PRESIDENT'S MESSAGE

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NUMBER SENSE—RIGHT NOW!

Is 4 × 12 closer to 40 or 50? How many paper clips can you hold in your hand? If the restaurant bill is $119.23, how much should you leave for a tip? How long will it take to make the 50-mile drive to Washington? If a 10-year-old is 5 feet tall, how tall will the child be at age 20?

You may sense the urgency in this title. Curricula, standards, focal points, and assessment guidelines all provide mathematics teachers with guidance about what's important at different levels of instruction. Some goals are more elusive than others and perhaps vaguely defined. My goal, hope, and wish are for all students to leave elementary school with a strong sense of number that will then expand and develop in middle school, before engaging in higher-level mathematics at the high school level. So, this column is all about the importance of number sense!

How does number sense begin? This is where cognitive psychology comes in. Early on, children are able to literally *see* small quantities, develop basic counting skills, and add small amounts. An early sense of number is mostly intuitive, developing through a variety of experiences. Home is a great place to start. I often talk to parents about having early math conversations with children. "How many spoons?" "Which is more?" "How do you know?" "What's one more?" "Two more?" "One less?" " Two less?" "How many steps to the door?" "How long do you think the drive will take?" Talk, talk, talk! These experiences bring math into the lives of children early on. Students approach school with a growing sense of number, and parents and others can build on this.

Once children begin their mathematics in school, a variety of mathematical experiences help develop a more formal sense of number. These experiences include, but are certainly not limited to, working with place value, composing and decomposing numbers, understanding how addition, subtraction, multiplication, and division work, acquiring basic facts, and developing fluency with whole-number operations. Number sense also requires an understanding of how the commutative, associative, and distributive properties work and how they are used in learning basic-fact combinations, adding columns of numbers, and seeing how the multiplication algorithm works. This work must extend to fractions, decimals, and related percents as students move through the elementary grades into middle school.

Students who have a good sense of number are able to provide a reasonable response to the examples above, including the driving example. And they know that there is no proportion-driven response for the final example. Number sense, however, is also about knowing that 6 + 7 and 7 + 6 both produce a sum of 13; that 25 × 7 is less than 200; that the quotient for 1/2 ÷ 1/4 is larger than 1/2; that the stadium could not seat 400,000 people; that tripling the square footage wouldn't make for the most economical home to heat; and so on.

As students estimate, talk about numbers, compute, use mental math, and judge the reasonableness of their results, they become more flexible in working with numbers. A sense of number emerges that is built on the foundations discussed above, which yield responses such as, "I knew 3/4 was more than 3/5 because the pieces were bigger in fourths." This is what all math teachers want. Such "aha!" classroom moments remind us about the importance of understanding. No, we can't wait. Number sense is important and needed—right now. Ω