








Middle School - 7th Grade Math

North Boone CUSD 200

UNITS (7/7 SELECTED)

SUGGESTED DURATION

 Unit 1: The Number System	<i>38 lessons</i>
 Unit 2: Ratios & Proportional Relationships	<i>22 lessons</i>
 Unit 3: Expressions, Equations & Inequalities	<i>25 lessons</i>
 Unit 4: Geometry	<i>28 lessons</i>
 Unit 5: Statistics	<i>22 lessons</i>
 Unit 6: Probability	<i>25 lessons</i>
 Unit 7: Mathematicians & Math Careers Enrichment	<i>5 lessons</i>

Unit 1: The Number System

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.NS.A.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

CCSS.Math.Content.7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

CCSS.Math.Content.7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

CCSS.Math.Content.7.NS.A.1a: Describe situations in which opposite quantities combine to make 0.

CCSS.Math.Content.7.NS.A.1b: 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.

CCSS.Math.Content.7.NS.A.1c: Understand subtraction of rational numbers as adding the 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.

CCSS.Math.Content.7.NS.A.1d: Apply properties of operations as strategies to add and subtract rational numbers.

CCSS.Math.Content.7.NS.A.2a: 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.

CCSS.Math.Content.7.NS.A.2b: 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 $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

CCSS.Math.Content.7.NS.A.2c: Apply properties of operations as strategies to multiply and divide rational numbers.

CCSS.Math.Content.7.NS.A.2d: 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.

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

Unit 1: The Number System

Middle School - 7th Grade Math - Last Updated on June 4, 2019

PRIORITY STANDARDS

7.NS.1	<p>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.</p> <p>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.</p> <p>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.</p> <p>c. Understand subtraction of rational numbers as adding the 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.</p> <p>d. Apply properties of operations as strategies to add and subtract rational numbers.</p>
7.NS.2	<p>Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.</p> <p>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.</p> <p>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 $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.</p> <p>c. Apply properties of operations as strategies to multiply and divide rational numbers.</p> <p>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.</p>
7.NS.3	<p>Solve real-world and mathematical problems involving the four operations with rational numbers.</p>

Unit 1: The Number System

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>Rational numbers are numbers that can be expressed as a ratio of two integers.</p> <p>Rational numbers are commonly encountered in real world contexts and problem solving. The ability to fluently perform addition, subtraction, multiplication, and division with rational numbers is an essential skill for solving real-world and mathematical problems.</p>	<p>How can you use addition, subtraction, multiplication and division of integers to solve real-world problems?</p> <p>How do operations with integers compare to operations with rational numbers?</p> <p>What will happen if you reverse the order of rational numbers when performing any operation?</p> <p>How can use rational numbers to solve real-world problems?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none"> • Key vocabulary associated with the number system, including: additive inverse (or opposite), rational numbers, repeating decimals, terminating decimals, complex fraction • The Inverse Property of Addition: The sum of a number and its additive inverse is 0. (0 is its own opposite.) • The Closure Property for Integer Multiplication: If a and b are integers, then $a \cdot b$ is also an integer. Note that the Closure Property also holds for addition and subtraction of integers, but not for division of integers. The Closure Property holds for all four operations with rational numbers. • The group of rational numbers includes fractions, mixed numbers, and whole numbers. • When written as a decimal, every rational number either terminates or has some finite number of digits that repeat. • The rules for operations with integers also apply to operations with signed rational numbers. 	<ul style="list-style-type: none"> • Correctly use key vocabulary associated with the number system in discussions and explanations of problem solving • Add, subtract, multiply, and divide integers with the same sign and with different signs. • Use integer operations to solve multistep real-world and mathematical problems. • Convert a rational number to a decimal. • Add, subtract, multiply, and divide rational numbers. • determine whether to model a real-world situation with addition or subtraction • justify their steps when solving mathematical and real-world problems • use mental math and estimation to assess the reasonableness of calculations • Use different forms of rational numbers and strategically choose tools to solve problems.

