| **Unit 1** | **Unit 2** | **Unit 3** | **Unit 4** | | **Unit 5** | **Unit 6** | **Unit 7** | **Unit 8** | **Unit 9** | **Unit 10** | **Unit 11** | | **Unit 12** | **Unit 13** | **Unit 14** |
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| **Adding and Subtracting Rational Numbers** | **Multiplying and Dividing Rational Numbers** | **Solving Linear Equations and Inequalities in One Variable** | **Scale Drawings to Support Ratios and Rates** | | **Linear Expressions** | **Proportional Reasoning: Percents** | **Proportional Reasoning: Coordinate Plane** | **Population Statistics** | **Simple Probability** | **Compound Probability** | **Area, Volume, and Surface Area** | | **Circles** | **Angles** | **Geometric Constructions** |
| **15 days** | **20 days** | **14 days** | **15 days** | | **14 days** | **14 days** | **14 days** | **9 days** | **8 days** | **6 days** | **10 days** | | **10 days** | **6 days** | **5 days** |
| 7.NS.A.1 | 7.NS.A.2 | 7.EE.B.4 | 7.RP.A.1 | | 7.EE.A.1 | 7.RP.A.3 | 7.RP.A.2 | 7.SP.A.1 | 7.SP.C.5 | 7.SP.C.8 | 7.G.A.3 | | 7.G.B.4 | 7.G.B.5 | 7.G.A.2 |
| 7.NS.A.3 | 7.NS.A.3 | MP.1 | 7.G.A.1 | | 7.EE.A.2 | MP.4 | MP.4 | 7.SP.A.2 | 7.SP.C.6 | MP.4 | 7.G.B.6 | | MP.1 | MP.1 | MP.3 |
| MP.1 | 7.EE.B.3 | MP.4 | MP.1 | | MP.2 | MP.6 | MP.6 | 7.SP.B.3 | 7.SP.C.7 | MP.5 | MP.4 | | MP.2 | MP.3 | MP.5 |
| MP.6 | MP.1 | MP.7 | MP.2 | | MP.7 | MP.8 | MP.8 | 7.SP.B.4 | MP.3 | MP.6 | MP.5 | | MP.7 | MP.7 | MP.7 |
| MP.7 | MP.2 |  | MP.4 | |  |  |  | MP.3 | MP.4 |  | MP.7 | | MP.8 |  |  |
|  | MP.7 |  | MP.6 | |  |  |  | MP.4 |  |  |  | |  |  |  |
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| **Major Clusters** | | | | **Supporting Clusters** | | | | **Additional Clusters** | | | | **Other** | | | |
| **RP** – Ratio and Proportional Reasoning (1, 2, 3)  **NS** – The Number System  (1, 2, 3)  **EE** – Expressions and Equations  (1, 2, 3, 4) | | | | **SP –** Statistics and Probability  (1, 2, 5, 6, 7, 8) | | | | **G** – Geometry  (1, 2, 3, 4, 5, 6)  **SP** – Statistics and Probability  (3, 4) | | | | **MP** – Standards for Mathematical Practice | | | |

