7th Grade Math Curriculum Map
2014-2015 School Year

Standards for Mathematical Practice are addressed throughout the year!

HENRY COUNTY SCHOOLS

First Semester			Second Semester			
Unit 1 Operations and Rational Numbers **(8 weeks)**	**Unit 2** Expressions and Equations **(6 weeks)**	**Unit 3** Ratios and Proportional Relationships **(5 weeks)**	**Unit 4** Inferences **(2 weeks)**	**Unit 5** Geometry **(4 weeks)**	**Unit 6** Probability **(3 weeks)**	**Unit 7** Show What We Know **(3 weeks)**
Common Core Georgia Performance Standards						
MCC7.NS.1: a,b,c,d MCC7NS.2: a,b,c,d MCC7.NS.3	MCC7.EE1 MCC7.EE2 MCC7.EE.3 MCC7.EE4: A,b *Incorporated Standards* *MCC7.NS.1* MCC7.NS.2 MCC7.NS.3	MCC7.RP.1 MCC7.RP2: a,b,c,d MCC7.RP.3 MCC7.G.1 *Incorporated Standards* *MCC7.EE.3* MCC7.NS.1 MCC7.NS.2 MCC7.NS.3	MCC7.SP.1 MCC7.SP2 MCC7.SP.3 MCC7.SP.4 *Incorporated Standards* *MCC7.NS.1* MCC7.NS.2 MCC7.NS.3	MCC7.G.2 MCC7.G.3 MCC7.G.4 MCC7.G.5 MCC7.G.6 *Incorporated Standards* *MCC7.G.1*	MCC7.SP.5 MCC7.SP.6 MCC7.SP.7: a,b MCC7.SP.8: a,b,c	All standards
Overarching Essential Questions						
"How do rational numbers help us to recognize or make connections among mathematical ideas?	*"How can we use equations to solve complex real-world problems?"*	*"When or where is it beneficial to use proportional relationships to analyze or solve real-world problems*	*"How do we analyze data to make inferences?"*	*"How do we describe the relationship between geometric figures?"*	*"How can expected value be used to help make decisions?"*	*"How can what we learned this year impact how we think in preparation for next year?"*

1

FIRST SEMESTER

Unit 1: Operations & Rational Numbers	Unit 2: Expressions & Equations	Unit 3: Ratios & Proportional Relationships
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. **7.NS.1a** Describe situations in which opposite quantities combine to make 0. **7.NS.1b** Understand p + q as the number located a distance $\lvert q \rvert$ 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. **7.NS.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. **7.NS.1d** Apply properties of operations as strategies to add and subtract rational numbers. **7.NS.2** Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers. **7.NS.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. **7.NS.2b** Understand that rational numbers can be divided, provided that the divisor is not zero, and every quotient of rational numbers (with non-zero divisor) is a rational number. If p and q are rational numbers then $-\left(\frac{p}{q}\right) = \frac{(-p)}{q} = \frac{p}{(-q)}$. Interpret quotients of rational numbers by describing real-world contexts. **7.NS.2c** Apply properties of operations as strategies to multiply and divide rational numbers **7.NS.2d** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0's or eventually repeats. **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers.	**7.EE.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **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. **7.EE.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 as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. **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. **7.EE.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. **7.EE.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.	**7.RP.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **7.RP.3** Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*

SECOND SEMESTER

Unit 3: Ratios & Proportional Relationships	Unit 4: Inference	Unit 5: Geometry	Unit 6: Probability	Unit 7: Show What We Know
7.RP.2 Recognize and represent proportional relationships between quantities. **7.RP.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. **7.RP.2b** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **7.RP.2c** 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. **7.RP.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. **7.G.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.	**Apply and extend previous understandings of measurement and interpreting data.** **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. **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. **7.SP.3**. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, 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. **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.	**Draw, construct and describe geometrical figures and describe the relationships between them.** **7.G.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. **7.G.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. **7.G.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. **7.G.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.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.	**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 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **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. **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. **7.SP.7a** 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. **7.SP.7b** 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 frequencies? **7.SP.8** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **7.SP.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. **7.SP.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. **7.SP.8c** 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?	**ALL STANDARDS**

