Math 7
Prerequisite: Sixth Grade Mathematics

Students in Math 7 will study mathematics concepts from sixth grade in more depth and extend knowledge to basic pre-algebra by conjecturing, verifying, thinking critically, and applying mathematical concepts. This course focuses on computation and estimation with rational numbers and emphasizes proportional reasoning. Students will investigate and explore mathematical ideas using technology and models to develop multiple strategies for analyzing complex situations. Students will apply mathematical skills and make meaningful connections to life's experiences.

Standard I: Students will expand number sense to understand, perform operations, and solve problems with rational numbers.

Objective 1: Represent rational numbers in a variety of ways.
  a. Demonstrate multiple ways to represent whole numbers, decimals, fractions, percents, and integers using models and real-life examples.
  b. Simplify numerical expressions with whole number exponents using order of operations, and recognize that any positive number to the 0 power is 1.
  c. Represent numbers greater than one using scientific notation.
  d. Select the most appropriate form of a rational number for a given context.

Objective 2: Compare and order rational numbers, including positive and negative fractions, positive and negative mixed numbers, and positive and negative decimals.
  a. Identify, read, and locate rational numbers on a number line.
  b. Compare pairs of rational numbers in different forms.
  c. Order rational numbers with and without a number line.

Objective 3: Explain relationships and equivalences among rational numbers.
  a. Find equivalent forms for common fractions, decimals, percents, and ratios, including repeating or terminating decimals.
  b. Predict the effect of operating with fractions, decimals, percents, and integers as an increase or a decrease of the original value.
  c. Recognize and use the identity properties of addition and multiplication, the multiplicative property of zero, the commutative and associative properties of addition and multiplication, and the distributive property of multiplication over addition.
  d. Recognize and use the inverse operations of adding and subtracting a fixed number, multiplying and dividing by a fixed number, and computing squares of whole numbers and taking square roots of perfect squares.

Objective 4: Model meanings of ratios and operations with rational numbers.

a. Demonstrate that the fraction $\frac{a}{b}$ represents *a divided by b*.

b. Recognize percents as ratios based on 100 and decimals as ratios based on powers of 10.

c. Extend the multiplication of whole numbers to multiplication of fractions using area models, measurement models, and the number line.

d. Compare the division of whole numbers to the division of fractions using area or set models, the number line, and missing factors.

Objective 5: Solve problems involving rational numbers.

a. Compute fluently using all four operations with integers and positive fractions and decimals.

b. Solve problems using factors, multiples, prime factorization, relatively prime numbers, and common divisibility rules.

c. Solve application problems involving rational numbers.

d. Determine if an answer is reasonable using estimation.

Mathematical Language and Symbols Students Should Use

whole number, decimal, fraction, percent, integer, exponent, scientific notation, rational number, identity, commutative, associative, distributive, factor, multiple, prime, relatively prime, additive inverse, multiplicative inverse

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Standard II: Students will use proportional reasoning to solve problems.

Objective 1: Solve problems involving ratios, rates, proportions and percentages.

a. Solve ratio and rate problems using informal methods involving multiplication and division.

b. Solve percent problems using ratio and proportion, including problems involving discounts, interest, taxes, tips, and percent increase or decrease.

c. Solve problems involving proportions, rates, and measures.

Objective 2: Apply the properties of proportionality to different units of measurement.

a. Convert from one unit of measurement to an equivalent unit of measurement in the same system using a given conversion factor.

b. Understand that in a proportional relationship, all dimensions change by the same scale factor.

c. Create and interpret scale drawings and approximate distance on maps using proportions.

Mathematical Language and Symbols Students Should Use

ratio, rate, proportion, scale drawing, conversion factor

Standard III: Students will develop fluency with the language and operations of algebra to analyze and represent relationships.

Objective 1: Evaluate, simplify, and solve algebraic expressions and equations.
   a. Write a variable expression to identify pattern relationships, and use those expressions to make predictions.
   b. Translate verbal expressions into algebraic expressions.
   c. Simplify and evaluate algebraic expressions.
   d. Show that performing the same operation on both sides of an equation will produce an equivalent equation.
   e. Solve single-variable linear equations and inequalities of the form $ax + b = c$, $ax + b < c$, or $ax + b > c$.

Objective 2: Represent relationships using graphs, tables, and other models.
   a. Identify integer coordinates when given the graph of a point on a rectangular coordinate system.
   b. Graph ordered pairs of integers on a rectangular coordinate system.
   c. Model real-world problems using graphs, tables, equations, manipulatives, and pictures.

Mathematical Language and Symbols Students Should Use

variable expression, algebraic expression, equivalent, linear equation, linear inequality, rectangular coordinate system, ordered pair

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Standard IV: Students will use algebraic, spatial, and logical reasoning to solve geometry and measurement problems.

Objective 1: Draw, label, and describe attributes of geometric figures to determine geometric relationships.
   a. Draw, label, and describe relationships among line segments, rays, lines, parallel lines, and perpendicular lines, including midpoint of a line segment.
   b. Draw, label, and describe relationships among vertical, adjacent, complementary, and supplementary angles.
   c. Draw, label, and describe attributes of angles, triangles, and quadrilaterals.

Objective 2: Determine measurements in metric and customary units using appropriate tools and formulas.
   a. Estimate metric and customary measures using everyday objects and comparisons.
   b. Measure length, area, volume, and angles to appropriate levels of precision.
   c. Calculate the measurement of everyday objects using formulas for perimeters and areas of triangles and quadrilaterals, and circumferences and areas of circles.
   d. Calculate the measurement of everyday objects using formulas for surface area and volume of right triangular and rectangular prisms and cylinders.

Mathematical Language and Symbols Students Should Use
line segment, ray, line, parallel, perpendicular, midpoint, vertical angles, adjacent angles, complementary angles, supplementary angles

Standard V: Students will understand concepts from probability and statistics and apply statistical methods to solve problems.

Objective 1: Use basic concepts of probability to determine the likelihood of an event and compare the results of various experiments.
   a. Write the results of a probability experiment as a fraction, ratio, or decimal, between zero and one, or as a percent between zero and one hundred, inclusive.
   b. Compare experimental results with theoretical probability.
   c. Compare individual, small group, and large group results of a probability experiment.

Objective 2: Display and compare data to make predictions and formulate conclusions.
   a. Display data using tables, scatter plots, and circle graphs.
   b. Compare two similar sets of data on the same graph.
   c. Compare two different kinds of graphs representing the same set of data.
   d. Propose and justify inferences and predictions based on data.

Mathematical Language and Symbols Students Should Use
experimental result, theoretical probability, scatter plot, circle graph, inference