# **Whole Numbers Discussion Guide (for use during or after reading)**

1. What is place value? Use an example to support your answer. (Place Value, p. 6-9)
   1. Place value is the position of a digit in a number. It represents, or shows, the value of each digit. For example, in the number 347, each digit represents a different value. The 3 represents 300, the 4 represents 40, and the 7 represents 7. Understanding place value is critical to understanding math in the base ten system.
2. Mathematicians use numbers in standard form, expanded form, and word form. Describe and provide an example of the three ways to represent a number. (Naming Numbers and Expanded Notation, p. 10-13)
   1. The standard form of a number is the number written with numerals. We typically think about numbers this way, especially in math. For example, 9,106 is written in standard form.
   2. Word form is another useful way to write numbers. Word form involves writing the English (or other language) equivalent of the number in words. For example, nine thousand, one hundred six is written in word form.
   3. Finally, mathematicians use expanded form to represent, decompose, and otherwise think about numbers. Expanded notation, or form, of a number is a sum that shows the total value of all the digits. For example, 9,000 + 100 + 6 is written in expanded form.
3. Describe the strategy you would use to compare the numbers 52,197 and 52,200. Which number is greater? (Comparing Numbers, p. 14-17)
   1. Students should reference place value strategies when comparing the two numbers. First, students should line up the numbers based on their place value. Next, they should compare the digits starting with those in the largest place value until they find ones that differ. The number with the greatest digit in the first place that differs is the greatest number.
   2. In this example, students should realize that the 5 and 2 in the ten thousands and thousands places respectively are the same so we must look to the hundreds place to compare. Because 2 is greater than 1, we can say 52,000 > 52,197.
4. What is rounding and why is it a useful skill for mathematicians to develop? (Rounding, p. 18-19)
   1. Rounding is a skill mathematicians use in many areas of math. It involves replacing a number with a close, but simpler value. Rounding can be useful for mathematicians when they are estimating or when they are trying to solve problems mentally. Rounding numbers builds on and continues to develop students’ number sense and allows them to work mentally with larger numbers.
5. Describe and compare the vocabulary terms factor and multiple. Use examples to support your answer. (Factors and Multiples, p. 20-29)
   1. A factor of a whole number can be multiplied by another number to make that whole number. Whole numbers are divisible by their factors. In order to find the factors of a number, it can be helpful to think about pairs of digits that multiply together to get that number as a product. For example, the factors of 28 include 1 and 28, 2 and 14, and 4 and 7. Numbers that only have one pair of factors, one and themselves, are called prime numbers.
   2. A multiple of a whole number is one of its products with another factor. It can be helpful to think about multiples as the numbers we produce when skip counting by a certain number. For example, the multiples of 4 include 4, 8, 12, 16, 24, 28, 32, and so on.
   3. It is important to note that multiples are infinite and can be listed forever, whereas factors are finite because there are only a certain number of digits that, when multiplied, produce a given amount.
6. List all the common factors of 56 and 21. What is their greatest common factor? (Factors, p. 22-25)
   1. The factors of 56 are 1, 56, 2, 28, 4, 14, 7 and 8. The factors of 21 are 1, 21, 3, and 7. The common factors of 56 and 21 are 1 and 7, so the greatest common factor of 56 and 21 is 7.
7. Describe how to find the least common multiple of 6 and 9. (Multiples, p. 28-29)
   1. In order to find the least common multiple of two numbers, first list a few multiples of each. Then look for similarities in the two lists, choosing the common multiple with the lowest value. For example, the first few multiples of 6 are 6, 12, 18, 24, 30, and 36, and the first few multiples of 9 are 9, 18, 27, 36, 45, and 54. We can see that both 18 and 36 are common multiples, but because 18 has the lowest value, it is the least common multiple of 6 and 9.
8. What does it mean if a number is divisible by something? (Divisibility, p. 30-31)
   1. In order for a number to be divisible by another number, it must be able to be divided evenly by that number. Another way to think about divisibility is by thinking about the factors of a whole number. A whole number is divisible by any of its factors. For example, the number 4 is divisible by 1, 2, and 4, but not 3 because dividing 4 into 3 groups would produce a non-whole number answer.
9. What is a property in math? Describe the three major addition and multiplication properties: identity, commutative, and associative. (Properties of Whole Numbers, p. 32-35)
   1. In math, a property refers to a characteristic that applies to a given set of numbers or to an operation. For example, both addition and multiplication have an identity property, a commutative property, and an associative property.
   2. In addition, the identity property states that adding zero to another number always equals that other number, the commutative property states that changing the order of the addends results in the same sum, and the associative property states that changing the grouping of the addends results in the same sum.
   3. In multiplication, the identity property states that multiplying any number by zero results in a product of 0, the commutative property states that changing the order of the factors results in the same product, and the associative property states that changing the grouping of the factors results in the same product.
10. Why might it be helpful for mathematicians to know and use the properties of addition and multiplication? (Properties of Whole Numbers, p. 32-35)
    1. It might be helpful for mathematicians to know and use the properties of addition and multiplication because it may make math simpler or easier for them. Understanding these properties involves more than just solving problems to include deepening number sense understanding. When mathematicians understand properties at a deep level, they become a natural part of their thought process and can help them efficiently solve problems from mental math to complex calculations.