3

Key Vocabulary

- **Additive Inverse**
- **Multiplicative Inverse**
- **Absolute Value**
- **Rational numbers**
- **Natural Numbers**
- **Negative Numbers**
- **Opposite Numbers**
- **Positive Numbers**
- **Rational Numbers**
- **Repeating Decimal**
- **Terminating Decimal**
- **Zero Pair**

Essential Questions

- What models can be used to show addition and subtraction of positive and negative rational numbers?
- What strategies are most useful in helping me develop algorithms for adding, subtracting, multiplying, and dividing positive and negative rational numbers?
- How can I use models to prove that opposites combine to 0?
- What real life situations combine to make 0?
- How do I use a number line to model addition or subtraction of rational numbers?
- How do I convert a rational number to a decimal using long division?

CCGPS Standards Addressed:

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.

7.NS.1a Describe situations in which opposite quantities combine to make 0.

7.NS.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.

7.NS.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.

7.NS.1d Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.2 Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.

7.NS.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.

7.NS.2b Understand that rational numbers can be divided, provided that the divisor is not zero, and every quotient of rational numbers (with non-zero divisor) is a rational number.

7.NS.2c Apply properties of operations as strategies to multiply and divide rational numbers

7.NS.2d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0's or eventually repeats.

7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Suggested Learning Resources/Performance Tasks

See next page for 7th grade resources and performance tasks.

Prerequisite Skills

- positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- rational numbers are points on the number line.
- numbers with opposite signs indicate locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite
- absolute value of a rational number is its distance from 0 on the number line
- interpret absolute value as magnitude for a positive or negative quantity in a real-world situation

Unit 2: Expressions and Equations

CCGPS Standards Addressed:

MCC7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

MCC7.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.

MCC7.EE.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 as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

MCC7.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.

MCC7.EE.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. **MCC7.EE.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.

Essential Questions
- How can we represent values using variables?
- What is the difference in an expression and an equation?
- How do I simplify expressions?
- How can we use variables to solve equations?
- How do I determine the difference in equations and inequalities?
- How do I solve and graph inequalities?

Key Vocabulary
- **Variable**
- **Numerical expression**
- **Algebraic expression**
- **Term**
- **Coefficient**
- **Constant**
- **Equation**
- **Inequality**

Suggested Learning Resources/ Performance Tasks
See next page for learning resources and performance tasks.

Enduring Understandings
- Variables can be used to represent numbers in any type mathematical problem.
- Understand the difference in an expression and an equation.
- Expressions you simplify and equations you solve for the variable's value.
- Write and solve multi-step equations including all rational numbers.
- Some equations may have more than one solution and understand inequalities.

Prerequisite Skills
- number sense
- computation with whole numbers and decimals, including application of order of operations
- addition and subtraction of common fractions with like denominators
- computation with all positive and negative rational numbers
- data usage and representations

Unit 3: Ratios and Proportional Relationships

Key Vocabulary

- Multiplicative inverse
- Percent rate of change
- Ratio
- Proportion
- Scale factor

Prerequisite Skills

- number sense
- computation with whole numbers and decimals, including application of order of operations
- addition and subtraction of common fractions with like denominators
- measuring length and finding perimeter and area of rectangles and squares
- characteristics of 2-D and 3-D shapes
- data usage and representations

Enduring Understandings

- Fractions, decimals, and percents can be used interchangeably
- The relationships and rules that govern whole numbers, govern all rational numbers
- In order to add or subtract fractions, we must have like denominators
- When we multiply one number by another, we may get a product that is bigger than the original number, smaller than the original number or equal to the original number
- When we divide one number by another, we may get a quotient that is bigger than the original number, smaller than the original number or equal to the original number
- Ratios use division to represent relationships between two quantities

