

## Ants and Generals: Two Riddles for May



### Riddle no. 1: Trace the Path of the Ants

This month marks the 105<sup>th</sup> birthday of [Richard Feynman](#), one of the greatest physicists of the twentieth century. In 1965, Feynman won a joint Nobel Prize along with his colleagues [Julian Schwinger](#) and [Shinichiro Tomonaga](#) for their work in the field of quantum field theory.

Feynman was known for his ability to explain complex concepts in a very clear manner, but he was also famous for his sense of humor and funny stories, including published works such as *Surely You're Joking, Mr. Feynman!* and *What Do You Care What Other People Think?* The latter depicts the evolution of ant navigation: At first, their paths were general and bore no obvious patterns; later, they grew shorter as a way of saving time. In the future, claimed Feynman, more ants will take shorter routes until they eventually evolve to walk in straight lines. In honor of his theory, this month's first riddle is about ant paths.

We are given the following function:

$$f[0,1]^2: \rightarrow \mathbb{R}$$

Let us assume that an anthill is located at  $(0,0, f(0,0))$ , and that the ants' food source is located at  $(1,1, f(1,1))$ . We would like to write an approximation algorithm that calculates the ants' path over time. In order to solve the riddle, let us say that the ants always walk at the same speed, whether they are moving uphill, downhill, or a horizontal plane.

## Riddle no. 2: In the Footsteps of Kissinger

One of the greatest political minds of the twentieth century, Henry Kissinger, will be celebrating his 100<sup>th</sup> birthday this month. Among his many achievements is the Détente between the United States and China in 1972. Let us honor him with a riddle in political science. In 183 BCE, just 2,206 years ago, two generals died: [Hannibal Barca](#) and [Scipio Africanus](#). Can you discover who died first, using either political thought or game theory?