SEVENTH GRADE MATH
Goal

Students in the seventh grade mathematics program will become adept at manipulating numbers and equations. They will understand and use factoring of numerators and denominators and properties of exponents. They will use the Pythagorean theorem to solve problems in which they compute the length of an unknown side. Students in the seventh grade will know how to compute the surface area and volume of basic three-dimensional objects and will understand how area and volume change with a change in scale. They will make conversions between different units of measurement. In addition, seventh grade students will know and use different representations of numbers (fractions, decimals, percents) and will become proficient at changing from one form to another. Students will increase their facility with ratio and proportion and will compute percents, and simple and compound interest. Students will also graph linear functions and will explore probability.

While learning mathematics, students should be actively engaged and using appropriate technologies, such as calculators, computers, spreadsheets, laser discs, and videos to enhance their understanding of qualitative concepts and for proficiency in basic computations. Students should correctly use the concepts, skills, symbols, and vocabulary associated with mathematics.

Number Sense and Operations

1. **The student will compute with numbers expressed in a variety of forms.**
   a. Read, write, and compare whole numbers in scientific notation. Convert scientific notation to standard form.
   b. Compare, order and determine equivalent relationships between fractions, decimals, percents, and numbers with exponents.
   c. Add, subtract, multiply and divide rational numbers (e.g. integers, fractions, and terminating decimals).
   d. Differentiate between rational and irrational numbers.
   e. Simplify expressions that contain rational numbers (e.g. whole numbers, fractions, and decimals) and use positive exponents, using properties of operations.
   f. Estimate and solve problems using ratio, proportion, and percent, including discounts taxes, commissions, simple, and compound interest.

2. **The student will solve ratio, proportion, and percent problems.**
   a. Represent, convert, and explain relationships among fractions, ratios, decimals, and percents.
   b. Solve problems involving percentages, average speeds, and scales on maps.
   c. Apply concepts of rate and change (e.g. heartbeats per minute).
   d. Solve consumer math problems.

3. **The student will use exponents, powers, and roots, and use exponents in working with fractions.**
   a. Add and subtract fractions by using factoring to find common denominators.
   b. Multiply, divide, and simplify rational numbers.
   c. Investigate squares and perfect square roots. Estimate the square root of a number.
   d. Define absolute value and determine the absolute value of real numbers.

e. Read, represent, and interpret large numbers in expanded, exponential, and scientific notation.

Patterns, Relations, and Algebra

1. The student will express quantitative relationships by using algebraic expressions, equations, inequalities, and graphs.

a. Use expressions to describe patterns represented by data in tables and graphs (e.g. 2, 4, 6, 8…2n).
b. Use the correct order of operations to simplify and evaluate algebraic expressions.
c. Solve simple equations and inequalities and graph their solutions.

Geometry

1. The student will identify and classify the properties of and relationships between geometric figures.

a. Compare and contrast quadrilaterals (e.g. parallelograms, rectangles, squares, rhombi, and trapezoids).
b. Identify and compare polygons (e.g. pentagons, hexagons, heptagons, octagons, nonagons, and decagons).
c. Classify three-dimensional figures from various perspectives (e.g. top, side, and front).
d. Determine if geometric figures are similar or congruent (e.g. quadrilaterals and triangles). Write proportions to express the relationships between corresponding parts of similar figures.
e. Identify elements of geometric figures (e.g. altitudes, midpoints, bisectors, radii, diameters, chords).
f. Identify parallel, perpendicular, horizontal, vertical, and transversal lines according to their properties.
g. Identify and compare interior, exterior, alternate interior, alternate exterior, complementary, supplementary, and vertical angles.
h. Identify segments, congruent angles, bisectors of line segments, and bisectors of angles.
i. Identify and perform transformations (e.g. reflection, translation, rotation) of a given figure in a coordinate plane.
j. Predict and verify patterns involving tessellations.
k. Investigate the concept of the Pythagorean Theorem.
l. Identify and graph ordered pairs in the four quadrants of a coordinate plane.
m. Locate, give the coordinates of, and graph plane figures, which are the results of translations or reflections in all quadrants of the coordinate plane.

2. The student will compute the perimeter, area, and volume of common geometric objects.

a. Use formulas for finding the perimeter and area of basic two-dimensional figures.
b. Use formulas for finding the surface area and volume of basic three-dimensional figures (e.g. rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, cylinders).

Measurement

1. **The student solves measurement problems.**
    a. Identify, compare, and measure acute, obtuse, right, complementary, and supplementary angles.
    b. Determine the measure of a missing angle using angle relationships.
    c. Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures (e.g. rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders).
    d. Determine the relationship between the diameter and circumference of a circle and the value of pi. Calculate the circumference of a circle.
    e. Determine the volume, or missing dimensions, of rectangular solids.
    f. Estimate and compute the area of irregular figures by subdividing them into more basic geometric shapes (e.g. rectangles and triangles).

Data Analysis, Statistics, and Probability

1. **The student will collect, analyze, display, and interpret data in a variety of methods.**
    a. Display and interpret data in a variety of graphical methods (e.g. histograms, stem and leaf plots, scatter grams, frequency distributions, and line plots).
    b. Construct circle graphs using ratios, proportions, and percents.
    c. Learn to recognize proportions in tables of numbers and on graphs.
    d. Use proportions to complete a set of data and to complete a graph.
    e. Apply and analyze appropriate measures of central tendency (e.g. mode, median, range) for a set of data.
2. **The student will explore probability and chance.**
    a. Represent the results of probability experiments as ratios, decimals, and percents between 0 &1.
    b. Determine the probability of events through experiments and simulations.
    c. Compute and apply simple permutations and combinations.