

PILES AND HOLES

How a story that isn't true can explain the mysteries of negative numbers!

TOPICS COVERED:

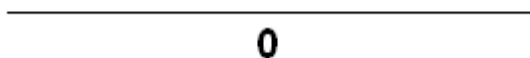
Basic introduction to negative numbers: addition and "subtraction."

Extension to polynomial division

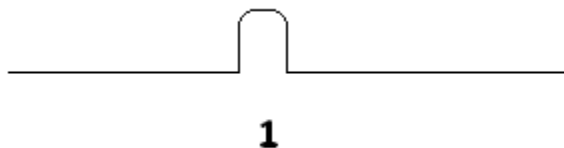
A. GETTING STARTED

Here is a story that isn't true.

When I was a young child I used to spend my days sitting in a sandbox at the back of my yard (not true). And being a very serene child I used to take my time in the morning leveling the sand in my box to make a perfectly flat horizontal surface (also not true). It very much appealed to my tranquil sensibilities, so much so that I decided to give this level state a name. I called it "zero."



I spent many an hour admiring my zero state (still not true), but then, one day, I had an epiphany! I realized I could reach behind where I was sitting, grab a handful of sand and make a pile. I called the one pile the "1" state.



And then I discovered two piles - which I called "2" - and three piles, "3" and so forth.



Hours of mathematical fun were had as I discovered the counting numbers with piles of sand.

Question 1: Had I discovered the counting numbers in this untrue story? Is counting piles of sand really the same as counting dots?

BUT THEN ... one day I had the most astounding epiphany of all! Instead of using a handful of sand to make a pile, I could ...

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