Grade Six Mathematics

The sixth-grade standards place continued emphasis on the study of whole numbers, decimals, and fractions. Students will use ratios to compare data sets, make conversions within a given measurement system, make geometric constructions and classify three-dimensional figures, and solve linear equations in one variable. While learning mathematics, students will be actively engaged, using concrete materials and appropriate technologies such as calculators and computers. However, facility in the use of technology shall not be regarded as a substitute for a student's understanding of quantitative concepts and relationships or for proficiency in basic computations. Students also will identify real-life applications of the mathematical principles they are learning that can be applied to science and other disciplines they are studying.

Mathematics has its own language, and the acquisition of specialized vocabulary and language patterns is crucial to a student's understanding and appreciation of the subject. Students should be encouraged to use correctly the concepts, skills, symbols, and vocabulary identified in the following set of standards.

Problem solving has been integrated throughout the six content strands. The development of problem-solving skills should be a major goal of the mathematics program at every grade level. Instruction in the process of problem solving will need to be integrated early and continuously into each student's mathematics education. Students must be helped to develop a wide range of skills and strategies for solving a variety of problem types.

Number and Number Sense

6.1 The student will identify representations of a given percent and describe orally and in writing the equivalence relationship between fractions, decimals, and percents.

6.2 The student will describe and compare two sets of data using ratios and will use appropriate notations such as a/b, a to b, and a:b.

6.3 The student will explain orally and in writing the concepts of prime and composite numbers.

6.4 The student will compare and order whole numbers, fractions, and decimals, using concrete materials, drawings or pictures, and mathematical symbols.

6.5 The student will identify and represent integers on a number line.

Computation and Estimation

6.6 The student will
- solve problems that involve addition, subtraction, and/or multiplication with fractions and mixed numbers, with and without regrouping, that include like and unlike denominators of 12 or less and express their answers in simplest form; and
- find the quotient, given a dividend expressed as a decimal through thousandths and a divisor expressed as a decimal to thousandths with exactly one non-zero digit. For divisors with more than one non-zero digit, estimation and calculators will be used.

6.7 The student will use estimation strategies to solve multistep practical problems involving whole numbers, decimals, and fractions.

6.8 The student will solve multistep consumer application problems involving fractions and decimals and present data and conclusions in paragraphs, tables, or graphs.

Measurement

6.9 The student will compare and convert units of measures for length, weight/mass, and volume within the U.S. Customary system and within the metric system and estimate conversions between units in each system:*
- length—part of an inch (1/2, 1/4, and 1/8), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers;
- weight/mass—ounces, pounds, tons, grams, and kilograms;
- liquid volume—cups, pints, quarts, gallons, milliliters, and liters; and
- area—square units.
- * *The intent of this standard is for students to make "ballpark" comparisons and not to memorize conversion factors between U.S. and metric units.*

6.10 The student will estimate and then determine length, weight/mass, area, and liquid volume/capacity, using standard and nonstandard units of measure.

6.11 The student will determine if a problem situation involving polygons of four sides or less represents the application of perimeter or area and apply the appropriate formula.

6.12 The student will create and solve problems by finding the circumference and/or area of a circle when given

the diameter or radius. Using concrete materials or computer models, the student will derive approximations for pi from measurements for circumference and diameter.

6.13 The student will estimate angle measures using 45°, 90°, and 180° as referents and use the appropriate tools to measure the given angles.

Geometry

6.14 The student will identify, classify, and describe the characteristics of plane figures including similarities and differences.

6.15 The student will determine congruence of segments, angles, and polygons by direct comparison, given their attributes. Examples of noncongruent and congruent figures will be included.

6.16 The student will construct the perpendicular bisector of a line segment and an angle bisector, using a compass and straightedge.

6.17 The student will sketch, construct models, and classify rectangular prisms, cones, cylinders, and pyramids.

Probability and Statistics

6.18 The student, given a problem situation, will collect, analyze, display, and interpret data in a variety of graphical methods, including line, bar, and circle graphs and stem-and-leaf and box-and-whisker plots. Circle graphs will be limited to halves, fourths, and eighths.

6.19 The student will describe the mean, median, and mode as measures of central tendency and determine their meaning for a set of data.

6.20 The student will determine and interpret the probability of an event occurring from a given sample space.

Patterns, Functions, and Algebra

6.21 The student will recognize, describe, and extend a variety of numerical and geometric patterns.

6.22 The student will investigate and describe concepts of exponents, perfect squares, and square roots, using calculators to develop the exponential patterns. Patterns will include zero and negative exponents, which lead to the idea of scientific notation. Investigations will include the binary number system as an application of exponents and patterns.

6.23 The student will
- model and solve algebraic equations, using concrete materials; and
- solve one-step linear equations in one variable, involving whole number coefficients and positive rational solutions.