Prairie-Hills Elementary School District 144
7th Grade ~ MATH Curriculum Map
Quarter 1

Month: August, September, October

Domain: Ratios & Proportional Relationships (4-5 weeks)

Essential Questions

- How do rates, ratios, percentages and proportional relationships apply to our world?
- When and why do I use proportional comparisons?
- How does comparing quantities describe the relationship between them?
- How do graphs illustrate proportional relationships?

Standard(s):

Analyze proportional relationships and use them to solve real-world and mathematical problems

7.RP.1 Compute unit rates associates with rations of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction $^{1/2}/_{1/4}$ miles per hour, equivalently 2 miles per hour. (Mastered)

7. RP.2 Recognize and represent proportional relationships between quantities. (Mastered)

a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

c.* Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.

d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

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 will benefit from:

- hands-on and virtual manipulative experiences using geometric figures and fraction, decimal, percent equivalence tools.
- explicit vocabulary instruction with regard to ratio and percent situations.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students make sense of ratio and unit rates in real-world contexts. They persevere by selecting and using appropriate representations for the given contexts.

* **2. Reason abstractly and quantitatively.** Students will reason about the value of the rational number in relation the models that are created to represent them.

3. Construct viable arguments and critique the reasoning of others.

* **4. Model with mathematics.** Students create models using tape diagrams, double number lines, manipulatives, tables and graphs to represent real-world and mathematical situations involving ratios and proportions. For example, students will examine the relationships between slopes of lines and ratio tables in the context of given situations.

5. Use appropriate tools strategically.

* **6. Attend to precision.** Students attend to the ratio and rate language studied in grade 6 to represent and solve problems involving rates and ratios.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

Target Skills:

Students will be able to …

- Compute unit rates involving rational numbers, fractions, and complex fractions. (7.RP.1)
- Compute ratios of length in like or different units. (7.RP.1)
- Compute ratios of area and other measurements in like or different units. (7.RP.1)
- Determine whether two quantities are in a proportional relationship by using a table and or graph. (7.RP.2)
- Identify the constant of proportionality (unit rate) in tables, graphs, diagrams, and verbal descriptions. (7.RP.2)
- Create and solve equations to represent proportional relationships. (7.RP.2)
- Use words to describe the location of a point on a graph and its relationship to the origin. (7.RP.2)
- Explain what a point on a graph of a proportional relationship means in terms of the situation. (how does the one quantity relate to the other) (7.RP.2)

Academic Vocabulary:

Critical Terms:		Supplemental Terms:	
Simple Interest	Percent increase	Tax	Tip
Percent decrease	Commission	Ratio	Rate
Percent error	Rate of change	Proportion	Percent
Gratuity		Unit rate	Equivalency
		Greatest Common Factor (GCF)	
		Least Common Multiple (LCM)	

Domain: Ratio & Proportion Applications (2-3 weeks)

Essential Questions

- How can I use proportional relationships to solve ratio and percent problems?
- How can I use scale drawings to compute actual lengths and area?
- How can I use geometric figures to reproduce a drawing at a different scale?

Standard(s):

Analyze proportional relationships and use them to solve real-world and mathematical problems.

- 7. RP.3 Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (Mastered)

Draw, construct, and describe geometrical figures and describe the relationships between them.

- 7.G.1 Solve problems involving scale drawing of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing in a different scale. **(Additional)**

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 will benefit from:

- hands-on and virtual manipulative experiences using geometric figures and fraction, decimal, percent equivalence tools.
- explicit vocabulary instruction with regard to ratio and percent situations.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students exhibit this standard when they represent and interpret proportional relationships to solve ratio and percent problems using visual models, proportions and other equations. They also make sense of proportional situations that involve scale drawings using diagrams and equations.
* **2. Reason abstractly and quantitatively.** Students will reason about the value of rational numbers in real-world contexts when representing and solving problems. They will apply proportional reasoning to scale drawings and determine if calculations are appropriate to the contexts.

