Essential Learning from 5th Grade to 6th Grade

(CA Math Framework pp. 265-268)

For more in-depth examples of tasks, expectations, and student reasoning on these topics, refer to the 5th Grade CA Math Framework at http://www.cde.ca.gov/ci/ma/cf/documents/mathrade5frw.pdf

In kindergarten through grade five, the focus is on the addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals, with a balance of concepts, procedural skills, and problem solving. Arithmetic is viewed as an important set of skills and also as a thinking subject that, done thoughtfully, prepares students for algebra. Measurement and geometry develop alongside number and operations and are tied specifically to arithmetic along the way. Multiplication and division of whole numbers and fractions are an instructional focus in grades three through five.

To be prepared for grade-six mathematics, students should be able to demonstrate they have acquired certain mathematical concepts and procedural skills by the end of grade five and have met the fluency expectations for the grade. For students in grade five, the expected fluency is to multiply multi-digit whole numbers (with up to four digits) using the standard algorithm (5.NBT.5). These fluencies and the conceptual understandings that support them are foundational for work in later grades.

Of particular importance at grade five are concepts, skills, and understandings needed to understand the place-value system (5.NBT.1–4); perform operations with multi-digit whole numbers and with decimals to hundredths (5.NBT.5–7); use equivalent fractions as a strategy to add and subtract fractions (5.NF.1–2); apply and extend previous understandings of multiplication and division to multiply and divide fractions (5.NF.3–7); and understand geometric measurement, including concepts of volume and how to relate volume to multiplication and addition (5.MD.3–5). In addition, graphing points on the coordinate plane to solve real-world and mathematical problems (5.G.1–2) is an important part of a student's progress toward algebra.

Fractions

Student proficiency with fractions is essential to success in later grades. By the end of grade five, students should be able to add, subtract, and multiply any two fractions and understand how to divide fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions).

Students should understand fraction equivalence and use their skills to generate equivalent fractions as a strategy to add and subtract fractions that have unlike denominators, including mixed fractions. Students should use these skills to solve related word problems. This understanding brings together the threads of fraction equivalence (emphasized in grades three through five) and addition and subtraction (emphasized in kindergarten through grade four) to fully extend addition and subtraction to fractions.

By the end of grade five, students know how to multiply a fraction or whole number by a fraction. Based on their understanding of the relationship between fractions and division, students divide any whole number by any non-zero whole number and express the answer in the form of a fraction or mixed number. Work with multiplying fractions extends from students' understanding of the operation of multiplication. For example, to multiply $\frac{a}{b} \times q$ (where q is a whole number or a fraction), students can interpret $\frac{a}{b} \times q$ as meaning a parts of a partition of q into b equal parts. This interpretation

leads to a product that is less than, equal to, or greater than q, depending on whether $\frac{a}{b}<1, \frac{a}{b}=1$, or $\frac{a}{b}>1$, respectively. In cases where $\frac{a}{b}<1$, the result of multiplying contradicts earlier student experience with whole numbers, so this result needs to be explored, discussed, explained, and emphasized.

Fifth-grade students divide a unit fraction by a whole number or a whole number by a unit fraction. By the end of grade five, students should know how to multiply fractions to be prepared for division of a fraction by a fraction in grade six.

Decimals

In grade five, students integrate decimal fractions more fully into the place-value system as they learn to read, write, compare, and round decimals. By thinking about decimals as sums of multiples of base-ten units, students extend algorithms for multi-digit operations to decimals. By the end of grade five, students understand operations with decimals to hundredths. Students should understand how to add, subtract, multiply, and divide decimals to hundredths by using models, drawings, and various methods, including methods that extend from whole numbers and are explained by place-value meanings. The extension of the place-value system from whole numbers to decimals is a major accomplishment for a student that involves both understanding and skill with base-ten units and fractions. Skill and understanding with adding, subtracting, multiplying, and dividing multi-digit decimals will culminate in fluency with the standard algorithm in grade six.

Fluency with Whole-Number Operations

In grade five, the fluency expectation is to multiply multi-digit whole numbers using the standard algorithm: one-digit numbers multiplied by a number with up to four digits and two-digit numbers multiplied by two-digit numbers. Students also extend their grade-four work in finding whole-number quotients and remainders to the case of two-digit divisors. Skill and understanding of division with multi-digit whole numbers will culminate in fluency with the standard algorithm in grade six.

Volume

Students in grade five work with volume as an attribute of a solid figure and as a measurement quantity. They also relate volume to multiplication and addition. Students' understanding and skill with this work support a learning progression that leads to valuable skills in geometric measurement in middle school.