Prairie-Hills School District 144
8th Grade Math Curriculum Maps

Month: 5 Weeks Quarter 1

Unit(s): Real Numbers and Exponents

Essential Question(s):

Why are quantities represented in multiple ways?
How is the universal nature of properties applied to real numbers?

Standard(s):
Know that there are numbers that are not rational, and approximate them by rational numbers.

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. (Introduce and Support)

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.,). *For example, by truncating the decimal expansion of, show that is between and, then between and explain how to continue on to get better approximations.* (Introduce and Support)

Work with radicals and integer exponents.

8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* **(Mastered)**

8.EE.2 **Use square root and cube root symbols to represent solutions to equations of the form and, where is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that is irrational. (Mastered)**

8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 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 and the population of the world as and determine that the world population is more than times larger.* ***(Mastered)***

8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notations 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. **(Mastered)**

Prairie-Hills Elementary School District 144

8th Grade Curriculum Map

WIDA: English language Learners communicate information, ideas and concepts necessary for academic success in the content of Mathematics. Explicit vocabulary instruction and the use of manipulatives and visuals.

Unit 1

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ls that "terminate" actually repeat the digit zero. ( ) (8.NS.1) Numbers that repeat in their decimal form are called rational. (8.NS.1)

Numbers that do not repeat in their decimal form are called irrational. (8.NS.1)

The number is irrational. (8.EE.2)

The square root of the area of a square represents the side length of the square. (8.EE.2)

Exponent operation properties. (8.EE.1)

KEY: Master Supporting Additional Standard

Targeted Skills:

Distinguish between rational and irrational numbers. (8.NS.1)

- Convert a decimal expansion which repeats eventually into a rational number. (8.NS.1)
- Convert a fraction into a repeating decimal. (8.NS.1)
- Find rational approximations of irrational numbers. (8.NS.2)
- Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.(8.NS.2)
- Evaluate square roots of small perfect squares and cube roots of small perfect cubes. (8.EE.2)
- Use square root and cube root symbols to solve and represent solutions of equations. (8.EE.2)
- Apply the properties of integer exponents to generate equivalent numerical expressions. (8.EE.1)
- Estimate very large or very small quantities using a single digit times a power of ten. (8.EE.3)
- Express how much larger one number expressed as a single digit times a power of ten is than another in the context of the situation. (8.EE.3)

- Express numbers in scientific notation. (8.EE.4)
- Perform operations with numbers expressed in scientific notation and a mix of scientific notation and decimal notation. (8.EE.4)
- Choose appropriate units of measurements for a given number in scientific notation. (8.EE.4)
- Interpret scientific notation that has been generated by technology. (8.EE.4)

Understandings: Students will understand that …

- Every number has a decimal expansion.
- The value of any real number can be represented in relation to other real numbers such as with decimals converted to fractions, scientific notation and numbers written with exponents ( ).
- Properties of operations with whole and rational numbers also apply to all real numbers.

Knowledge: Students will know…

- Decimals that "terminate" actually repeat the digit zero. ( ) (8.NS.1)
- Numbers that repeat in their decimal form are called rational. (8.NS.1)
- Numbers that do not repeat in their decimal form are called irrational. (8.NS.1)
- The number is irrational. (8.EE.2)
- The square root of the area of a square represents the side length of the square. (8.EE.2)
  Exponent operation properties. (8.EE.1)

Skills: Students will be able to…

- Distinguish between rational and irrational numbers. (8.NS.1)
- Convert a decimal expansion which repeats eventually into a rational number. (8.NS.1)
- Convert a fraction into a repeating decimal. (8.NS.1)
- Find rational approximations of irrational numbers. (8.NS.2)
- Use rational approximations of irrational numbers to compare the size of irrational numbers,
- locate them approximately on a number line, and estimate the value of expressions.(8.NS.2)
- Evaluate square roots of small perfect squares and cube roots of small perfect cubes. (8.EE.2)
- Use square root and cube root symbols to solve and represent solutions of equations. (8.EE.2)
- Apply the properties of integer exponents to generate equivalent numerical expressions. (8.EE.1)
- Estimate very large or very small quantities using a single digit times a power of ten. (8.EE.3)
- Express how much larger one number expressed as a single digit times a power of ten is than another in the context of the situation. (8.EE.3)
- Express numbers in scientific notation. (8.EE.4)
- Perform operations with numbers expressed in scientific notation and a mix of scientific
- notation and decimal notation. (8.EE.4)
- Choose appropriate units of measurements for a given number in scientific notation. (8.EE.4)
- Interpret scientific notation that has been generated by technology. (8.EE.4)

Prerequisite Skills/Concepts:

Students should already be able to…

- Perform operations with rational numbers including negative rational numbers. (7.NS)
- Rewrite expressions in different forms. (7.EE.2)

Advanced Skills/Concepts:

Some students may be ready to…

- Identify real and complex numbers.
- Reduce irrational numbers to simplest radical form. .
- Rationalizing fractions with a square root in the denominator.
- Multiply and divide monomials.