3. Construct viable arguments and critique the reasoning of others. Students will be expected to articulate their problem solving processes and explain the connection between the various representations (visual, tabular, algebraic, real-life) used to solve problems involving scale drawings and other proportional relationships.

* **4. Model with mathematics.** Students will use double number lines, tape diagrams and ratio charts to represent real-world situations involving proportional relationships.

5. Use appropriate tools strategically. Students are expected to select appropriate measurement and construction tools when reproducing scale drawings.

6. Attend to precision. Students will attend to the units of measurement when solving and representing problems with scale drawings. They will also attend to precise mathematical language when interpreting and communicating about problem solving with ratio and percent situations.

7. Look for and make use of structure. Students look for patterns when solving proportional relationships and interpreting scale drawings.

8. Look for and express regularity in repeated reasoning. Students use repeated reasoning when they replicate drawings at different scales.

Target Skills:

Students will be able to …

- Solve multi-step ratio and percent problems. (7.RP.3)
- Solve problems involving simple interest and tax. (7.RP.3)
- Solve problems involving markups and markdowns, gratuities and commissions, and fees. (7.RP.3)
- Solve problems involving percent increase, percent decrease, and percent (margin of) error. (7.RP.3)
- Solve problems involving scale drawings of geometric figures. (7.G.1)
- Compute actual lengths and areas from a scale drawing. (7.G.1)
- Reproduce a scale drawing at a different scale. (7.G.1)

Academic Vocabulary:	
Critical Terms: Ratio Proportion Percent increase Percent decrease Percent error Markdowns Markups Scale	**Supplemental Terms:** Tax Gratuity Area Volume Simple interest equivalent

Prairie-Hills Elementary School District 144
7th Grade ~ MATH Curriculum Map
Quarter 2

Month: October, November, December

Domain: Rational Number Operations (5-6 weeks)

Essential Questions:

- How are rational numbers used and applied in real-life and mathematical situations?
- What is the relationship between properties of operations and types of numbers?

Standard(s):

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

- 7.NS.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 diagram.**
  - **a) Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. (Mastered)**
  - b) Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
  - c) Understand subtraction of rational numbers as adding additive inverse, $p- q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
  - d) Apply properties of operations as strategies to add and subtract rational numbers.
- **7. NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. (Mastered)**
  - a) Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers, interpret products of rational numbers by describing real-world contexts.
  - b) Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $–(p/1) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
  - c) Apply properties of operations as strategies to multiply and divide rational numbers.
  - d) Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
- 7. NS.3 **Solve real-world and mathematical problems involving the four operations with rational number**. **(Mastered)**

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:

- The use of manipulatives for developing understanding of operations with positive and negative numbers.
- Attention to mathematical vocabulary when solving real-world and mathematical problems involving positive and negative numbers.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students explain and demonstrate rational number operations by using symbols, visuals, words, and real life contexts. Students demonstrate perseverance while using a variety of strategies. (number lines, manipulatives, drawings, etc.)
* **2. Reason abstractly and quantitatively.** Students demonstrate quantitative reasoning by representing and solving real world situations using visuals, numbers, and symbols. They demonstrate abstract reasoning by translating numerical sentences into real world situations.
* **3. Construct viable arguments and critique the reasoning of others.** Students will discuss rules for operations with rational numbers using appropriate terminology and tools/visuals. Students apply properties to support their arguments and constructively critique the reasoning of others while supporting their own position.
4. **Model with mathematics.** Students model understanding of rational number operations using tools such as algebra tiles, counters, visuals, and number lines and connect these models to solve problems involving real-world situations.
5. **Use appropriate tools strategically.** Students demonstrate their ability to select and use the most appropriate tool (paper/pencil, manipulatives, and calculators) while solving problems with rational numbers.
6. **Attend to precision.** Students demonstrate precision by using correct terminology and symbols and labeling units correctly. Students use precision in calculation by checking the reasonableness of their answers and making adjustments accordingly.
7. **Look for and make use of structure.** Students look for structure in positive and negative rational numbers when they place them appropriately on the number line. They use this structure in calculation when considering the position of numbers on the number line. In addition, students recognize the problem solving structures of word problems and use this awareness to aid in solving them.
8. **Look for and express regularity in repeated reasoning.** Students will use manipulatives to explore the patterns of operations with rational numbers. Students will use these patterns to develop algorithms. They can use these algorithms to solve problems with a variety of problem solving structures.