Essential Question

- What information do I get when I compare two numbers using a ratio?
- What kinds of problems can I solve by using ratios?
- How do I compute unit rate in tables, graphs, equations and diagrams?
- How do I compute unit rate in real-world problems?
- How do I use ratios and their relationships to solve real world problems?
- How do I recognize proportional relationships between quantities?
- How do I represent proportional relationships between quantities?
- How do I solve multistep ratio problems using proportional relationships?
- How do I solve multistep percent problems using proportional relationships?
- How do I represent proportional relationships by equations?
- How do I solve problems involving scale drawings of geometric figures?
- How do I compute actual lengths and areas from a scale drawing?
- How do I reproduce a scale drawing at a different scale?

CCGPS Standards Addressed:

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

7.RP.2 Recognize and represent proportional relationships between quantities.

7.RP.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.

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

7.RP.2c 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 $t = pn$.

7.RP.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.

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

7.G.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.

Suggested Learning Resources/ Performance Tasks
See next pages for resources and performance tasks.

Unit 4: Inference

Key Vocabulary

- Frequency
- Grouped Frequency Table
- Maximum and Minimum value
- Mean, Mode, Median, Range
- Measures of Center
- Measures of Spread
- Mutually Exclusive
- Outlier
- Sample
- Simple Random Sampling

Prerequisite Skills

- Analyzing patterns and seeing relationships
- Represent and interpret data, using addition and subtraction, multiplication and division
- Data can be represented graphically in a variety of ways. The type of graph is selected to best represent a particular data set.
- Measures of center (mean, median, mode) and measures of variation (range, quartiles, interquartile range) can be used to analyze data.
- Larger samples are more likely to be representative of a population.
- Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
- Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- Summarize numerical data sets in relation to their context, such as by reporting the number of observations.
- Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.

Enduring Understandings

- 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.
- 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.
- 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.
- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Essential Question

- In what ways are sample statistics related to the corresponding population parameters?
- How do I choose and create appropriate graphs to represent data?
- What conclusions can be drawn from data?
- How can I describe the center of a set of data?
- How can I describe the variation within a data set?
- How can I use data to compare different groups?

CCGPS Standards Addressed:

Apply and extend previous understandings of measurement and interpreting data.

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.

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.

7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

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.

Suggested Learning Resources/ Performance Tasks

See next pages for learning resources and performance tasks.

Unit 5 Geometry

Key Vocabulary:
- **Adjacent Angle**
- **Circumference**
- **Complementary and Supplementary Angles**
- **Congruent**
- **Cross- section**
- **Irregular Polygon**
- **Parallel Lines**
- **Pi**
- **Regular Polygon**
- **Vertical Angles**

Essential Questions
- What are the characteristics of angles and sides that will create geometric shapes, especially triangles?
- What plane figures can I make by slicing a cube by planes? What about when I use cones, prisms, cylinders, and pyramids instead of cubes?
- How can I be sure I have found all possible cross-sections of a solid?
- How are the diameter and circumference of a circle related?
- What is pi? How does it relate to the circumference and diameter of a circle?
- How do we find the circumference of a circle?
- How do the areas of squares relate to the area of circles?
- How is the formula for the area of a circle related to the formula for the area of a parallelogram?
- Why is the area of a circle measured in "square units" when a circle isn't square?
- How can I use the special angle relationships – supplementary, complementary, vertical, and adjacent – to write and solve equations for multi-step problems?
- How are the perimeter and area of a shape related?
- How are the areas of geometric figures related to each other?
- How can the formulae for the area of plane figures be used to solve problems?
- How can we find the area of regular and irregular polygons when you don't have a specific formula?
- What kinds of problems can be solved using surface areas of right rectangular prisms?
- How can I use the concept of surface area and volume to solve problems?