Unit 1: The Number System

Middle School - 7th Grade Math - Last Updated on June 4, 2019

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Subtraction is formally defined as addition of the opposite, or additive inverse.• Properties of addition, such as the Commutative, Associative, and Inverse Properties of Addition, do not apply to subtraction problems. However, when subtraction is written as addition of the opposite, these properties can be applied.• The rules for multiplying integers also apply to rational numbers:<ul style="list-style-type: none">◦ the product of two rational numbers with opposite signs is negative◦ the product of two rational numbers with the same sign is positive◦ the product of 0 and any other rational number is 0• The inverse operation of division is multiplication.• Division by zero is undefined.	

Unit 2: Ratios & Proportional Relationships

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.RP.A.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

CCSS.Math.Content.7.RP.A.2: Recognize and represent proportional relationships between quantities.

CCSS.Math.Content.7.RP.A.2a: 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.

CCSS.Math.Content.7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems.

CCSS.Math.Content.7.RP.A.2b: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

CCSS.Math.Content.7.RP.A.2c: Represent proportional relationships by equations.

CCSS.Math.Content.7.RP.A.2d: 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.

CCSS.Math.Content.7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

CCSS.Math.Content.7.EE.A.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.

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

Unit 2: Ratios & Proportional Relationships

Middle School - 7th Grade Math - Last Updated on June 4, 2019

PRIORITY STANDARDS

7.RP.A.2	<p>Recognize and represent proportional relationships between quantities.</p> <p>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.</p> <p>b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>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 $t = pn$</p> <p>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.</p>
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Unit 2: Ratios & Proportional Relationships

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>Ratios and proportionality are useful for solving single- and multi-step problems as well as a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease.</p> <p>Problems involving markup and markdowns are a common application of percents of change. They also provide an opportunity to observe how writing an expression in different forms can provide different information about the situation the problem describes.</p> <p>Simple interest is one common application of percents, and lays the foundation for the future study of compound interest. The amount of simple interest earned depends on three quantities: the principal, the interest rate, and the amount of time involved. Most real-world financial situations involve compound interest rather than simple interest. The main difference between simple and compound interest is that compound interest is earned or paid both on the principal and on the previously earned interest.</p> <p>In graphs of proportional relationships, the steepness of the line, called the slope, represents the unit rate.</p>	<p>How can you use rates and proportionality to solve real-world problems?</p> <p>How can you use proportional relationships and percent to solve real-world problems?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Key concepts and vocabulary associated with ratios and proportional relationships, including: complex fraction, unit rates, constant of proportionality, proportion, proportional relationship, rate of change, percent decrease, percent increase, principal, simple interest	<ul style="list-style-type: none">• Correctly use key concepts and vocabulary associated with ratios and proportional relationships in discussions and explanations of problem solving• Find and use unit rates• Identify and represent proportional relationships• Use graphs to represent and analyze proportional relationships

Unit 2: Ratios & Proportional Relationships

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Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Another name for proportional relationship is direct variation because one variable varies directly with the other variable.• Whether a relationship between two quantities is or is not proportional	<ul style="list-style-type: none">• Use percents to describe change• Rewrite expressions to help solve markup and markdown problems• Use percents to solve problems

Unit 3: Expressions, Equations & Inequalities

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

CCSS.Math.Content.7.EE.B.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.

CCSS.Math.Content.7.EE.B.4a: Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

CCSS.Math.Content.7.EE.B.4b: Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

CCSS.Math.Content.7.EE.A.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.