Target Skills:

Students will be able to …

- Add and subtract rational numbers. (7.NS.1)
- Represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)
- Use words, visuals and symbols to describe situations in which opposite quantities combine to make 0. (7.NS.1)
- Represent addition of quantities with symbols, visuals and words by showing positive or negative direction from one quantity to the other. (7.NS.1)
- Show that a number and its opposite have a sum of 0 using visuals, symbols, words and real-world contexts. (7.NS.1)
- Use the term "additive inverse" to describe 2 numbers whose sum is zero. (7.NS.1)
- Use commutative, distributive, associative, identity, and inverse properties to add and subtract rational numbers. (7.NS.1)
- Use the term "absolute value" to describe the distance from zero on number line diagram and with symbols. (7.NS.1)
- Multiply and divide rational numbers. (7.NS.2)
- Use the distributive property to multiply positive and negative rational numbers using symbols, visuals, words and real-life contexts. (7.NS.2)
- Interpret products of rational numbers by describing real-world contexts. (7.NS.2)
- Identify situations when integers can and cannot be divided. (7.NS.2)
- Use words and real-world contexts to explain why the quotient of two integers is a rational number. (7.NS.2)
- Identify and apply properties used when multiplying and dividing rational numbers. (7.NS.2)
- Convert a rational number to a decimal using long division. (7.NS.2)
- Identify terminating or repeating decimal representations of rational numbers. (7.NS.2)
- Solve real world and mathematical problems involving the four operations with rational numbers. (7.NS.3)

Academic Vocabulary:

Critical Terms:		**Supplemental Terms:**	
Commutative Property	Distributive Property	Absolute Value	Additive Inverse
Integers	Negative Numbers	Associative Property	Expanding
Opposites	Positive Numbers	Factoring	Quadrant I, II, III, IV
Income/Profit		Order of Operations	Rational Numbers
		Area	Coordinate Grid
		Decimals	Expressions
		Fact Family	Fractions
		Mathematical Sentence	Number Line
		Number Sentence	Operations
		Ordered Pair	Variable

Domain: Expressions (2-3 weeks)

Essential Questions

- When and how are expressions, equations, inequalities and graphs applied to real world situations?
- How can the order of operations be applied to evaluating expressions, and solving from one-step to multi-step equations?

Standard(s):

Use properties of operations to generate equivalent expressions

- **7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (Mastered)**
- 7.EE.2 **Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a +0.05a = 1.05a means that "increase by 5% is the same as multiply by 1.05."* (Mastered)**

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 of an algebraic expression.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

1. **Make sense of problems and persevere in solving them.**

* **2. Reason abstractly and quantitatively.** Students demonstrate quantitative reasoning by representing and solving real world situations using visuals, numbers, and symbols. They demonstrate abstract reasoning by translating expressions, equations, inequalities and linear relationships into real world situations.

* **3. Construct viable arguments and critique the reasoning of others.** Students will discuss the differences among expressions, equations and inequalities using appropriate terminology and tools/visuals. Students will apply their knowledge of equations and inequalities to support their arguments and critique the reasoning of others while supporting their own position.

* **4. Model with mathematics.** Students will model an understanding of expressions, equations, inequalities, and graphs using tools such as algebra tiles/blocks, counters, protractors, compasses, and visuals to represent real world situations.

