Math
EIGHTH GRADE
(Pre-Algebra)

Students in Grade 8 are independent thinkers. They can apply prior knowledge to new situations but may need to be guided through the learning process by continuing the use of hands-on materials, mathematical discourse, and technology. These students have the ability to take ownership of their own mathematical learning and need opportunities to explore and investigate mathematical concepts. Students in Grade 8 also need to be provided with instruction that includes a balance between skill development and mathematical understanding.

The major focus of the eighth-grade curriculum is the integration of new and prior knowledge to solve problems dealing with all mathematical strands, with particular emphasis on algebra, geometry, and proportional reasoning. This curriculum offers a more in-depth study of algebraic concepts than in years past. Therefore, this course is subtitled Pre-Algebra. Students who successfully complete the eighth grade have a thorough knowledge of the skills and concepts necessary for the study of Algebra I. High school credit may not be awarded for this course.

Number and Operations

1. Use various strategies and operations to solve problems involving real numbers
    - Use alternative representations of rational numbers: models, drawings, grids, graphs
    - Apply GCF, LCM, and prime and composite numbers, including justification for the reasonableness of results, when working with rational numbers
    - Apply proportional reasoning
    - Solve problems using percents
    - Use vocabulary and notation associated with set theory, including *union* and *intersection*. Illustrate with Venn diagrams
    - Determine whether a number is rational or irrational
    - Demonstrate computational fluency with operations on rational numbers
2. Simplify expressions containing exponents by applying the laws of exponents
    - Write numbers using scientific notation
3. Use order of operations to evaluate and simplify algebraic expressions
4. Demonstrate mastery of the properties of real numbers

Algebra

5. Solve problems involving linear functions
    - Develop vocabulary associated with functional relationships
    - Identify functions from information in tables, sets of ordered pairs, equations, graphs, and mappings
    - Determine the rule that defines a function
    - Classify relations as linear or nonlinear by examining tables, graphs, or simple equations
6. Solve multi-step linear equations and inequalities, including those requiring the use of the distributive property
7. Graph linear relations by plotting points or by using the slope and y-intercept
    - Determine slopes and y-intercepts of lines
    - Calculate the slope of a linear relation given as a table or graph
    - Exhibit conceptual understanding of various uses of variables

Geometry, Measurement and Spatial Sense

8. Solve problems using the Pythagorean Theorem
    - Use and apply square roots
9. Compare polygons and solids, using their properties and characteristics.
10. Identify angle bisectors, perpendicular bisectors, congruent angles, and congruent figures
11. Construct congruent and similar polygons, congruent angles, congruent segments, and parallel and perpendicular lines
12. Identify measures of angles / special angle pairs, using adjacent, vertical, supplementary / complementary angles, and angles formed by parallel lines cut by a transversal
13. Find the perimeter/circumference and area of plane figures
14. Determine the surface area and volume of rectangular prisms, cylinders, pyramids, spheres
    - Estimate surface area and volume of solid figures
    - Determine the appropriate units of measure to describe surface area and volume
    - Develop formulas to determine surface area/volume of rectangular prism, cylinder, pyramid
15. Determine lengths of missing sides and measures of angles in similar and congruent figures
    - Apply proportional reasoning
    - Find the ratios of the perimeters and areas of similar triangles, trapezoids, and parallelograms

Data Analysis and Probability

16. Gather, graph and analyze data
    - Represent the data with the most appropriate graph, including box-and-whisker plot, circle graph, and scatter plot
    - Make predictions by estimating the line of best fit from a scatter plot
    - Determine the measure of central tendency that is the most appropriate for a given situation
17. Determine the probability of an event
    - Calculate the probability of complementary events and mutually exclusive events
    - Compare experimental and theoretical probability
    - Compute the probability of two independent events and two dependent events
    - Determine the probability of an event through simulation

Communication

18. Interpret and express mathematical ideas orally and in writing
    - Model situations using oral, written, concrete, pictorial, graphical and algebraic methods
    - Discuss mathematical ideas, make conjectures and convincing arguments
    - Analyze and evaluate the mathematical thinking and strategies of others
    - Use the language of mathematics to express mathematical ideas precisely
    - Use the skills of reading, listening, and viewing to interpret and evaluate mathematical ideas
    - Recognize the value of mathematical notation and its role in the development of mathematical ideas

Technology

19. Demonstrate the use of current technology as a tool to collect, store, and manipulate data about the real world and to solve problems