Critical Terms:	**Supplemental Terms:**		Assessment: Assessment: MARS Task, Common Assessment, Unit Assessment
Exponent	Equation		
Scientific notation	Expression		
Radical	Variable		
Irrational number	Property		
Rational number	Unknown		
Square root	Solution		
Cube root	Integer		
Perfect cube	Inverse operations		
Perfect square			

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Month: 3 Weeks 1st Quarter extended

Unit(s): Expression and Equations

Essential Question(s):

- How do we express a relationship mathematically?
- How do we determine the value of an unknown quantity?

Standard(s):

Analyze and solve linear equations.

8.EE.7 Solve linear equations in one variable. **(Mastered)**

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, *or* results (where and 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.

WIDA Standard: (English Language Learners)
English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics. English language learners benefit from: Explicit vocabulary instruction with regard to the components.

Unit 2

Analyze and solve linear equations. 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, or results (where and 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.

Skills: ***Students will be able to…***

- **Simplify linear expressions utilizing the distributive property and collecting like terms. (8.EE.7)**
- **Create a multi-step linear equation to represent a real-life situation. (8.EE.7)**
- **Solve equations with linear expressions on either or both sides including equations with one solution, infinitely many solutions, and no solutions. (8.EE.7)**

Give examples of and identify equations as having one solution, infinitely many solutions, or no solutions. (8.EE.7)

Targeted Skills:

- **Simplify linear expressions utilizing the distributive property and collecting like terms. (8.EE.7)**
- **Create a multi-step linear equation to represent a real-life situation. (8.EE.7)**
- **Solve equations with linear expressions on either or both sides including equations with one solution, infinitely many solutions, and no solutions. (8.EE.7)**
- **Give examples of and identify equations as having one solution, infinitely many solutions, or no solutions. (8.EE.7)**

Key Vocabulary: Simplify Distributive property Like terms Solution Inverse operations	Expand Factor Variable Unknown		Assessment: MARS Task, Common Assessment, Unit Assessment
Quarter 2			

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Month: 6 weeks
Unit(s): Unit 4: Congruence and Similarity

Essential Question(s):

1. **What are transformations and what effect do they have on an object?**
2. **What does the scale factor of a dilation convey?**
3. **How can transformations be used to determine congruency or similarity?**
4. **What angle relationships are formed by a transversal?**

Standard(s):
Unit (s): Congruence & Similarity

Understand congruence and similarity using physical models, transparencies, or geometry software.

8.G.1 Verify experimentally the properties of rotations, reflections, and translations: (Mastered)

- **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. (Mastered)

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

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. (Mastered)

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.* (Mastered)

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Supporting Standards:

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. (Mastered)

Targeted Skills:

- **Describe a series of transformations that exhibits congruence between two congruent figures. (8.G.2)**
- **Describe transformations (dilations, translations, rotations, and reflections) with words and with coordinates. Note that dilations can have centers other than. (8.G.3)**
- **Describe a series of transformations that exhibits similarity between two similar figures. (8.G.4)**
- **Find the measures of angles using transversals, the sum of angles in a triangle, the exterior angles of triangles. (8.G.5)**
- **Determine if triangles are similar using the angle-angle criterion. (8.G.5)**
- **Justify congruence or similarity of figures using a series of transformations. (8.G.2 and 8.G.4)**
- **Properties of rotations, reflections and translations. (8.G.1)**
- **Exterior angle and angle sum of triangles. (8.G.5)**
- **Angles created when parallel lines are cut by a transversal. (8.G.5)**
- **Angle-angle criterion for similarity of triangles.**

Key Vocabulary: Pre-image Image Translation Rotation Center of Rotation Angle of rotation Reflection Line of reflection Dilations Center of Dilation Transversal Exterior angles Interior angles	Line segments Parallel lines Congruent (congruency) Symmetry Similarity Corresponding Scale factor		Assessment: MARS Task, Common Assessment, Unit Assessment

Month: 8 weeks Quarter 2& 3

Unit(s): Unit 4 : Functions
Essential Question(s):

Standard(s):
Unit 6

Understand the connections between proportional relationships, lines, and linear equations.