* **5. Use appropriate tools strategically.** Students demonstrate their ability to select and use the most appropriate tool (pencil/paper, manipulatives, calculators, protractors, etc.) while simplifying/evaluating/analyzing expressions, solving equations and representing and analyzing linear relationships.

* **6. Attend to precision.** Students demonstrate precision by correctly using numbers, variables and symbols to represent expressions, equations and linear relationships, and correctly label units. Students use precision in calculation by checking the reasonableness of their answers and making adjustments accordingly. Students will use appropriate geometric language to describe and label figures.

7. **Look for and make use of structure.** to solve for the variable. Students will also examine the relationship between the structure of a circle and the formulas for area and circumference.
8. **Look for and express regularity in repeated reasoning.**

Target Skills:

Students will be able to …

- Use Commutative, Associative, Distributive, Identity, and Inverse Properties to add and subtract linear expressions with rational coefficients. (7.EE.1)
- Use Commutative, Associative, Distributive, Identity, and Inverse Properties to factor and expand linear expressions with rational coefficients. (7.EE.1)
- Rewrite an expression in a different form. (7.EE.2)
- Choose the form of an expression that works best to solve a problem. (7.EE.2)
- Explain your reasoning for the choice of expression used to solve a problem. (7.EE.2)

Academic Vocabulary:		
Critical Terms:		**Supplemental Terms:**
Distributive Property	Commutative Property	Algebra
Associative Property	Multiplicative Property of Zero	Property
Variable	Numerical expression	Order of operations
Algebraic expression	Term	Evaluate
Coefficient	Constant	Simplest form
Equation	Inequality	

Prairie-Hills Elementary School District 144
7th Grade ~ MATH Curriculum Map
Quarter 3

Month: January, February, March

Domain: Equations (4-5 weeks)

Essential Questions

- When and how are expressions, equations, inequalities and graphs applied to real world situations?
- What are some possible real-life situations to which there may be more than one solution?
- How does the ongoing use of fractions and decimals apply to real-life situations?

Standard(s):

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

- 7.EE.3 Solve multistep 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. For example: *If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary and hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar* 9 ¾ *inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge;* this estimate can be used as a check on the exact computation. **(Mastered)**
- 7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. **(Mastered)**
- **a.** Solve word problems leading to equations of the form px + q = rand p (x + q) = r, where p, q, and rare specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is the width?*
- **b.** Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and rare specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: *As a salesperson you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

- 7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informational derivation of the relationship between the circumference and area of a circle. **(Mastered)**

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 regarding the structure and elements of equations.
- The use of area models for working with multiplicative relationships

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students explain and demonstrate an understanding of expressions, equations, and linear relationships by using symbols, visuals, words, and real-life contexts. Students demonstrate perseverance by drawing from their own experiences, prior knowledge, and repertoire of strategies until they find the solution for the given situation.

* **2. Reason abstractly and quantitatively.** Students demonstrate quantitative reasoning by representing and solving real- world situations using visuals, numbers, and symbols. They demonstrate abstract reasoning by translating expressions, equations, inequalities and linear relationships into real-world situations.

3. Construct viable arguments and critique the reasoning of others.

* **4. Model with mathematics.** Students will model an understanding of expressions, equations, inequalities, and graphs using tools such as algebra tiles/blocks, counters, protractors, compasses, and visuals to represent real-world situations.

* **5. Use appropriate tools strategically.** Students demonstrate their ability to select and use the most appropriate tool (pencil/paper, manipulative, calculators, protractors, etc.) while simplifying/evaluating/analyzing expressions, solving equations and representing and analyzing linear relationships.

* **6. Attend to precision.** Students demonstrate precision by correctly using numbers, variables and symbols to represent expressions, equations and linear relationships, and correctly label units. Students use precision in calculation by checking the reasonableness of their answers and making adjustments accordingly. Students will use appropriate geometric language to describe and label figures.