PRIORITY STANDARDS

7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7.EE.B.4	<p>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.</p> <p>a. Solve word problems leading to equations of the form $px + q = r$ and $p(x+q)=r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic 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 it width?</p> <p>b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it is 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.</p>

Unit 3: Expressions, Equations & Inequalities

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>The properties of operations (addition, subtraction, multiplication, and division) and the relationships between addition and subtraction, and multiplication and division are maintained when these operations are extended to all rational numbers</p> <p>Fluency with the arithmetic of rational numbers is an essential skill for solving real-world and mathematical problems.</p> <p>Formulation of expressions and equations in one variable and accurate equation solving are essential skills for effective problem solving.</p>	<p>How can you use algebraic expressions and equations to solve real-world problems?</p> <p>How can you use inequalities to solve real-world problems?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Key concepts and vocabulary associated with expressions, equations, and inequalities, including: factor, distributive property, algebraic expression, commutative property of addition, associative property of addition, two-step linear equation• Algebraic expressions are subtracted by first rewriting the subtraction as addition of the opposite• In writing algebraic expressions, products involving variables are usually written without multiplication symbols to avoid confusion between the symbol \times and the variable x.• Every two-step linear equation has one and only one solution.• The similarities and differences of arithmetic and algebraic solutions• The same number can be added to or subtracted from both sides of an inequality without changing the solution	<ul style="list-style-type: none">• Correctly use key concepts and vocabulary associated with expression, equations, and inequalities in discussions and explanations of problem solving• Add, subtract, factor, and multiply algebraic expressions• Simplify algebraic expression by using the properties of operations to justify steps• Use one-step equations with rational coefficients to solve problems• Write and solve two-step equations• Write and solve one-step inequalities• Write and solve two-step inequalities

Unit 3: Expressions, Equations & Inequalities

Middle School - 7th Grade Math - Last Updated on June 4, 2019

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Both sides of an inequality can be multiplied or divided by a positive number without changing the solution• When both sides of an inequality are multiplied or divided by a negative number, the inequality symbol is reversed	

Unit 4: Geometry

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.G.A.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

CCSS.Math.Content.7.G.A.2: Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

CCSS.Math.Content.7.G.A.3: Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

CCSS.Math.Content.7.G.B.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

CCSS.Math.Content.7.G.B.5: Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

CCSS.Math.Content.7.G.B.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

CCSS.Math.Content.7.RP.A.2: Recognize and represent proportional relationships between quantities.

CCSS.Math.Content.7.RP.A.2a: 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.

CCSS.Math.Content.7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems.

CCSS.Math.Content.7.EE.A.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.

CCSS.Math.Content.7.EE.B.4a: Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Unit 4: Geometry

Middle School - 7th Grade Math - Last Updated on June 4, 2019

PRIORITY STANDARDS

7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
7.RP.2	Recognize and represent proportional relationships between quantities. 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.
7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Unit 4: Geometry

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>Ratios, proportionality, and scale drawings that model corresponding lengths between objects or relationships of lengths within an object that are preserved in similar objects are useful in problem solving.</p> <p>Solving real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of circles, triangles, quadrilaterals, polygons, spheres, cubes, and right prisms is facilitated by applying strategies such as:</p> <ul style="list-style-type: none">• reasoning about relationships among two-dimensional figures• using scale drawings and informal geometric constructions• being familiar with the relationships between angles formed by<ul style="list-style-type: none">intersecting lines• relating three-dimensional figures to two-dimensional figures by<ul style="list-style-type: none">examining cross-sections	<p>How can you use proportions to solve real-world geometry problems?</p> <p>How can you apply geometry concepts to solve real-world problems?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Key concepts and vocabulary associated with geometry, including: scale, scale drawing, cross section, intersection, adjacent angles, complementary angles, congruent angles, supplementary angles, vertex, vertical angles, circumference, diameter, and radius• A unique triangle is determined by:<ul style="list-style-type: none">◦ three segments where the sum of the lengths of any two of the three segments is be greater than the length of the third (The Triangle Inequality Theorem)	<ul style="list-style-type: none">• Correctly use key concepts and vocabulary associated with geometry in discussions and explanations of problem solving• Use scale drawings to solve problems• Use the area of a figure on a scale drawing to find the corresponding area on the actual object• Draw shapes that satisfy given conditions• Identify cross sections of three-dimensional figures• Use angle relationships to solve problems• Find and use the circumference of a circle• Find the area of a circle

