

The Odd Trail

Solution

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The North Pole works. There are also infinitely many starting circles near the South Pole.

Treat Earth as a sphere. “South” and “north” mean following a meridian, and “west” means following a line of latitude. Ignore terrain and obstacles.

The North Pole

Walk one mile south from the North Pole. Walking west keeps you on the same latitude, still one mile from the North Pole. Walking one mile north takes you back to the pole.

The South Pole family

Find the small latitude circle near the South Pole whose circumference is exactly one mile. Start anywhere exactly one mile north of that circle. Your southward leg reaches it; your westward mile makes one full circuit; your northward mile retraces the first leg.

The same works for a circle whose circumference is half a mile: the westward leg makes two complete circuits. A circumference of one-third mile gives three circuits, and so on.

Thus for *every positive integer* k , take the southern latitude circle of circumference $1/k$ mile. Every point one mile north of that circle is a valid start. Each of these starting circles itself contains infinitely many points.

Why this lists all the possibilities

Away from the poles, the north and south legs preserve longitude and cancel their changes in latitude. To finish at the same point, the westward leg must therefore make an integer number of complete circuits of its latitude circle. Its circumference must be $1/k$ mile.

Such tiny circles occur near both poles, but the ones near the North Pole cannot be reached by walking a full mile south from a valid nonpolar starting point: they are less than a mile from that pole. The southern circles do work. The North Pole is the separate exceptional case because all longitudes meet there.

This description is exact for the spherical model. Approximating these tiny circles by flat circles is unnecessary. The South Pole itself is not another start: there is no initial southward direction from it.

History and sources: [companion history PDF](#).