* **7. Look for and make use of structure.** Students will apply structure by defining the variable and choosing an appropriate mode of representation to aid in solving the problem. (i.e. diagram, table, graph, number line). Students will model with an equation to solve for the variable. Students will also examine the relationship between the structure of a circle and the formulas for area and circumference.

8. **Look for and express regularity in repeated reasoning.**

Target Skills:

Students will be able to …

- Use commutative, associative, distributive, identity, and inverse properties to calculate with numbers in any form (whole numbers, fractions and decimals). (7.EE.3)
- Convert between rational number forms (whole numbers, fractions and decimals) to solve problems as appropriate. (7.EE.3)
- Solve multi-step mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
- Solve multi-step real-life problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
- Use mental computation and estimation strategies to assess the reasonableness of the answer. (7.EE.3)
- Translate words or real-life situations into variable equations. (7.EE.4)
- Translate words or real-life situations into variable inequalities. (7.EE.4)
- Solve one- or two-step equations with rational numbers fluently. (7.EE.4)
- Solve word problems leading to one- or two-step equations with rational numbers. (7.EE.4)
- Construct simple equations and inequalities with rational numbers to solve problems. (7.EE.4)
- Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. (7.EE.4)
- Solve word problems leading to one- or two-step inequalities with rational numbers. (7.EE.4)
- Graph the solution set of inequalities and interpret it in the context of the problem. (7.EE.4)
- Know the formulas for the area and circumference of a circle. (7.G.4)
- Use the formulas for area and circumference of a circle to solve problems. (7.G.4)
- Informally, derive the area formula for a circle based on circumference. (7.G.4)

Academic Vocabulary:	
Critical Terms: Linear Factored form Combining like terms Rate of change Coefficient Circumference Inverse operation	**Supplemental Terms:** Evaluate Equivalent Commutative property Distributive property Expanded form Inequality Term Expression Rational number Associative property Identity properties Equation Circle

Domain: Data Distributions (3-4 weeks)

Essential Questions

- How can two data distributions be compared?
- How can statistics be used to gain information about a sample population?
- How can a random sample of a larger population be used to draw inferences?

Standard(s):

Use random sampling to draw inferences about a population.

- **7.SP.1** Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **(Introduce and Support)**
- 7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be. **(Introduced and Support)**

Draw informal comparative inferences about two populations

- 7.SP.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. (Additional)
- **7.SP.4** Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. (Additional)

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 instruction regarding statistical language with regard to visual data representations.
- Clear examples of bias expressed using simple language and supported with visual representations.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

1. **Make sense of problems and persevere in solving them.** Students explain and demonstrate an understanding of expressions, equations, and linear relationships by using symbols, visuals, words, and real-life contexts. Students demonstrate perseverance by drawing from their own experiences, prior knowledge, and repertoire of strategies until they find the solution for the given situation.

* 2. **Reason abstractly and quantitatively.** Students demonstrate quantitative reasoning by representing and solving real-world situations using visuals, numbers, and symbols. They demonstrate abstract reasoning by translating expressions, equations, inequalities and linear relationships into real-world situations.

* 3. **Construct viable arguments and critique the reasoning of others.**

* 4. **Model with mathematics.** Students will model an understanding of expressions, equations, inequalities, and graphs using tools such as algebra tiles/blocks, counters, protractors, compasses, and visuals to represent real-world situations.

5. **Use appropriate tools strategically.** Students demonstrate their ability to select and use the most appropriate tool (pencil/paper, manipulative, calculators, protractors, etc.) while simplifying/evaluating/analyzing expressions, solving equations and representing and analyzing linear relationships.

6. **Attend to precision.** Students demonstrate precision by correctly using numbers, variables and symbols to represent expressions, equations and linear relationships, and correctly label units. Students use precision in calculation by checking the reasonableness of their answers and making adjustments accordingly. Students will use appropriate geometric language to describe and label figures.