- **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. (Mastered)**
- **8.EE.6 Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation for a line through the origin and the equation for a line intercepting the vertical axis at**
- **Define, evaluate, and compare functions. (Mastered)**
- **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. (Mastered)**
- **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. (Mastered)**
- **8.F.3 Interpret the equation as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function giving the area of a square as a function of its side length is not linear because its graph contains the points, and, which are not on a straight line. (Mastered)**
- **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 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. (Mastered)**
- **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. (Mastered)**

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Targeted Skills:

- **Verify that a relationship is a function or not. (8.F.1)**
- **Reason from a context, graph, or table after knowing which quantity is the input and which is the output. (8.F.1)**
- **Represent and compare functions numerically, graphically, verbally and algebraically. (8.F.2)**
- **Interpret equations in form as a linear function. (8.F.3)**
- **Determine whether a function is linear or non-linear. (8.F.3)**
- **Identify and contextualize the rate of change and the initial value from tables, graphs, equations, or verbal descriptions. (8.F.4)**
- **Construct a model for a linear function. (8.F.4)**
- **Describe the qualities of a function using a graph (e.g., where the function is increasing or decreasing). (8.F.5)**
- **Sketch a graph when given a verbal description of a situation. (8.F.5)**
- **Compare graphs, tables, and equations of proportional relationships. (8.EE.5)**
- **Graph proportional relationships and interpret the unit rate as the slope. (8.EE.5)**
- **Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane. (8.EE.6)**
- **Derive the equation for a line through the origin and for a line intercepting the vertical axis at. (8.EE.6)**

Key Vocabulary:				Assessment: MARS Task, Common Assessment, Unit Assessment
Function Graph of a function Slope Rate of change Unit rate Input/output Ordered pairs/coordinate plane Linear/non-linear Domain Range				

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Month: 4 weeks Quarter 3

Unit(s): Unit 5: Linear Relationships

Essential Question(s):
Why is one variable dependent upon the other in relationships?

- **What makes a solution strategy both efficient and effective?**
- **How is it determined if multiple solutions to an equation are valid?**
- **How does the context of the problem affect the reasonableness of a solution?**
- **Why can two equations be added together to get another true equation?**

Standard(s):

Estimate solutions by graphing equations. (8.EE.8)

- **Solve systems by graphing, substitution, or elimination (combination). (8.EE.8)**
- **Determine if a system has one solution, no solutions, or many solutions. (8.EE.8)**
- **Interpret the solution to a system of equations in context. (8.EE.8)**

Targeted Skills:

- **Verify that a relationship is a function or not. (8.F.1)**
- **Reason from a context, graph, or table after knowing which quantity is the input and which is the output. (8.F.1)**
- **Represent and compare functions numerically, graphically, verbally and algebraically. (8.F.2)**
- **Interpret equations in form as a linear function. (8.F.3)**
- **Determine whether a function is linear or non-linear. (8.F.3)**
- **Identify and contextualize the rate of change and the initial value from tables, graphs, equations, or verbal descriptions. (8.F.4)**
- **Construct a model for a linear function. (8.F.4)**
- **Describe the qualities of a function using a graph (e.g., where the function is increasing or decreasing). (8.F.5)**
- **Sketch a graph when given a verbal description of a situation. (8.F.5)**
- **Compare graphs, tables, and equations of proportional relationships. (8.EE.5)**
- **Graph proportional relationships and interpret the unit rate as the slope. (8.EE.5)**

- **Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane. (8.EE.6)**
- **Derive the equation for a line through the origin and for a line intercepting the vertical axis at. (8.EE.6)**
- **Unit rates can be explained in graphical representation, algebraic equations, and in geometry through similar triangles.**
- **The solution to a system of two linear equations in two variables is an ordered pair that satisfies both equations.**
- **Some systems of equations have no solutions (parallel lines) and others have infinite solutions (the same line).**

Key Vocabulary: Slope (Rate of change) System of linear equations Simultaneous equations Linear equation Parallel Substitution Elimination Intersecting lines Origin Proportional relationships Unit rate				Assessments: MARS Tasks, Unit assessments, Common Assessments MAP

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Month: 2 weeks Quarter 3

Unit(s): Unit 6: Pythagorean Theorem

Essential Question(s):

