Grade Eight

The eighth-grade standards contain both content that reviews or extends concepts and skills learned in previous grades and new content that prepares students for more abstract concepts in algebra and geometry. Students will gain proficiency in computation with rational numbers (positive and negative fractions, positive and negative decimals, whole numbers, and integers) and use proportions to solve a variety of problems. New concepts include solving two-step equations and inequalities, graphing linear equations, visualizing three-dimensional shapes represented in two-dimensional drawings, applying transformations to geometric shapes in the coordinate plane, and using matrices to organize and interpret data. Students will verify and apply the Pythagorean Theorem and represent relations and functions using tables, graphs, and rules.

While learning mathematics, students will be actively engaged, using concrete materials and appropriate technologies such as fraction calculators, computers, spreadsheets, laser discs, and videos. 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 will also 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

8.1 The student will
- a) simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers;
- b) recognize, represent, compare, and order numbers expressed in scientific notation; and
- c) compare and order decimals, fractions, percents, and numbers written in scientific notation.

8.2 The student will describe orally and in writing the relationship between the subsets of the real number system.

Computation and Estimation

8.3 The student will solve practical problems involving rational numbers, percents, ratios, and proportions. Problems will be of varying complexities and will involve real-life data, such as finding a discount and discount prices and balancing a checkbook.

8.4 The student will apply the order of operations to evaluate algebraic expressions for given replacement values of the variables. Problems will be limited to positive exponents.

8.5 The student, given a whole number from 0 to 100, will identify it as a perfect square or find the two consecutive whole numbers between which the square root lies.

Measurement

8.6 The student will verify by measuring and describe the relationships among vertical angles, supplementary angles, and complementary angles and will measure and draw angles of less than 360°.

8.7 The student will investigate and solve practical problems involving volume and surface area of rectangular solids (prisms), cylinders, cones, and pyramids.

Geometry

8.8 The student will apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures represented on graph paper. The student will identify applications of transformations, such as tiling, fabric design, art, and scaling.

8.9 The student will construct a three-dimensional model, given the top, side, and/or bottom views.

8.10 The student will

a) verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement; and

b) apply the Pythagorean Theorem to find the missing length of a side of a right triangle when given the lengths of the other two sides.

Probability and Statistics

8.11 The student will analyze problem situations, including games of chance, board games, or grading scales, and make predictions, using knowledge of probability.

8.12 The student will make comparisons, predictions, and inferences, using information displayed in frequency distributions; box-and-whisker plots; scattergrams; line, bar, circle, and picture graphs; and histograms.

8.13 The student will use a matrix to organize and describe data.

Patterns, Functions, and Algebra

8.14 The student will
- a) describe and represent relations and functions, using tables, graphs, and rules; and
- b) relate and compare tables, graphs, and rules as different forms of representation for relationships.

8.15 The student will solve two-step equations and inequalities in one variable, using concrete materials, pictorial representations, and paper and pencil.

8.16 The student will graph a linear equation in two variables, in the coordinate plane, using a table of ordered pairs.

8.17 The student will create and solve problems, using proportions, formulas, and functions.

8.18 The student will use the following algebraic terms appropriately: *domain, range, independent variable*, and *dependent variable*.