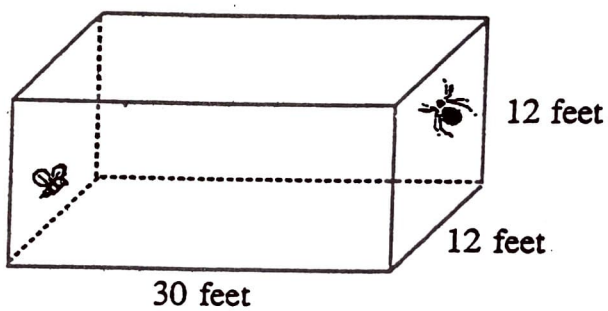
THE SPIDER & THE FLY

Here is problem that was first published in 1903 in a British newspaper by Henry Ernest Dudeney, a renowned 19th century English puzzle creator.

There is a spider and a fly in a room. The spider has designs on the fly, and the fly is so frightened it cannot move. The details are:

- The room is rectangular and measures 30 feet by 12 feet by 12 feet.
- The spider is at the middle of an end wall, one foot from the ceiling.
- The fly is at the middle of the opposite end wall, one foot above the floor.



The question is:

What is the shortest possible route along which the spider may crawl (without leaving a surface) to reach his prey?

If the spider crawls straight down the wall, then in a straight line along the floor, and then straight up the other wall, or follows a similar route along the ceiling, the distance is 42 feet. Now surely it is impossible to imagine a shorter route! But there is. What is it?

This problem and many others can be found in *The Joy of Mathematics: Discovering Mathematics All Around You* by Theoni Pappas (Wide World Publishing/Tetra, 1989). Another book of fascinating problems is Tom Wujec's *Pumping Ions* (Doubleday and Company, 1988). William Poundstone's book *Labyrinths of Reason: Paradox, Puzzles and the Frailty of Knowledge* (Doubleday, 1988) is also an excellent resource for ToK.

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ToK Lateral Thinking Problem

SOLUTION TO THE SPIDER AND THE FLY PROBLEM

Was it impossible to imagine a route shorter than 42 feet? Here is one way to get the answer. Start by cutting out a sheet of paper, which, when properly folded, will make a model of the room. Then by joining the points representing the spider and the fly by a straight line, a geodesic can be obtained. The length of this geodesic is only **40 feet**, in other words, 2 feet shorter than the "obvious" route of following straight lines.

There are several ways of cutting the sheet of paper, and accordingly, there are several possible routes, but that of 40 feet is the shortest; and remarkably enough, as may be seen below, this route requires the spider to pass over 5 of the 6 sides of the room.

This problem graphically reveals the point that our intuitive notions about space almost invariably lead us astray.