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| **Summary of Year for Grade 7 Mathematics** |
| In 6th grade, students extend their conceptual understanding of the set of rational numbers to include negative rational numbers. In 7th grade, students will extend their work on operations with rational numbers to include all rational numbers. Students should apply the connections between addition and subtraction as well as the connections between multiplication and division to gain a high level of procedural skill and fluency in performing operations with rational numbers. Students’ fluency with rational numbers will be applied in modeling and solving multi-step real-world and mathematical problems; furthermore, their fluency with rational numbers will be applied to their work in solving linear equations and inequalities in one variable. Students will be expected to extend their procedural skill and fluency in solving a single-step equation from 6th grade to solving multi-step equations and inequalities in 7th grade. Then the course will transition to extending students’ capacity for rigor with proportional reasoning. First, students will use scale drawing to reengage with proportional reasoning, then apply proportional reasoning to model and solve problems involving percents, and finally extend their work with proportional reasoning to examine relationships between two quantities. After proportional reasoning students will extend their work with univariate statistics from 6th grade to examining and making inferences about populations. Pairing with statistics, students will be introduced to the concept of probability and work problems involving simple and compound probabilities. Both statistics and probability will support student’s work with rational numbers and proportional reasoning by allowing students to apply their conceptual understanding and fluency in new and different contexts. The course concludes with a study of geometry including geometric construction, geometric measures of two and three dimensional figures, an introduction to circles, and angle pairs. |
| **Standards Clarification for Grade 7 Mathematics** |
| Some standards are included in multiple units to provide students with multiple opportunities to engage with the content. In the tables that follow, suggested focus areas and possible benchmarks for repeated standards are identified in the column labeled Standards Clarification. |
| **Mathematical Practices Recommendations for Grade 7 Mathematics** |
| Mathematical practices should be evident *throughout* mathematics instruction and connected to all of the content areas addressed at this grade level. Mathematical tasks are an important opportunity to connect content and practices. Some brief examples of how the content of this grade might be connected to the practices follow.   * When students compare arithmetic and algebraic solutions to the same problem (7.EE.4a), they are identifying correspondences between different approaches (MP.1). * Solving an equation such as 4 = 8(*x* – 1/2) requires students to see and make use of structure (MP.7), temporarily viewing *x* – 1/2 as a single entity. * When students notice when given geometric conditions determine a unique triangle, more than one triangle or no triangle (7.G.2), they have an opportunity to construct viable arguments and critique the reasoning of others (MP.3). Such problems also present opportunities for using appropriate tools strategically (MP.5). * Proportional relationships present opportunities for modeling (MP.4). For example, the number of people who live in an apartment building might be taken as proportional to the number of stories in the building for modeling purposes. |
| **Fluency Expectations for Grade 7 Mathematics** |
| * **7.EE.B.3:** Students solve multistep problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. This work is the culmination of many progressions of learning in arithmetic, problem solving and mathematical practices. * **7.EE.B.4:** In solving word problems leading to one-variable equations of the form *px* + *q* = *r* and *p*(*x* + *q*) = *r*, students solve the equations fluently. This will require fluency with rational number arithmetic (7.NS.1–3), as well as fluency with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1). * **7.NS.A.1-2:** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic (see below), fluency with rational number arithmetic should be the goal in grade 7. |

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| **Unit 1: Adding and Subtracting Rational Numbers** | | **Possible time frame**:  15 days |
| 7th grade is the year that students begin performing arithmetic operations with negative rational numbers. Students should enter 7th grade with a conceptual understanding positive and negative rational numbers as describing quantities having opposite directions or values; however, students have performed arithmetic operations with negative rational numbers prior to their 7th grade year. In this unit students should apply and extend their understanding of addition and subtraction to add and subtract within the entire set of rational numbers. Students should begin this unit representing addition and subtraction on a horizontal or vertical number line diagram and finish the unit being able to apply properties of operations as strategies to add and subtract rational numbers. Students should leave this unit with a deeper conceptual understanding of positive and negative rational numbers and be able to use them to solve real-world and mathematical problems including real-world problems where the sum is zero. Although procedural skill and fluency should be improved through this unit, conceptual understanding must be the basis for discovery and instruction. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**  **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.   1. 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.* 2. 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. 3. 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. 4. Apply properties of operations as strategies to add and subtract rational numbers.   **7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers. | | **7.NS.A.3** Limited to only addition and subtraction in this unit. Students will continue to solve problems involving the four operations with rational numbers throughout the remainder of the course. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | Looking for and making use of structure (MP.7) helps students’ understanding of addition and subtraction of positive and negative rational numbers. Students also engage in MP.1 and MP.6 in order to solve the multi-step problems. | |
| **MP.6** Attend to precision. |
| **MP.7** Look for and make use of structure. |

