Janus Upside Down

Janus is the Roman god of gates. He has a two-faced head because from each gate he needs to look in both directions. The first month of the year, January, is derived from Janus, because it is the gateway to a new year.

Of course standing at a gate all day is a pretty boring activity for a god, so Janus thought up the following problems. First he placed six of his coins on a table to form this triangle:

Then he tried inverting this triangle by sliding only TWO coins. Because Janus was a smart god, it only took him 1 year to find the answer...

Extensions:

- Next he tried inverting this triangle of 10 coins by sliding only THREE coins:

- Finally he tried inverting this triangle of 15 coins by sliding only FIVE coins:

- 2, 3, and 5 are numbers in the Fibonacci sequence. Is this just coincidence?
- What is the formula for the number of coins needed to invert a triangle with N coins per side?

The Math in This Problem:

In this investigation, students are introduced to the Fibonacci sequence, more specifically as it is evident through the recurrence relation defined by triangular patterns. This coin-related puzzle will provide students with an idea of the patterns and sequences aspects within mathematics.