Math 8 2018-2019
Pre-Algebra Year Overview

In Grade 8, instructional focus is on three areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem. Source: NYS Next Generation Mathematics Learning Standards (2017). The EL education learning targets can be found here.

Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June
Unit 1	**Unit 1** **Unit 2**	**Unit 3**	**Unit 4**	**Unit 4** **Unit 5**	**Expedition**	**Expedition** **Unit 6**	**Unit 6**	**Unit 7**	**Unit 7**

Unit	Big ideas	Focus questions
0: Week of Inspirational Math September 5-8	• Groundwork for growth mindset • Engaging in risk free mathematics	• What does it mean to be a learner in this class? • What is a growth mindset? • How can I develop a growth mindset?
1: Linear Foundations Moving straight Ahead September 10-October 12	Students will understand that the rate of change is the covariation between two variables through a variety of representations (table, graph, equation, words, diagrams, etc.)	• How can multiple representations be used to model linear relations? • What are the defining characteristics of linear relations? • How can equations be solved by manipulating symbols?
	Students will understand that linear relationships are composed of a constant pattern of change and a y-intercept.	• How can we find the constant rate of change/slope from an equation, graph, and a table? • What information does the y-intercept of a linear relationship represent? • What are the independent and dependent variables represent in the situation?

	Students will understand how to select a representation (table, graph, equation, words, diagrams, etc.) for linear relationships given a situation	• How to determine if a set of data points have a linear relationship from a table? • How can we use a table of data points representing a linear relationship to write an equation? • How can you match the appropriate table with the corresponding graph and equation? • How can you convert a verbal description of a linear relationship into a table, graphing and equation?
2: Linear functions Thinking with Mathematical Models October 15-November 9	Students will understand that linear and non linear data patterns can be represented using graphs, tables, word descriptions, and algebraic expressions.	• What are the key variables in a situation? • What is the pattern relating the variables? • How can I represent this relationship?
	Students will understand that mathematical models can be used to analyze and solve linear relationships.	• What is a mathematical model? • How can a mathematical model be used to solve problems? • How can I use a mathematical model to answer questions about a relationship?
	Students will understand that a line of best fit can be used to make predictions on a given set of data	• How can data be approximated by a linear relation?
	Students will understand that bivariate data can be analyzed to determine the strength of linear association illustrated by scatter plots	• If there is a pattern relating the variables, is it strong enough to allow predictions to be made?
	Students will understand how to distinguish between categorical and numerical variables in two way data tables.	• How can two way tables be used to find associations between variables?
3: Functions & Making sense of symbols Say it with symbols	Students will understand functions as relations in which each input value has only one output value.	• How can we describe a relation? • How can we describe a function? • How can we identify a relation or a function using a table, graph, equation, or diagram?

November 12-December 7	Students will understand that the properties of real numbers can be used to write equivalent expressions.	• What strategies can you use to solve equations that contain parentheses? • What are strategies for finding a solution that is common to two-variable linear equations? • What are some strategies for factoring a quadratic expression?
	Students will understand that different symbolic expressions are mathematically equivalent	• What are some advantages and disadvantages of using one equation rather than two or more equations to represent a situation? • What are some ways you can combine one or more expressions to create a new expression?
	Students will understand that algebraic equations can be used to describe the relationship among the volumes of cylinders, cones and spheres that have the same height and radius.	• What equations represent the relationships among the volumes of cylinders, cones and spheres? • What formulas are useful in solving problems involving volumes of cylinders, cones and spheres?
	Students will understand that you can interpret the information that equivalent expressions represent in a given context.	• How can you use an equation to answer particular questions about a function and the situation it represents? • How can two different contexts be represented by the same equation? • How can you determine which function to use to solve or represent a problem?
4: Systems of Equations	Students will understand that linear equations in two variables in can be represented in standard form Ax + By =C is equivalent to the form y=mx+b.	• How can you change an equation from the Ax+By=C form to an equivalent y=mx+b form and vice versa?