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| **Unit 2: Multiplying and Dividing Rational Numbers** | | **Possible time frame**:  20 days | |
| After learning how to add and subtract rational numbers in Unit 1, students will extend their previous understandings of multiplication and division and of fractions to multiply and divide within the entire set of rational numbers. In this unit students should apply their understanding of positive and negative numbers to establish the rules for multiplying signed numbers. Additionally students should understand that integers can be divided, provided that the divisor is not zero, and develop an understanding that the quotient of integers (with non-zero divisors) is a rational number. This unit also has a large focus on interpreting rational numbers in real-world context. This unit is not solely focused on procedural skill and fluency; rather, this unit should address all three facets of rigor: conceptual understanding, procedural skill and fluency, and application. This unit culminates by having students combine all four operations with rational numbers to solve multi-step real-world and mathematical problems. | | | |
| **Major Cluster Standards** | | | **Standards Clarification** |
| **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**  **7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.   1. 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. 2. 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. 3. Apply properties of operations as strategies to multiply and divide rational numbers. 4. 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.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers.  **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**  **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. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 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.* | | | **7.NS.A.3** Computations with rational numbers extend the rules for multiplying fractions to complex fractions. Students will continue to solve problems involving the four operations with rational numbers throughout the remainder of the course. |
| **Focus Standards of Mathematical Practice** | | | |
| **MP.1** Make sense of problems and persevere in solving them. | Looking for and making use of structure (MP.7) helps students’ understanding of addition and subtraction of positive and negative rational numbers. Students also engage in MP.1 and MP.6 in order to solve the multi-step problems. In manipulating these equations to generate equivalent expressions, they also reason abstractly and quantitatively (MP.2). | | |
| **MP.2** Reason abstractly and quantitatively. |
| **MP.6** Attend to precision. |
| **MP.7** Look for and make use of structure. |

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| **Unit 3: Solving Linear Equations and Inequalities in One Variable** | | **Possible time frame**:  14 days |
| In the 6th grade students are introduced to the concept of a variable and begin solving single-step linear equations in one variable. Also in the 6th grade, students gain a conceptual understanding of inequalities as constraints for real-world or mathematical problems recognizing that inequalities have an infinite number of solutions and can be graphed on a number line. Students do not solve any linear inequalities in one variable while in the 6th grade. This unit is designed to extend students’ work with linear equations and inequalities to include solving multi-step linear equations and inequalities in one variable. The goal of this unit is to have students solving real-world problems leading to equations and inequalities. To achieve this goal, students will need to improve their procedural skill and fluency in solving multi-step equations and inequalities which can happen both with context and without. Additionally students must learn how to construct equations and inequalities from mathematical and real-world problems. Embedded in solving multi-step equations and inequalities is the ability to perform arithmetic operations with rational numbers; therefore, this unit will continue to increase students’ procedural skill and fluency in performing arithmetic operations with rational numbers by allowing them to use their skills in a new context. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**  **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.   1. 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 its width?* 2. 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. *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.* | | The equations and inequalities in this unit should provide the students an opportunity to work with all types of rational numbers, not just integers. (7.NS.A.3 from Unit 2)  **7.EE.B.4** Students will write and solve equations (and possibly inequalities) to solve problems involving missing angle measures in Unit 13.  **7.EE.B.4a** It is not necessary nor is it encouraged to use the distributive property to solve the multi-step equations in this unit..  **7.EE.B.4b** Although the mathematical examples in the standard only show the less than and greater than signs, it is appropriate to use the less than or equal to and the greater than or equal to signs as well. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | Students solve real-life problems (MP.1) by modeling them with algebraic expressions (MP.4). In manipulating these equations to generate equivalent expressions, look for and make use of structure (MP.7). | |
| **MP.4** Model with mathematics. |
| **MP.7** Look for and make use of structure. |

