Pre-Algebra Common Core Curriculum Map: (122 days)

Unit #1: Algebra: Equations and Graphing (15 days)
Resources: Big Ideas Chapter 1
Common Core Standards: 8.EE.7a-b

Number	Learning Targets	Common Core Standard	Resources
1	I can solve one and two step equations. (1 day)	8.EE.7a; 8.EE.7b	1.1 (Extra)
2	I can simplify expressions	Extra	Extra
3	I can solve multi-step equations.	8.EE.7a; 8.EE.7b	1.2
4	I can clear the fraction to solve an algebraic equation.	8.EE.7	Extra
5	I can solve equations with variables on both sides.	8.EE.7a; 8.EE.7b	1.3
6	I can determine whether equations have no solution or infinitely many solutions. (1 day)	8.EE.7a; 8.EE.7b	1.3 (Extra)
7	I can rewrite equations to solve for a different variable.	8.EE.7	1.4

8.EE.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 simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Unit #2: Algebra: Graphing (17 days)
Resources: Big Ideas Chapter 4
Common Core Standards: 8.EE.5; 8.EE.6; 8.F.4

Number	Learning Targets	Common Core Standard	Resources
1	I can graph linear equations from a table.	8.EE.5	4.1
2	I can find the slope of lines by using two points or from tables.	8.EE.6	4.2
3	I can identify parallel and perpendicular lines. (1 day)	8.EE.6	4.2
4	I can write and graph proportional relationships.	8.EE.5; 8.EE.6	4.3
5	I can graph linear equations written in slope intercept form.	8.EE.6	4.4
6	I can graph linear equations written in standard form	8.EE.6	4.5
7	I can write equations of lines in slope intercept form.	8.F.4	4.6

8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

8.EE.6 Use right 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.

8.F.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.

Unit #3: Systems and Functions (14 days)
Resources: Big Ideas: Chapter 5
Common Core Standards: 8.EE.7a-b; **8.EE.8a-c**

Number	Learning Targets	Common Core Standard	Resources
1	I can write and solve systems of linear equations by graphing.	8.EE.8a-c	5.1
2	I can write and solve systems of linear equations by substitution.	8.EE.8b-c	5.2
3	I can write and solve systems of linear equations by elimination	8.EE.8b-c	5.3
4	I can write and solve systems of linear equations in word problems	8.EE.8b-c	Extra
5	**I can solve systems of linear equations with no solution or infinitely many solutions.**	**8.EE.8a-c**	**5.4**
6	**I can solve linear equations by graphing a system of linear equations.**	**8.EE.7 8.EE.8**	**5.4 Extension**

8.EE.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 simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8.EE.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 algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*

c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

Unit #4: Functions (11 days)
Resources: Big Ideas: Chapter 6
Common Core Standards: 8.F.1; 8.F.2; 8.F.3; 8.F.4; 8.F.5; 8.SP.1; 8.SP.2; 8.SP.3; 8.SP.4

Number	Learning Targets	Common Core Standard	Resources
1	I can determine whether relations are functions. (1 day)	8.F.1	6.1
2	I can write a function rule.	8.F.1	6.2
3	I can compare linear functions and write linear functions using graphs or tables.	8.F.2; 8.F.3; 8.F.4	6.3
4	I can identify and compare linear and nonlinear functions from tables or graphs. (1 day)	8.F.3	6.4
5	I can analyze and sketch graphs to show the relationship between two quantities.	8.F.5	6.5
6	I can construct, describe, and interpret scatter plots. I can find lines of best fit to solve problems. (3 days)	8.SP.1; 8.SP.2; 8.SP.3	9.2
7	I can read, make, and interpret two-way tables. (1 day)	8.SP.4	9.3

8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

8.F.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. *For example, the function* $A = s^2$ $A = s^2$ *giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*

8.F.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.

8.F.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). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

8.SP.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.

8.SP.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.

