COMMON MISCONCEPTIONS

• Students skip place values when translating into standard form.
  
  Given a number in word form, such as five thousand thirty-four, a student may overlook the meaning of the place values and, seeing only three numbers, write 534. To avoid this, always bring students back to the meaning of each place value and give them examples that “skip” some values in word form. Remind students that the values always stay in the same place. If 5 is in the one thousands place, then it is the 4th number from the right. If there are no hundreds in the word form, that means there are 0 hundreds, so there should be a 0 in the hundreds place.

• Numbers must be written out in the order they are listed, regardless of place value.
  
  When presented with a number in expanded form but out of order of place value, such as 20 + 50,000 + 400 + 3,000 + 1, a student may write 25,431. Students should see that the most important information is the place value, and that expanded form is the same as adding. Give students plenty of practice writing numbers in standard form from word form or from expanded form given in random order.

• When comparing the size of two numbers, all place values must be checked.
  
  Students are taught that when comparing the size of two numbers, we compare each place value from the largest place to the smallest (left to right). For example, to compare 4,253 and 4,359, students begin by comparing the thousands place, and since they are the same, they move on to comparing the hundreds place. Here, once it is determined that 3 > 2, they can conclude that 4,359 > 4,253. However, students may believe that it is necessary to compare the tens and ones places as well. Here, place value blocks are helpful so that students have a visual representation of why tens and ones are irrelevant once they establish that one number has more hundreds.

NAMING PLACE VALUES UP TO THE HUNDRED-THOUSANDS

Students should already be able to name and say numbers with three digits, or up to the hundreds place. They should understand that each place value uses units that are 10 times larger than the one on its right. Tens are 10 times larger than ones, and hundreds are 10 times larger than tens.

Students now learn about one thousands, ten thousands, and hundred thousands. Place value blocks can be used: have a single cube represent one thousand, a tens rod represent ten thousand, and a hundreds flat represent one hundred thousand. The students should notice the repeating pattern of “one, ten, hundred.”

Students are already familiar with expanding 3-digit numbers, and now you can have them expand numbers up to the hundred thousands place. Try 52,891 and 484,026. Show students that 484,026 can be expanded as 400,000 + 80,000 + 4,000 + 20 + 6. Because there is a zero in the hundreds place, there is no addend for hundreds.
COMPARING NUMBER SIZE USING PLACE VALUE

Number sizes can be compared using place value. Begin by reminding students what the signs < and > mean. To compare two numbers, we can follow these steps:

- Do both numbers have values in the greatest place value? 53,394 has a 5 in the ten thousands place, but 4,035 has nothing in the ten thousands place, so we know right away that 53,394 is greater. We write 53,394 > 4,035.

- If both numbers have values in the greatest place, we must compare the places from left to right. For example, to compare 6,345 and 6,463 we begin by checking the thousands place. Since both numbers have 6 in the thousands place, we move on to the hundreds place. Since one number has 4 in the hundreds place while the other has 3, we know that 6,463 > 6,345 and there is no need to check the tens and ones places.

The lesson also briefly introduces students to multiplying and dividing by 10. If we multiply a number by 10, we can simply change each place value to be 10 times larger. For example, 234 is 2 hundreds, 3 tens, and 4 ones. When we multiply 234 × 10, we get 2,340, and now we have 2 thousands, 3 hundreds, 4 tens, and we add a zero at the end because we have 0 ones. Similarly, when dividing, we change each place value to be 10 times smaller. So, 450 (4 hundreds, 5 tens, 0 ones) divided by 10 becomes 45 (4 tens, 5 ones).

TEACHER TIPS

Place-value blocks are very useful for this lesson, mainly to help reinforce the idea that each place-value unit is 10 times more than the one to the right of it. Show students that each time we have 10 ones, we make a rod that means “one ten.” Each time we have 10 tens, we make a flat that is one hundred. So a value in the tens place is 10 times more than a value in the ones place, and a value in the hundreds place is 10 times more than a value in the tens place.

When students learn about thousands, ten thousands, and hundred thousands, you can repeat this demonstration with one unit cube representing one thousand.

Because this lesson is about multiple ways of representing numbers, take as many opportunities as you can to have students translate every number between numerical, expanded, and word forms. Practice using commas and not saying “and” in large numbers.