Pre-Algebra

Course Description: Pre-Algebra offers an opportunity to review essential middle school math concepts and skills. Students will explore topics such as integers, multi-step equations, inequalities, graphs, basic functions, and the concept of slope. Students can strengthen their conceptual understanding and procedural fluency before taking Algebra I.

Learning Targets

Domain: The Number System

M.7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line.
- I can add and subtract integers.

M.7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- I can multiply and divide integers.

Domain: Expressions and Equations

M.6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents.
- I can evaluate numerical expressions with exponents.

M.6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.
- I can translate expressions.
- I can simplify expressions.

M.6.EE.A.3 Apply the properties of operations to generate equivalent expressions.
- I can factor expressions.
- I can use the distributive property with fractions.
- I can combine like terms to identify equivalent expressions.

M.6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- I can substitute a value to determine if an equation or inequality is true.

M.6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

- I can write and interpret equalities provided in real-world examples.
- I can find the slope between two points and write an equation for a linear relationship.

M.6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers.
- I can solve one-step equations with rational numbers.
- I can solve two-step equations with rational numbers.
- I can solve equations with fractional coefficients.

M.6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
- I can graph the solutions to an inequality on a number line.

M.7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
- I can use the order of operations when working with rational numbers and variables.

M.8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- I understand how to calculate an exponent with a calculator.
- I can explain and use rules for multiplying, dividing, and raising powers of 10, including using negative exponents.
- I can apply exponent rules to rewrite expressions with negative exponents as positive exponents and choose the appropriate rule to simplify an expression with a single exponent.
- I can use and explain the rule for multiplying terms with different bases but the same exponent.

M.8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other.
- I can plot very large or very small quantities and express how many times as much one is than the other.

M.8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
- I can explain how the slope and equation of a line describe its pattern and direction.

M.8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

- I can find the slope between two points and write an equation for a linear relationship.

M.8.EE.C.7 Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into equivalent forms. b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
- I can create equations and graphs to represent linear relationships, and I can tell if a point is or isn't a solution.
- I can find missing values in a linear equation and explain how I solved it.

M.8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables by graphing and analyzing tables. Solve simple cases represented in algebraic symbols by inspection. c. Solve real-world and mathematical problems leading to two linear equations in two variables.
- I can describe and identify when a system of equations has one solution, no solution, or infinitely many solutions.
- I can graph two linear relationships and explain what the point of intersection means in a real situation.
- I can solve systems of equations using graphs, substitution, and other strategies, and explain how I found the solution.
- I can create and solve a system of equations to represent and explain a real-world situation.

Domain: Ratio and Proportion
M.7.RP.A.2 Recognize and represent proportional relationships between quantities.
- I can represent a proportional relationship using an equation ($y = kx$), table, and graph, and explain what the constant of proportionality means.
- I can interpret real-life situations to determine costs and proportionality.

Domain: Functions
M.8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a numerically valued function is the set of ordered pairs consisting of an input and the corresponding output.
- I can understand that a function has only one output for each input and describe situations using function language (e.g., "the [output] depends on the [input]").
- I can determine whether a graph represents a function, interpret points on a graph, and explain the reasoning behind the graph's representation of a function.

M.8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- I can compare proportional relationships using equations, graphs, and tables, and explain how their rates of change are the same or different.

M.8.F.A.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.
- I can interpret various representations of functions (graphs, tables, equations) and answer questions based on the provided information.

M.8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.
- I can graph a set of points and draw a line.
- I can describe how the slope and y-intercept affect the graph of a line.
- I can match an equation to its graph and compare lines that have the same slope but different y-intercepts.
- I can create and interpret graphs of linear relationships, including lines that are horizontal, vertical, or have a negative slope.

M.8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, continuous or discrete). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
- I can explain the difference between proportional and non-proportional linear relationships.

Domain: Statistics and Probability
M.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- I can explain what a point on a scatter plot means, and describe if it fits the pattern or stands out as an outlier.
- I can identify clusters, trends, and outliers in a scatter plot, and describe if the data shows a linear or nonlinear pattern.

M.8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line. and informally assess the model fit by judging the closeness of the data points to the line.
- I can draw and describe a line that fits data on a scatter plot, and use it to make predictions.
- I can describe the relationship between two variables using the slope and pattern of a line of fit.