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| **Unit 4: Scale Drawings to Support Ratios and Rates** | | **Possible time frame**:  15 days |
| Students leave the 6th grade with a conceptual understanding of ratios, rates, and unit rates. In this unit students will reengage with these concepts and extend them to include ratios of fractions including ratios of lengths, areas, and other quantities measured in like or different units. This unit provides students an opportunity to apply their procedural skills and fluency with rational numbers including complex fractions in a different context. Their procedural skill and fluency should enhance their work with ratios and proportions. Additionally in this unit, students will solve problems involving scale drawings of geometric figures including computing actual lengths and areas from a scale drawing, reproducing a scale drawing at a different scale, and calculating unit rates that model the relationship between side lengths of geometric figures and between areas of geometric figures. Working with scale drawings will support the students work with unit rates and allow them to see their application in a geometric context. | | |
| **Major Cluster Standards** | **Standards Clarification** | |
| **Analyze proportional relationships and use them to solve real-world and mathematical problems.**  **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. *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.* | Students will apply their work with complex fractions in this unit to compute unit rates with ratios of fractions. (7.NS.A.3 from Unit 2)  **7.RP.A.1** Students will need a strong conceptual understanding of unit rates to be successful in Unit 7. | |
| **Additional Cluster Standards** | **Standards Clarification** | |
| **Draw, construct, and describe geometrical figures and describe the relationships between them.**  **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.A.1** The concept of similarity is not introduced until the 8th grade and should not be discussed when working with scale drawings. | |

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| **Focus Standards of Mathematical Practice** | |
| **MP.1** Make sense of problems and persevere in solving them. | Students solve real-life problems (MP.1) by modeling them with unit rates (MP.4), while reasoning abstractly and quantitatively (MP.2). To build an understanding of how areas of two or more scale drawing relate, students engage in MP.8. They attend to precision (MP.6) as they engage in solving problems relating to scale drawings. |
| **MP.2** Reason abstractly and quantitatively. |
| **MP.4** Model with mathematics. |
| **MP.6** Attend to precision. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 5: Linear Expressions** | | **Possible time frame**:  14 days |
| Students were introduced to the concept of a variable in their 6th grade course as well as established the conceptual understanding that two expressions are equivalent when they name the same number regardless of which value is substituted into them. In this unit students will extend their work with variables and generating equivalent expressions by applying properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. Students should see and understand simplifying a linear expression as a different process that requires similar and different conceptual understandings and procedural skills than those required to solve a linear equation. Students will also look at coefficients differently in this unit than they did in Unit 3 understanding that a coefficient tells you “how many” of a variable or term you have in an expression and then use this understanding to expand and factor linear expressions. Due to the limitations on the complexity of linear equations in this course, this unit on linear expressions was designed more to support students’ work with ratios and proportional relationships instead of linear equations. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Use properties of operations to generate equivalent expressions.**  **7.EE.A.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.  **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. *For example, a + 0.05a = 1.05a means that “increase by 5%” is the same as “multiply by 1.05.”* | | **7.EE.A.2** Students will apply their conceptual understanding and procedural skill in rearranging expressions to make them more meaningful within a particular context in Unit 6. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.2** Reason abstractly and quantitatively. | In manipulating these equations to generate equivalent expressions, they also reason abstractly and quantitatively (MP.2) and look for and make use of structure (MP.7). | |
| **MP.7** Look for and make use of structure. |

