TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION

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Take It to the MAT begins its seventh year with a question from a local teacher: "What's the big deal with teaching rounding?" That is a very fair question. It seems we spend a good deal of time teaching and drilling *rounding* of whole numbers, decimals, and at times fractions. Why? The primary reason *why* we round numbers is to facilitate *estimation*, which is a necessary and practical skill in academics and in life.

In this letter, we'll confine ourselves to estimation as it relates to computation. Estimation allows us to solve problems that do not require an exact solution. It also helps check the reasonableness of pencil-and-paper calculations. When you really boil it down, estimation is about "*about*." A sum, difference, product, quotient, or other result of a mathematical process should be "*about*" so much. The sum 19,487 + 62,646 is *about* 80,000. The product 473 × 215 is *about* 100,000.

Rounding is simply a mechanism to reduce the number of non-zero digits with which we must contend. Rounding itself is an "*about*" process. In the examples above, 473 is *about* 500; 215 is *about* 200. It is easy to do arithmetic when we have a lot of zeros, so we want as few non-zero digits as possible. Since 19,487 and 62,646 are *about* 20,000 and 60,000, respectively, then 19,487 + 62,646 is *about* 80,000 since 20,000 + 60,000 = 80,000. Likewise, 473 × 215 is *about* 100,000 since 500 × 200 = 100,000.

We could have said that 19,487 and 62,646 are *about* 19,500 and 62,600, or 473 and 215 are *about* 470 and 220, but neither may reduce the number of non-zero digits enough for us to make a quick computation, especially in the case of the product. It's easier to compute when we have fewer non-zero digits to handle and easiest when we only have one in each number.

How we round is the majority of instruction usually provided in the elementary grades. That "how" is a set of rules, simple and straightforward. To round a number to a particular *place value* is to find the value closest to the number whose last non-zero digit is in that place. Another way of saying this is to find the multiple of the place nearest to the number. Take 473 for example. To round it to the nearest ten, we ask, "What multiple of 10 is closest to 473?"

To round to the nearest hundred, what multiple of 100 is closest to 473? In the case of rounding to the nearest ten, it is 470; for the nearest hundred it is 500. Notice that when we round to the tens place, the last non-zero digit is in the tens place. The same is true for rounding to the hundreds place.

Consider 215 rounded to the nearest ten. Which multiple of ten is it closer to, 210 or 220? What does the conventional rounding rule tell us to do? Why? We'll save that for next month.