

## Fifth Grade Math Curriculum

Fifth grade mathematics is about (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to two-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

### **Module 1: Place Value and Decimal Fractions**

Students' experiences with the algorithms as ways to manipulate place value units in Grades 2-4 really begin to pay dividends in Grade 5. In Module 1, whole number patterns with number disks on the place value table are easily generalized to decimal numbers. As students work word problems with measurements in the metric system, where the same patterns occur, they begin to appreciate the value and the meaning of decimals. Students apply their work with place value to adding, subtracting, multiplying and dividing decimal numbers with tenths and hundredths.

### **Module 2: Multi-Digit Whole Number and Decimal Fraction Operations**

Module 2 begins by using place value patterns and the distributive and associative properties to multiply multi-digit numbers by multiples of 10 and leads to fluency with multi-digit whole number multiplication.<sup>79</sup> For multiplication, students must grapple with and fully understand the distributive property (one of the key reasons for teaching the multi-digit algorithm). While the multi-digit multiplication algorithm is a straightforward generalization of the one-digit multiplication algorithm, the division algorithm with two-digit divisors requires far more care to teach because students have to also learn estimation strategies, error correction strategies, and the idea of successive approximation (all of which are central concepts in math, science, and engineering).

### **Module 3: Addition and Subtraction of Fractions**

Work with place value units paves the path toward fraction arithmetic in Module 3 as elementary math's place value emphasis shifts to the larger set of fractional units for algebra. The new complexity is that when units are not equivalent, they must be changed for smaller equal units so that they can be added or subtracted.

### **Module 4: Multiplication and Division of Fractions and Decimal Fractions**

Near the end of Module 4 students know enough about fractions and whole number operations to begin to explore multi-digit decimal multiplication and division. In multiplying  $2.1 \times 3.8$ , for example, students now have multiple skills and strategies that they can use to locate the decimal point in the final answer, including:

- Unit awareness:  $2.1 \times 3.8 = 21 \text{ tenths} \times 38 \text{ tenths} = 798 \text{ hundredths}$
- Estimation (through rounding):  $2.1 \times 3.8 \approx 2 \times 4 = 8$ , so  $2.1 \times 3.8 = 7.98$
- Fraction multiplication:  $21/10 \times 38/10 = (21 \times 38)/(10 \times 10)$

### **Module 5: Addition and Multiplication with Volume and Area**

Frequent use of the area model in Modules 3 and 4 prepares students for an in-depth discussion of area and volume in Module 5. But the module on area and volume also reinforces work done in the fraction module: Now, questions about how the area changes when a rectangle is scaled by a whole or fractional scale factor may be asked and missing fractional sides may be found.

### **Module 6: Problem Solving with the Coordinate Plane**

Scaling is revisited in the last module on the coordinate plane. Since Kindergarten where growth and shrinking patterns were first introduced, students have been using bar graphs to display data and patterns. Extensive bar-graph work has set the stage for line plots, which are both the natural extension of bar graphs and the precursor to linear functions. It is in this final module of K-5 that a simple line plot of a straight line is presented on a coordinate plane and students are asked about the scaling relationship between the increase in the units of the vertical axis for 1 unit of increase in the horizontal axis. This is the first hint of slope and marks the beginning of the major theme of middle school: ratios and proportions.