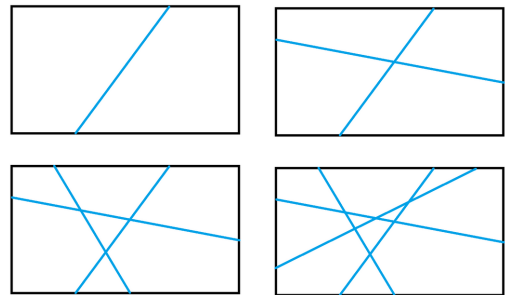
11 regions

To get the smallest of regions, make sure lines never intersect! This gives you 5 regions.

5 regions
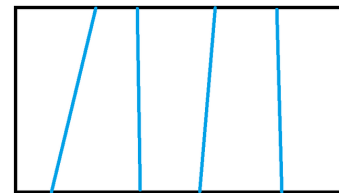
puzzle #2

There is another place on Earth where the women could have started her curious walk. (She won't see a bear on this journey, though.) Where?

ANSWER TO PUZZLE 2:

Draw a small circle of circumference 1 mile around the South pole. If the woman starts her journey 1 mile north of this circle, then:

Walking south for 1 mile takes her to this circle.

Walking east for 1 mile has her walk once around the circle.

Walking north 1 mile then sends her back to start.

In fact, you can find even more admissible starting points! Start by thinking about a circle around the South Pole with circumference half-a-mile in length, or a third of a mile, and so on!
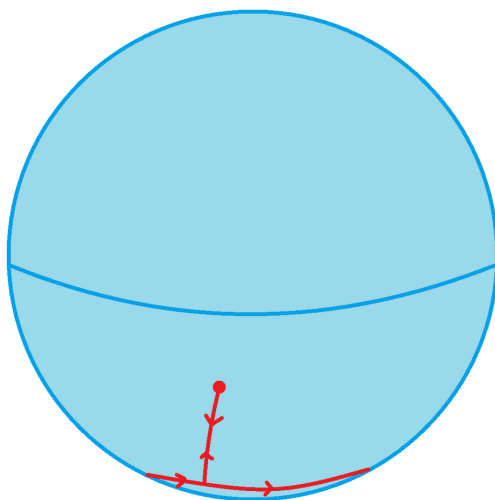
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The NMF Weekly is written by mathematician Dr. James Tanton as a resource for friends and fans of the 2021 National Math Festival.

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