8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

Unit #5: Exponents and Scientific Notation (18 days)
Resources: Big Ideas Chapter 10
Common Core Standards: 8.EE.1; 8.EE.3; 8.EE.4

Number	Learning Targets	Common Core Standard	Resources
1	I can write and evaluate expressions using exponents.	8.EE.1	10.1
2	I can use exponent rules to find a power of a power.	8.EE.1	10.2
3	I can use exponent rules to simplify expressions involving the quotient of powers.	8.EE.1	10.3
4	I can evaluate expressions involving zero and negative integer exponents.	8.EE.1	10.4
5	I can identify, write and compare numbers in scientific notation.	8.EE.3; 8.EE.4	10.5
6	I can write large and small numbers in scientific notation.	8.EE.3; 8.EE.4	10.6
7	I can add, subtract, multiply and divide numbers written in scientific notation.	8.EE.3; 8.EE.4	10.7

8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.*

8.EE.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. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 and determine that the world population is more than 20 times larger.*

8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Unit #6: Square Roots and Pythagorean Theorem (11 days)
Resources: Big Ideas: Chapter 7
Common Core Standards: 8.NS.1; 8.NS.2; 8.EE.2; 8.G.6; 8.G.7; 8.G.8

Number	Learning Targets	Common Core Standard	Resources
1	I can find square roots and use them in evaluating expressions and solving equations. (1 day)	8.EE.2	7.1
2	I can find cube roots and use them in evaluating expressions and solving equations. (1 day)	8.EE.2	7.2
3	I can understand and use the Pythagorean Theorem to find missing side lengths of right triangles.	8.EE.2; 8.G.6; 8.G.7; 8.G.8	7.3
4	I can approximate square roots.	8.NS.1; 8NS.2; 8.EE.2	7.4
5	I can use the Pythagorean Theorem to find distances in a coordinate plane.	8.EE.2; 8.G.6; 8.G.7; 8.G.8	7.5

8.NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., 2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

8.G.6 Explain a proof of the Pythagorean Theorem and its converse.

8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Unit #7: Geometry- Angles and Triangles (10 days)
Resources: Big Ideas Chapter 3
Common Core Standards: 8.G.5

Number	Learning Targets	Common Core Standard	Resources
1	I can identify and measure angles formed when parallel lines are cut by a transversal.	8.G.5	3.1
2	I can find the measures of interior and exterior angles of triangles.	8.G.5	3.2
3	I can find the measures of interior and exterior angles of polygons.	8.G.5	3.3
4	I can identify similar triangles and use indirect measurement to find missing measures.	8.G.5	3.4

8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

Unit #8: Geometry- Volume (13 days)
Resources: Big Ideas Chapter 8
Common Core Standards: 8.G.9

Number	Learning Targets	Common Core Standard	Resources
1	I can find the volume of cylinders and solve for missing dimensions given the volume.	8.G.9	8.1
2	I can find the volume of cones and solve for missing dimensions given the volume.	8.G.9	8.2
3	I can find the volume of spheres and solve for missing dimensions given the volume.	8.G.9	8.3
4	I can identify similar solids and find missing measures from similar solids.	8.G.9	8.4

8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Unit #9: Geometry: Transformations (15 days)
Resources: Big Ideas Chapter 2
Common Core Standards: 8.G.1; 8.G.2; 8.G.3; 8.G.4

Number	Learning Targets	Common Core Standard	Resources
1	I can identify congruent figures and name corresponding angles and sides.	8.G.2	2.1
2	I can identify translations and translate figures in the coordinate plane.	8.G.1; 8.G.2; 8.G.3	2.2
3	I can identify reflections and reflect figures using the x and y axis. I can identify dilations and dilate figures in a coordinate plane.	8.G.1; 8.G.2; 8.G.3	2.3 & 2.7
4	I can identify rotations and rotate figures in the coordinate plane.	8.G.1; 8.G.2; 8.G.3	2.4
5	I can perform and describe sequences of transformations using translations, reflections, rotations, and dilations.	8.G.1; 8.G.2; 8.G.3	Extra
6	I can identify similar figures, name corresponding sides and angles, and find unknown measures.	8.G.4	2.5

8.G.1 Verify experimentally the properties of rotations, reflections, and translations:
a. Lines are taken to lines, and line segments to line segments of the same length.
b. Angles are taken to angles of the same measure
c. Parallel lines are taken to parallel lines.

8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two dimensional figures, describe a sequence that exhibits the similarity between them