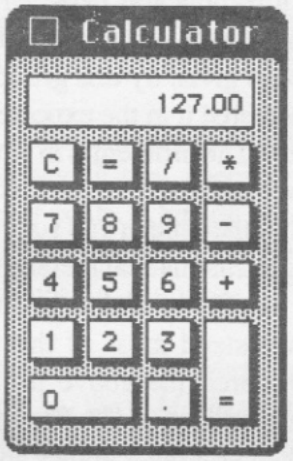
Ideas On Calculators

Why do the zeros disappear when you press equal? *by Ihor Charischak*

The big push over the past few years has been for teachers to use calculators. Unfortunately, the issue is charged because many parents have a hard time supporting teachers who use calculators before their children have learned their algorithms. (A recent survey* on the attitudes of parents is very sobering reading.) Though I'm a strong proponent for the use of calculators, I have to sympathize with these parents because many of the teachers that I observe have students use them only to check their work. Since this is a somewhat contrived use, students will "cheat" and use them the way adults use them: to do the actual calculation!



Contrary to conventional wisdom mathematicians have always hated tedious calculations and have sought methods to ease this pain. And students should do the same. Unfortunately, this will not necessarily lead to any learning about how numbers actually work. I once watched a graduate student use a calculator to find what percent of 86 was 30. First he punched in 86, divided it by 30 and got an answer he didn't understand. So he tried it again this time reversing the numbers. He looked up with a confident smile and said it was about 35%. He knew that finding percentages had something to do with division and that most percents showed up as decimals less than one, so he concluded that the second answer made "sense". Eventhough he had only a vague notion of how percents work, he did have enough intuitive number sense to get the answer.

To help students not only understand how numbers work, but also gain this invaluable intuitve understanding, I would suggest "making sense" sessions with calculators. I'm not big on all those "tricks" you find in calculator activity books which reinforce kids beliefs that math is magical and mysterious. The goal should be to take the mystery out of what happens on the calculator, not add to it.

Here's a simple example of what I mean. I once asked my seventh grade class to enter a decimal number on the calculator. I noticed that everyone entered a number with a decimal point in it. So on my overhead transparency calculator I pressed in the number 127 and told them that this was my decimal number. Though most of them were willing to accept what I did (since students usually assume I'm the math magician and what I say goes), one student told me that I forgot the decimal point in my number. So I asked the class whether a decimal number needs a decimal point. The class seemed to agree that you did. As I was about to move on, a student (fortunately) challenged what I just said. "But your number doesn't have a decimal point," he said. In reply I wrote on the blackboard 127.00. "Is this a decimal number?" I asked. He said yes. "Let me punch it in on the overhead calculator," was my reply. Then I pressed equal. "What happened to my decimal point?" I asked. Hands shot up. "Oh, you don't need a decimal point! The calculator just *turned it* into a whole number," one student yelled out. "So you mean a whole number is not a decimal number?" I said. Some nodded in agreement, some disagreed, and others were silent.

We discussed the confusion about the two meanings of the word decimal. I told them that decimal can refer to the point that separates the whole part from the fractional part. Or it can refer to our base 10 place value system since decimal comes from the Latin word *decimalis* meaning "ten times".

My goal was to have my students understand that *numbers are masters of disguise*. They can take on an infinite number of forms. The trick in problem solv-

*First Things First: What Americans Expect from the Public Schools - Survey conducted by Public Agenda, a non-partisan, citizen research group. From Albert Shanker's article in New York Times (10/16/94).

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