Prerequisite Skills:
- number sense
- computation with whole numbers and decimals, including application of order of operations
- addition and subtraction of common fractions with like denominators
- measuring length and finding perimeter and area of rectangles and squares
- characteristics of 2-D and 3-D shapes
- angle measurement
- data usage and representations

Suggested Learning Resources

See next pages for learning resources and performance tasks.

Enduring Understandings:
- Coordinate geometry can be a useful tool for understanding geometric shapes and transformations.
- Cross-sections of three-dimensional objects can be formed in a variety of ways, depending on the angle of the cut with the base of the object.
- The area of irregular and regular polygons can be found by decomposing the polygon into triangles, squares, and rectangles.
- "Pi" (π) is the relationship between a circle's circumference and diameter.
- Parallelograms and rectangles can be used to derive the formula for the area of a circle.
- Approximate volumes of simple geometric solids may be found using estimation
- Formulas may be used to determine the volume of fundamental solid figures.
- Approximate surface area of simple geometric solids may be found using estimation
- Manipulatives and the construction of nets may be used in computing the surface area of right rectangular prisms.
- Formulas may be used to compute the surface area of right rectangular prisms.

CCGPS Standards Addressed:
7.G.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.

7.G.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.

7.G.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.

7.G.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.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.

Unit 6: Probability

Key Vocabulary:

- Chance Process
- Compound Event
- Empirical
- Event
- Experimental Probability
- Independent events
- Probability
- Probability Model
- Relative Frequency of Outcomes
- Sample space
- Simple Event
- Simulation
- Theoretical Probability
- Tree diagram

Suggested Learning Resources

See next pages for learning resources and performance tasks.

Prerequisite Skills:

- number sense
- computation with whole numbers and decimals, including application of order of operations
- addition and subtraction of common fractions with like denominators
- measuring length and finding perimeter and area of rectangles and squares
- characteristics of 2-D and 3-D shapes

Essential Questions:

- Why must the numeric probability of an event be between 0 and 1?
- What is the likeliness of an event occurring based on the probability near 0, ½, or 1?
- How can you determine the likelihood that an event will occur?
- How are the outcomes of given events distinguished as possible?
- What is the difference between theoretical and experimental probability?
- What is the significance of a large number of trials?
- How do I determine a sample space?
- How can you represent the likelihood of an event occurring?
- How are theoretical probabilities used to make predictions or decisions?
- How can you represent the probability of compound events by constructing models?
- How can I use probability to determine if a game is worth playing or to figure my chances of winning the lottery?
- What is the process to design and use a simulation to generate frequencies for compound events?

Enduring Understandings:

- Probabilities are fractions derived from modeling real world experiments and simulations of chance.
- Modeling real world experiments through trials and simulations are used to predict the probability of a given event.
- Chance has no memory. For repeated trials of a simple experiment, the outcome of prior trials has no impact on the next.
- The probability of a given event can be represented as a fraction between 0 and 1.
- Probabilities are similar to percents. They are all between 0 and 1, where a probability of 0 means an outcome has 0% chance of happening and a probability of 1 means that the outcome will happen 100% of the time. A probability of 50% means an even chance of the outcome occurring.
- If we add the probabilities of every outcome in a sample space, the sum should always equal 1.
- The experimental probability or relative frequency of outcomes of an event can be used to estimate the exact probability of an event.
- Experimental probability approaches theoretical probability when the number of trials is large.
- Sometimes the outcome of one event does not affect the outcome of another event. (This is when the outcomes are called independent.)
- Tree diagrams are useful for describing relatively small sample spaces and computing probabilities, as well as for visualizing why the number of outcomes can be large.
- Simulations can be used to collect data and estimate probabilities for real situations that are sufficiently complex that the theoretical probabilities are not obvious.

CCGPS Standards Addressed:

MCC7.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.

MCC7.SP.7a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

MCC7.SP.7b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

MCC7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

MCC7.SP.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.

MCC7.SP.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.

MCC7.SP.8c Design and use a simulation to generate frequencies for compound events.