Grade 4

The big ideas in Grade 4 include

• developing understanding with multi-digit multiplication and division;
• understanding fraction equivalence;
• adding and subtracting fractions with like denominators;
• multiplication of fractions and whole numbers.

This blueprint could start with any of the four units without prerequisites: 4.1 Factors and Multiples, 4.3 Base Ten Structure, 4.5 Comparing Fractions, and 4.9 Points, Lines, and Angles. We chose the first of these because it provides a natural way for students to bridge from their third grade work on multiplication and division, but any of the four choices is reasonable.

Students begin their work in Grade 4 by revisiting their work with multiplication and division through 100 from Grade 3. They develop an understanding of multiplicative comparisons, distinguishing it from additive comparison. They continue their study of the base-ten system, and compare, order, and round base-ten numbers. They multiply and divide multi-digit numbers, and illustrate and explain calculations using equations, arrays, and area models. They solve word problems involving adding, subtracting, multiplying, and dividing whole numbers.

Next, students deepen their understanding of fraction equivalence and reason about the size of fractions, which leads to comparing and ordering fractions, including decimal fractions. They extend their understanding of multiplication to multiply fractions by whole numbers. They apply their understanding to solve word problems involving multiplication of a fraction by a whole number. Then they extend their understanding of adding and subtracting whole numbers to fractions, including work with decimals. Traditionally, many curricula begin fraction arithmetic by adding and subtracting fractions. This blueprint suggests beginning with multiplication and division because fractions were invented because

the quotient of two whole numbers is not always a whole number. Fractions feel at home with multiplication and division; they submit to addition and subtraction more reluctantly.

The standard 4.OA.A.3 is a pinnacle standard for grades K–4, calling on students to use much of what they've learned throughout the grade, as well as previous grade's learning, in order to solve multistep word problems using the four operations. Students represent problems using equations with letters for unknown quantities and assess the reasonableness of answers using mental computation and estimation strategies. This is an opportunity for students to do additional work with unit conversions, applications in measurement, multiplicative comparison. It is in this unit that fluency with addition and subtraction of multi-digit whole numbers is expected.

Students finish the year with a short unit on geometry, where they are introduced to angles. They also classify shapes by their properties and study line symmetry.

Note that this course blueprint is only one of many possible ways of arranging a sequence of topics designed to achieve the standards. It is a continually evolving document and we welcome your comments here.

4.1 Factors and Multiples

In this unit students

- **define factors and multiples;**
- **convert units and see the connection to factors and multiples;**
- **look for and explain patterns in tables that have multiples.**

In this unit students revisit their work with multiplication and division within 100 from Grade 3. They understand and find factors and multiples and solve problems involving converting measurement units from a larger unit to a smaller unit. Additionally, students analyze and generate number patterns that follow given rules involving multiples.

Comment on this unit here.

4.2 Multiplicative Comparison

In this unit students understand, represent, and solve multiplicative comparison problems.

This unit builds on previous work with factors and multiples. Students develop an understanding of multiplication equations as comparisons (for example, understanding 35 = 5 x 7 as 35 is 5 times as many as 7) and using that understanding to multiply or divide to solve word problems. An important idea for students to grasp is how multiplicative comparison differs from additive comparison.

Comment on this unit here.

4.3 Base Ten Structure

In this unit students

- **understand base-ten structure for whole numbers;**
- **multiply and divide multi digit numbers;**
- **look for and explain patterns in tables in terms of base-ten structure.**

In this unit students extend their understanding of the base ten system. They work with multi-digit numbers to practice comparing, ordering, rounding, and writing numbers in expanded form. They begin on fluency with addition and subtraction of multi-digit whole numbers using the standard algorithm. More importantly, they extend their work with place value understanding and properties of operations to perform multiplication and division with multi-digit numbers. They illustrate and explain calculations using equations, arrays, and area models. As in Unit 4.1, students analyze and generate number patterns that follow given rules related to base ten structure.

Comment on this unit here.

4.4 Measurement Applications

In this unit students

- **use measurement contexts to work on adding, subtracting, multiplying, and dividing whole numbers;**
- **solve problems involving area and perimeter;**
- **work towards adding and subtracting with fluency.**

Students solve word problems involving adding, subtracting, multiplying, and dividing whole numbers. They use the formulas for area and perimeter to solve real world and mathematical problems, and they continue to work towards fluency with addition and subtraction of multi-digit numbers.

Comment on this unit here.

4.5 Comparing Fractions

In this unit students

- **compare equal and unequal fractions;**
- **understand fraction equivalence;**
- **work with decimal fractions for tenths and hundredths.**

Students deepen their understanding of fraction equivalence and reason about the size of fractions, which leads to comparing and ordering using visual fraction models. Students are also introduced to decimal fractions in this unit. They do similar work with equivalence (express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100) and compare decimals by reasoning about their size. This is the first unit out of three that focuses on fractions, which is part of the major work of 4th grade.

Comment on this unit here.

4.6 Multiplying Fractions

In this unit students extend their understanding of multiplication of whole numbers to multiplying whole numbers and fractions.

Students extend their understanding of multiplication to multiply fractions by whole numbers. They use visual fraction models and equations to develop this understanding. They apply their understanding to solve word problems involving multiplication of a fraction by a whole number.

Comment on this unit here.

4.7 Adding and Subtracting Fractions

In this unit students

- **extend understanding of addition and subtraction of whole numbers to addition and subtraction of fractions with the same denominator;**
- **use fraction equivalence in the special case of decimals.**

Students extend their understanding of adding and subtracting whole numbers in order to perform the same operations with fractions that have the same denominator. They work with decomposing fractions into a sum of fractions, add and subtract mixed numbers, and solve word problems using these skills. Students work with decimals, using fraction equivalence in the special case of $\frac{a}{10} = \frac{a \times 10}{100}$ to understand, e.g., that $0.67 = \frac{6}{10} + \frac{7}{100}$.

Comment on this unit here.

4.8 Operations with Whole Numbers

In this unit students

• **solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including applications in measurement, unit conversions and problems involving multiplicative comparison;**
• **achieve fluency with addition and subtraction of whole numbers.**

The main focus of this unit is standard 4.OA.A.3, which is a pinnacle standard for grades K–4. This standard calls on students to use much of what they've learned throughout the grade, as well as previous grade's learning, in order to solve multistep word problems using the four operations. Students represent problems using equations with letters for unknown quantities and assess the reasonableness of answers using mental computation and estimation strategies. This is an opportunity for students to do additional work with unit conversions, applications in measurement, multiplicative comparison. It is in this unit that achievement of fluency with addition and subtraction of multi-digit whole numbers is expected.

Comment on this unit here.

4.9 Points, Lines, and Angles

In this unit students

• **draw and identify points, lines, segments, rays, angles, perpendicular and parallel lines, triangles, and line symmetry;**
• **practice the four operations in length, area, and angle measure contexts.**

Students develop their understanding of the concept of an angle and measure angles using protractors. They get additional practice with addition and subtraction in the context of angle measures, length, and area. Shapes are classified by their properties (lines and angles) and students are introduced to symmetry.

Comment on this unit here.