Unit 4: Geometry

Middle School - 7th Grade Math - Last Updated on June 4, 2019

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">◦ the lengths of two segments and the measure of the angle between them; and,◦ the measures of two angles totaling less than 180° and the length of the segment between them• If a point S is in the interior of $\angle PQR$, then $m\angle PQS + m\angle SQR = m\angle PQR$ (The Angle Addition Postulate)• Vertical angles are congruent (the Vertical Angles Theorem)• If two angles are supplementary to the same angle, the two angles are congruent (Congruent Supplements Theorem)• The formula for the circumference C of a circle, where d is the diameter and r is the radius is $C = \pi d$ or $2\pi r$ • The number π is an irrational number, meaning it cannot be represented as the ratio of two integers or as a terminating or repeating decimal• The decimal expansion of π begins 3.1415926..., but in applications, the approximations for π of 3.14 and $22/7$ are often useful• The area of the circle is given by $A = \pi r^2$	<ul style="list-style-type: none">• Find the area of composite figures• Find the surface area of a figure made up of cubes and prisms• Find the volume of a figure made of cubes and prisms

Unit 5: Statistics

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.SP.A.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.

CCSS.Math.Content.7.SP.A.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.

CCSS.Math.Content.7.SP.B.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.

CCSS.Math.Content.7.SP.B.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

CCSS.Math.Content.7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems.

PRIORITY STANDARDS

7.SP.A.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.
7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Unit 5: Statistics

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>Addressing questions about differences between populations is at the heart of using statistical analyses in helping to solve real-world and mathematical problems.</p> <p>Sampling involves choosing a subset of a population in order to make statistical inferences about the population. The sampling method can have a profound effect on how representative the data can be.</p> <p>Random sampling is useful for generating data sets from which valid inferences may be drawn.</p>	<p>How can you use random samples and populations to solve real-world problems?</p> <p>How can you solve real-world problems by analyzing and comparing data?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• Key concepts and vocabulary associated with statistics, including: biased sample, population, simple random sample, stratified random sample, convenience sample, cluster sampling, systematic sample, voluntary response sample and sample• The interquartile range (IQR) can be used to find outliers in a data set• When a population is too large to be studied easily, a representative sample of the population may be studied instead• Samples may be simulated with technology (using graphing calculators) or without technology (using random number tables)• Dot plots can be used to analyze data. There are two categories of dot plots. A Wilkinson dot plot shows the data points plotted above a horizontal scale. A Cleveland dot plot shows categorical labels on the vertical axis and continuous values on the horizontal axis.	<ul style="list-style-type: none">• Correctly use key concepts and vocabulary associated with statistics in discussions and explanations of problem solving• Use a sample to gain information about a population• Use proportional reasoning to solve multistep ratio problems• Use a sample to make inferences about a population• Generate and use random samples to represent a population• Compare two sets of data displayed in dot plots• Compare two sets of data displayed in box plots• Use statistical measures to compare populations

Unit 5: Statistics

Middle School - 7th Grade Math - Last Updated on June 4, 2019

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• The mean, median, and mode of a data set are measures of central tendency• The mean is the sum of the data values divided by the number of values and is useful for describing data that are close in value and data that are normally distributed. The mean is not useful if the data contain outliers, which can skew the mean to the right or left of the center• The median is the middle value of the data when the values are in numerical order and is useful for describing a data set that is not normally distributed or that has outliers• The mode is the data value that occurs most often and is useful for describing a data set in which the data cluster around certain values. It is the only measure of the three that can be used to describe non-numerical, categorical data• The mean absolute deviation (MAD) is a measure of statistical dispersion of quantitative data. It is the average distance of the data set from its mean. A data set with a smaller MAD has data values that cluster closer to the mean than a data set with a greater MAD.	

Unit 6: Probability

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

CCSS.Math.Content.7.SP.C.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 $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

CCSS.Math.Content.7.SP.C.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.

CCSS.Math.Content.7.SP.C.7a: Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

CCSS.Math.Content.7.SP.C.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

CCSS.Math.Content.7.SP.C.8c: Design and use a simulation to generate frequencies for compound events.

CCSS.Math.Content.7.SP.C.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.