It's in the system December 10-January 11	Students will understand that linear equations have infinitely many solutions (x,y) and the graph of those solutions is a straight line.	• What kind of solutions will be found for an equation with two variables in form ax+by=c? • What kind of solutions will be found for an equation with variables in the form y=mx+b. • What will the graph these solutions look like?
	Students will understand strategies to solve linear equations in two variables by using diagrams, graphs and with algebraic methods	• How can you solve a system of two linear equations with two variables using the equations (or equivalent forms)? • How can you solve a system of linear equations by combining the two equations into a single equation using addition or subtraction?
	Students will understand that solving a system of linear equations is equivalent to finding the values that will simultaneously satisfy all equations in the system.	• What does it mean to have a common solution? • How are solutions show in the graph of the system?
	Students will understand that systems of linear equations can have exactly one solution, infinitely many solutions, or no solutions.	• What are solution possibilities for systems? • What do the solution possibilities look like? (on a table, graph, diagrams, equation)
5: Integer Exponents and Scientific Notation Growing, Growing & Growing January 14-February 8	Students will understand exponential functions through patterns in tables.	• How can we represent an exponential function with a table, graph, or equation? • What patterns do we notice in exponential functions? • How can we compare patterns found in exponential functions to linear functions?
	Students will develop rules and patterns to write and interpret equivalent expressions using exponents	• How can we represent an exponential function with a table, graph, or equation? • How does the growth factor effect an exponential function? • How does the initial value affect an exponential function? • Why do these rules we developed work?

	Students will understand that rules and patterns for exponents are used in expressing an expression in scientific notation.	• How can we use our exponent rules to write numerical expressions in scientific notation? • How can we interpret numerical expressions in scientific notation? • How can we operate with numerical expressions in scientific notation?
Expedition Work February 8-March 20	TBD	TBD
6: Geometric Congruence & Similarity Butterflies, Pinwheels & Wallpaper March 25-May 3	Students will recognize properties and explore techniques for using rigid motion transformations (reflection, rotation, translation) to create congruent figures.	• What are the properties/characteristics of rigid motion transformations? • How can transformations be used to understand congruence and similarity of geometric shapes?
	Students will develop and use coordinate rules for basic rigid motion transformations.	• What are the properties/characteristics of rigid motion transformations on a coordinate grid? • How can transformations on a coordinate grid be used to understand congruence and similarity of geometric shapes?
	Students will recognize that two figures are congruent if one is derived from the other by a sequence of reflection, rotation, and/or transformations.	• What are the properties/characteristics of rigid motion transformations? • How can transformations be used to understand congruence and similarity of geometric shapes? • How can you use transformations to check whether two figures are similar or not?

	Students will understand that similar figures are the result of a sequence of rigid motion and a dilation.	• What figures in problem are similar? • What coordinate rules mobel dilations? • How do dilations change or preserve the properties of the original figure?
	Students will understand the angle relationship created by parallel lines and transversals.	• What are the angle relationships are created by parallel lines and transversals? • What transformations can be used to show angle relationships created by parallel lines and transversals? • What is always true about the angle measures of a triangle? • How can I relate angle sums of a triangle to angle pairs formed by two parallel lines and a transversal?
Pythagorean Theorem & Irrational numbers Looking For Pythagoras May 6-June 7	Students will develop strategies for finding the distance between two points on coordinate grid.	How do driving distance and flying distance between two coordinates relate to each other? How do the coordinates of endpoints of a segment help draw other lines, which are parallel or perpendicular to the segment? How does knowing how to calculate areas of rectangles and triangles help in the calculation of irregular areas?
	Students will explain a proof of the Pythagorean Theorem and use the Theorem to solve everyday problems.	
	Students will understand the relationship between the area of a square to its side length and the volume of a cube to its side length to square and cubed roots.	
	Students will be able to recognize rational and irrational numbers.	