

# MindBugs in Math

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A third-grader uses fingers to count just THREE objects on a table.

A sixth-grade honor student still lines numbers up to the right...even when adding decimals.

High achieving students avoid careers in math and science.

Straight-A math students can't use a tape measure to make a 180-inch line.

Science students on the college track fail to understand a simple graph.

## What is Happening? How Do We Help?

Major detours in conceptual learning can occur very early in a child's education; when students should be learning the fundamental nature of numbers. Take David for example:

David pretends to understand numbers in 2nd grade and memorizes procedures for counting, adding and subtracting. In 4th grade, decimals enter the picture and memorizing procedures becomes too complex. All of the 'tricks' fail to work and he starts to falter on assessments. Since David never really understood the nature of a number, place value is lost. Long division is catastrophic without place value. By 5th grade, David shuts down to math. Without math, you cannot succeed in science.

How do we address the capable young "Davids" of our world? We help students, teachers and parents understand that learning 1000's of procedures isn't sufficient. We help students, parents and teachers learn the fundamental underlying concepts so that the 1000's of procedures aren't necessary.



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# MindBugs in Science

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If the Earth were the center of our Solar System, what would the path of the sun look like over the course of a day?

You've got it. It would look exactly like it does today. This Q&A illustrates perfectly why students and educators alike create and carry misconceptions in science. Without careful observations coupled with accurate measurements, it's easy to draw incorrect conclusions about the world around us.

## Banish the MindBugs from Your School

Using the 5 E's as a guideline, educators can lead students toward discovery and foster a love of science. The 5 E's suggest that you actively engage students then support them through exploring phenomena with the level of guidance appropriate for their age and ability. Only after exploring are students primed for an accurate but age-appropriate explanation. To effectively plan future instruction, evaluate understanding and as appropriate extend it.

With a strong understanding of scientific content and an effective teaching strategy, educators see and take advantage of opportunities to create and continually reinforce critical scientific concepts and skills.



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