7. **Look for and make use of structure.** Students will apply structure by defining the variable and choosing an appropriate mode of representation to aid in solving the problem. (i.e. diagram, table, graph, number line). Students will model with an equation to solve for the variable. Students will also examine the relationship between the structure of a circle and the formulas for area and circumference.

8. **Look for and express regularity in repeated reasoning.** Students use their prior experiences with visual representations of data to interpret new data sample sets.

Target Skills:

Students will be able to …

- Recognize and identify that different sampling techniques must be used in real life situations, because it is very difficult to survey an entire population. (7.SP.1)
- Select appropriate sample sizes based on a population in real-life situations and explain why generalizations about a population from a sample are valid only if the sample is random and representative of that population. (7.SP.1)
  Collect data from a sample population in order to predict information about a population. (7.SP.1)
- Interpret data from a random sample to draw inferences about a population with an unknown characteristic of interest. (7.SP.2)
  Generate multiple samples (or simulated samples) of the same size to determine the variation in estimates or predictions by comparing the samples. (7.SP.2)
- Identify the degree of overlap between two numerical sets of data. (7.SP.3)
- Visually compare two numerical data distributions with like ranges. (7.SP.3)
  Measure the difference between the centers of two different data distributions and express this difference as a multiple of a measure of variability. (7.SP.3)
- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. (7.SP.4)

Academic Vocabulary:

Critical Terms:		**Supplemental Terms:**	
Random sample	Biased sample	Statistics	Mean
Unbiased sample	Histogram	Median	Mode
Box plot	Dot plot		
Double box plot	Double dot plot		

Prairie-Hills Elementary School District 144
7th Grade ~ MATH Curriculum Map
Quarter 4

Month: March, April, May

Domain: Probability (2-3 weeks)

Essential Questions

- How are probability and the likelihood of an occurrence related and represented?
- How is probability approximated?
- How is a probability model used?
- How are probabilities of compound events determined?

Standard(s):

Investigate chance processes and develop, use and evaluate probability models.

- 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that in neither unlikely nor likely, and a probability near 1 indicates a likely event. (Introduce and Support)

- 7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. (Introduce and Support)
  a) 7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (Introduce and Support)Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. (Introduce and Support)
  b) Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed
- 7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
  a) Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (Introduce and Support)

  b) Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

  c) Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

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 will benefit from:

- Explicit instruction with regard to understanding the contexts for probability models.
- Explicit vocabulary instruction with regard to probability language.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

1. **Make sense of problems and persevere in solving them.** Students make sense of probability situations by creating visual, tabular and symbolic models to represent the situations. They persevere through approximating probabilities and refining approximations based upon data.

* 2. **Reason abstractly and quantitatively.** Students' reason about the numerical values used to represent probabilities as a value between 0 and 1.

* 3. **Construct viable arguments and critique the reasoning of others.** Students approximate probabilities and create probability models and explain reasoning for their approximations. They also question each other about the representations they create to represent probabilities.

* 4. **Model with mathematics.** Students model real world populations using mathematical probability representations that are algebraic, tabular or graphic.

5. **Use appropriate tools strategically.** Students select and use technological, graphic or real-world contexts to model probabilities.
6. **Attend to precision.** Students use precise language and calculations to represent probabilities in mathematical and real-world contexts.
7. **Look for and make use of structure.** Students recognize that probability can be represented in tables, visual models, or as a rational number.
8. **Look for express regularity in repeated reasoning.** Students use repeated reasoning when approximating probabilities. They refine their approximations based upon experiences with data.