- **Why does the Pythagorean Theorem apply only to right triangles?**
- **How does the knowledge of how to use right triangles and the Pythagorean Theorem enable the design and construction of such structures as a properly**
- **pitched roof, handicap ramps to meet code, structurally stable bridges, and roads?**
- **How can the Pythagorean Theorem be used for indirect measurement? How do indirect measurement strategies allow for the measurement of items in the real world such as playground structures, flagpoles, and buildings?**

Standard(s):

8.G.6 Explain a proof of the Pythagorean Theorem and its converse. (Mastered)
8.G.7 Use the Pythagorean Theorem to solve for a missing side of a right triangle given the other 2 sides in both 2-D and 3-D problems. (Mastered)
8.G.7 Apply the Pythagorean Theorem to solve problems in real-world contexts. (Mastered)
8.G.8 Apply the Pythagorean Theorem to find the distance between two points in the coordinate system. (Mastered)

Targeted Skills:

- **Explain a proof of the Pythagorean Theorem and its converse. (8.G.6)**
- **Use the Pythagorean Theorem to solve for a missing side of a right triangle given the other 2 sides in both 2-D and 3-D problems. (8.G.7)**
- **Apply the Pythagorean Theorem to solve problems in real-world contexts. (8.G.7)**
- **Apply the Pythagorean Theorem to find the distance between two points in the coordinate system. (8.G.8) on a non-vertical line in the coordinate plane. (8.EE.6)**

Key Vocabulary: Legs of a triangle Hypotenuse Right triangle Pythagorean theorem Square root	Distance formula Irrational Perfect squares Radical			Assessments: MARS Tasks, Unit assessments, Common Assessments MAP

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Quarter 4				
Month: 3 weeks				
Unit(s): Unit 7: Volume **Essential Question(s):** **How do we determine the volume of rounded objects?** **Standard(s):** **Unit 6** **8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. (Additional)** **8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32×3−5=3−3=133=127. (Mastered)** **8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form x2=p and x3=p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. (Mastered)** **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., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. Find the volume of rounded objects in real-world contexts. (Introduce and Support)** **8.G.9 Give volume in terms of π and using π≈3.14 or 227. (Additional)** **8.G.9 Find a missing dimension given the volume of rounded object. (Additional)**				
Targeted Skills: • **Find the volume of rounded objects in real-world contexts. (8.G.9)** • **Give volume in terms of π and using π≈3.14 or 227. (8.G.9)** • **Find a missing dimension given the volume of rounded object. (8.G.9)** • **Determine the surface area of a cylinder, cone or sphere.** • **Determine the volume of composite figures such as determining how much rubber is needed to make a tennis ball by taking the outer sphere volume minus the inner sphere volume or determining how much grain will fit in a cylindrical silo with a conical top.**				
Key Vocabulary: Volume Cylinder Cone Sphere	Square root Cube root			

Prairie-Hills Elementary School District 144
8th Grade Curriculum Map

Quarter 4
Month: 4 weeks
Unit(s): Unit 8: Patterns and bivariate data **Essential Question(s):** **What relationships can be seen in bivariate data?** **□ What conclusions can be drawn from data displayed on a graph?** **□ What do the slope and y-intercept of a line of best fit signify on a** **□ graph? How can graphs, tables, or equations be used to predict data?** **Standard(s):** **Unit 6** **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. (Introduce and Support)** **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. (Introduce and Support)** **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. (Introduce and Support)** **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? (Introduce and Support)**
Targeted Skills: • **Construct and interpret scatter plots and two-way tables for patterns such as positive or negative association, linearity or curvature, and outliers. (8.SP.1)** • **□ Generate an approximate line of best fit. (8.SP.2)** • **□ Use the equation of a linear model to solve problems in the context of bivariate measurement data. (8.SP.3)**

KEY: Master Supporting Additional Standard

• **Interpret the slope and y-intercept of the line of best fit in context. (8.SP.3)** • **Show that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. (8.SP.4)** • **Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. (8.SP.4)** • **Use relative frequencies calculated for rows or columns to describe possible association between the two variables. (8.SP.4)** • **Written descriptions, tables, graphs, and equations are useful in representing and investigating relationships between varying quantities.** • **Different representations (written descriptions, tables, graphs, and equations) of the relationships between varying quantities may have different strengths and weaknesses.** • **Linear functions may be used to represent and generalize real situations.** • **Slope and y-intercept are keys to solving real problems involving linear relationship models of data.** • **Some data may be misleading based on representation.**				
Key Vocabulary: Bivariate data Scatter plot Line of best fit Clustering Outlier Positive/negative association	Linear/non-linear Slope Rate of change			