CCSS.Math.Content.7.SP.C.7b: Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

CCSS.Math.Content.7.SP.C.8a: 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.

CCSS.Math.Content.7.SP.C.8b: 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.

CCSS.Math.Content.7.RP.A.2c: Represent proportional relationships by equations.

CCSS.Math.Content.7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems.

CCSS.Math.Content.7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

Unit 6: Probability

Middle School - 7th Grade Math - Last Updated on June 4, 2019

PRIORITY STANDARDS

7.SP.C.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 $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
7.SP.C.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 the outcomes in the sample space for which the compound event occurs. 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 doubles 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?
7.RP.2	Recognize and represent proportional relationships between quantities. 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.
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.

Unit 6: Probability

Middle School - 7th Grade Math - Last Updated on June 4, 2019

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>The probability of an event is the likelihood of the event on a scale from 0 to 1. A probability may be expressed as a ratio, a decimal, or a percent from 0% to 100%, inclusive.</p> <ul style="list-style-type: none"> If an event is impossible, then it has a probability of 0. If an event is certain, then it has a probability of 1. If an event is neither likely nor unlikely, it has a probability of 0.5. <p>The experimental probability of an event is the ratio of the number of times an event occurs to the total number of trials.</p> <p>The theoretical probability of an event is the ratio of the number of ways the event can occur to the total number of possible outcomes.</p> <p>Probability is especially helpful in solving real-world and mathematical problems that involve making predictions and decisions.</p>	<p>How can you use experimental probability to solve real-world problems?</p> <p>How can you use theoretical probability to solve real-world problems?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none"> Key concepts and vocabulary associated with probability, including: complement, event, experiment, outcome, probability, sample space, trial, experimental probability, simple event, simulation, compound event, theoretical probability If an experiment is repeated many times, the experimental probability of the event approaches the theoretical probability of the event (The Law of Large Numbers). 	<ul style="list-style-type: none"> Correctly use key concepts and vocabulary associated with probability in discussions and explanations of problem solving Describe the likelihood of an event Find the experimental probability of a simple event Find the experimental probability of a compound event Make predictions using experimental probability Find the theoretical probability of a simple event Find the probability of a compound event Make predictions using theoretical probability

Unit 6: Probability

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Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none">• If event A can occur in m ways and event B can occur in n ways, the events occur together a total of $m \cdot n$ ways. This principle easily extends to more than two events (The Fundamental Counting Principle).• A compound event is an event that includes two or more simple events, such as flipping a coin and rolling a number cube.• A compound event can include events that depend on each other or are independent.• Events are independent if the occurrence of one event does not affect the probability of the other event.	<ul style="list-style-type: none">• Use technology simulations to estimate probabilities

Unit 7: Mathematicians & Math Careers Enrichment

Middle School - 7th Grade Math - Last Updated on June 4, 2019

STANDARDS

PRIORITY STANDARDS

ELA.RI.7.3	Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).
ELA.RI.7.2	Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text. Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text.
ELA.W.7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

DESIRED RESULTS

Enduring Understandings	Essential Question(s)
<p>The math students learn in school today was developed historically by many influential mathematicians.</p> <p>The math students learn in school today helps them develop thinking and problem solving skills that will be useful in any career, but especially in math and science focused careers.</p>	<p>Who are some famous mathematicians and how did they contribute to the development of mathematics?</p> <p>What are some math focused careers and how is math used in them?</p>

Students will know (Knowledge):	Students will be able to (Skills):
<ul style="list-style-type: none"> The names, brief biographies and major contributions to the field of some historically significant mathematicians Some math focused career opportunities in today's world, contributions made by people in those careers, and the education and experience path for pursuing that career 	<ul style="list-style-type: none"> Research and present information about a historically significant mathematician, summarizing his/her contributions to the field of mathematics, educational background, and biographical information Research and present about math focused career opportunities, summarizing the kind of work the career entails, the educational background needed, and the rewards and challenges of the career path. Creatively present information to the class in a 5-8 minute speech.