Target Skills:

Students will be able to …

- Represent the probability of a chance event as a number between 0 and 1. (7.SP.5)
- Use the terms "likely", "unlikely," to describe the probability represented by the fractions used. (7.SP.5)
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency. (7.SP.6)
- Predict the approximate relative frequency of a chance event given the probability. (7.SP.6)
- Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. (7.SP.7)
- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. (7.SP.7)
- Compare probabilities from a model to observed frequencies. (7.SP.7)
- If the agreement between a model and observed frequencies is not good, explain possible sources of the discrepancy. (7.SP.7)
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP.8)
- Represent the probability of a compound event as the fraction of outcomes in the sample space for which the compound event occurs. (7.SP.8)
- Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. (7.SP.8)
- For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. (7.SP.8)
- Design and use a simulation to generate frequencies for compound events. (7.SP.8)

Academic Vocabulary:

Critical Terms:		**Supplemental Terms:**	
Simulation	Compound event	Empirical probability	Equally likely
Probability	Sample space	More likely	Less likely
Random sample	Outcome	Fair	Unfair
Theoretical probability	Experimental probability	Simple event	Fraction
Relative Frequency	Tree diagram	Decimal	Percent
Likelihood	Counting Principle	Combination	Permutation
Uniform probability model		Dependent Event	Independent Event
		Complementary Event	Relative frequency

Domain: Geometric Measurement (4-5 weeks)

Essential Questions

- How are forms and objects created or represented?
- How are two-dimensional and three-dimensional space related?
- How are specific characteristics and a classification system useful in analyzing and designing structures? How does our understanding of geometry help us to describe real-world objects?

Standard(s):

Analyze proportional relationships and use them to solve real-world and mathematical problems.

- 7. RP.3 **Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.** **(Mastered)**

Draw, construct, and describe geometrical figures and describe the relationships between them.

7.G.1 Solve problems involving scale drawing of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing in a different scale. (Additional)

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:

- tactile and virtual manipulative for the study of geometric figures and their components.
- explicit vocabulary instruction with regard to geometric and measurement terminology.

Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students make sense of the problems involving geometric measurements (area, volume, surface area, etc.) through their understanding of the relationships between these measurements. They demonstrate this by choosing appropriate strategies for solving problems involving real-world and mathematical situations.

2. Reason abstractly and quantitatively.

* **3. Construct viable arguments and critique the reasoning of others.** Students are able to construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades.

4. Model with mathematics. Students are able to apply the geometry concepts they know to solve problems arising in everyday life, society and the workplace. This may include applying area and surface of 2-dimensional figures to solve interior design problems or surface area and volume of 3-dimensional figures to solve architectural problems.

* **5. Use appropriate tools strategically.** Mathematically proficient students consider available tools that might include concrete models, a ruler, a protractor, or dynamic geometry software such as virtual manipulatives and simulations. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data.

6. Attend to precision.

7. Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure.

* They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They can see complicated things as single objects or as being composed of several objects.

* **8. Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.

Target Skills:

Students will be able to …

- Use freehand, ruler, protractor and technology to draw geometric shapes with given conditions. (7.G.2)
- Construct triangles from 3 measures of angles or sides. (7.G.2)
- Given conditions, determine what and how many type(s) of triangles are possible to construct. (7.G.2)
- Describe the two-dimensional figures that result from slicing three-dimensional figures (right rectangular prisms and right rectangular pyramids). (7.G.3)
- Identify and describe supplementary, complementary, vertical, and adjacent angles. (7.G.5)
- Use understandings of supplementary, complementary, vertical and adjacent angles to write and solve equations. (7.G.5)
- Explain (verbally and in writing) the relationships between the angles formed by two intersecting lines. (7.G.5)
- Solve mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (7.G.6)
- Solve real-world problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (7.G.6)

Academic Vocabulary:

Critical Terms:		**Supplemental Terms:**	
Three-dimensional	Two-dimensional	Nets	Volume
Surface area	volume	Area	Polygon
Intersecting lines	Vertex	Pyramid	Prism
Complementary angles	Supplementary angles	Triangle	Angle
Cross-sections	Right rectangular prism	Right angle	Obtuse angle
Right rectangular pyramid	Constructions	Degrees	Acute angle
Virtual manipulative	Cube	Angle measure	Line segment
Planar section	Compose	Prism	Pyramid
Decompose		Plane	