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| **Unit 6: Proportional Reasoning: Percents** | | **Possible time frame**:  14 days |
| In 6th grade students gain an understanding of a percent as a rate per 100 and use this understanding to find the percent of a quantity and to find the whole given the part and percent. In this unit students will use this understand to solve multistep ratio and percent problems including simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. Additionally, students will use their knowledge of creating equivalent expressions to provide insight into the context of problems. This conceptual understanding and fluency with proportional reasoning and percents will be used again in Units 8, 9, and 10 as students extrapolate from random samples and use probability to solve problems. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Analyze proportional relationships and use them to solve real-world and mathematical problems.**  **7.RP.A.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.* | | Students will continue to use the structure of expressions to provide additional insight into the context of problems with a focus on expressions involving percents. (7.EE.A.2 from Unit 5)  **7.RP.A.3** Students will continue to use proportional reasoning and percents in their work with probability and statistics in Units 8, 9, and 10. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.4** Model with mathematics. | Students model with mathematics (MP.4) and attend to precision (MP.6) as they look for and express repeated reasoning (MP.8) by generating various representations of proportional relationships and use those representations to identify and describe constants of proportionality. | |
| **MP.6** Attend to precision. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 7: Proportional Reasoning: Coordinate Plane** | | **Possible time frame**:  14 days |
| Students are introduced to the coordinate plane and graphing point in the first quadrant in the 5th grade and extend their work to include all four quadrants in the 6th grade. Also in 6th grade, students began creating and graphing a series of equivalent ratios. Students have not been introduced to the concept of a proportion or a proportional relationship prior to this unit. This unit extends the students’ work with creating equivalent ratios and graphing to include continuous data sets to establish the idea of proportional relationships. Once the students have established the criteria for a proportional relationship, they will explore and discover the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions. Students will generalize a proportional relationship to model them with an equation. Students should leave this unit with a deep conceptual understanding of the connections between equivalent ratios, unit rates, proportional relationships, and their graphs on the coordinate plane. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Analyze proportional relationships and use them to solve real-world and mathematical problems.**  **7.RP.A.2** Recognize and represent proportional relationships between quantities.   1. 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. 2. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. | | Students will extend their work with unit rates to discover the constant of proportionality from a table, graph, equation, diagram, or verbal description in a proportional relationship. Additionally students will understand the significance of the point (1, *r*) where the output is the unit rate of the graph for a proportional relationship. (7.RP.A.1 from Unit 4) |
| **Focus Standards of Mathematical Practice** | | |
| **MP.4** Model with mathematics. | Students model with mathematics (MP.4) attend to precision (MP.6) as they look for and express repeated reasoning (MP.8) by generating representations of proportional relationships and use those representations to identify and describe constants of proportionality. | |
| **MP.6** Attend to precision. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 8:Population Statistics** | **Possible time frame**:  9 days | |
| In 5th grade students begin working with data representations using only numerical data. In 6th grade students were introduced to statistics by gaining an understanding that a statistical question is one that anticipates variability in the data related to that question and accounts for it in the answer. Also in the 6th grade, students looked at data distributions for data arising from a real-world context. This work with statistics extends in this course to population statistics. All of the data used in this unit will be from a real-world context with an emphasis on representative samples and their corresponding populations. Students will utilize both measures of center and measures of variability to compare and make inferences for two populations. | | |
| **Supporting Cluster Standards** | | **Standards Clarification** |
| **Use random sampling to draw inferences about a population.**  **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.  **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. *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.* | |  |
| **Additional Cluster Standards** | | **Standards Clarification** |
| **Draw informal comparative inferences about two populations.**  **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. *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.B.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.* | |  |

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| **Focus Standards of Mathematical Practice** | |
| **MP.3** Construct viable arguments and critique the reasoning of others. | In this unit, students engage in modeling (MP.4) as they draw inferences about a population. They also use data to construct and critique arguments (MP.3). In doing so, they should also attend to precision of their use of language and mathematics (MP.6). |
| **MP.4** Model with mathematics. |
| **MP.6** Attend to precision. |

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| **Unit 9: Simple Probability** | | **Possible time frame**:  9 days |
| In this unit students will be introduced to the concept of probability. In Unit 8 of this course, students applied their understanding of statistics to gain insights from and to make inferences for a population. After working with population statistics, students start to explore the concept of the chance events. This is the students’ first experience with probability, and it begins with the conceptual understanding that the probability of a chance event is a rational number between 0 and 1. Students will explore simple probability through collecting data on a chance process as well as through developing probability models. Probability is designed to enhance the students’ statistical thinking and reasoning. | | |
| **Supporting Cluster Standards** | | **Standards Clarification** |
| **Investigate chance processes and develop, use, and evaluate probability models.**  **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 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.  **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. *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.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.   1. 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.* 2. 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?* | | Students use proportional reasoning and percentages when working with probability. (7.RP.A.3 from Unit 6)  **7.SP.C.5**  Students will need a strong conceptual understanding of probability to be successful in Unit 10. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.3** Construct viable arguments and critique the reasoning of others. | In this unit, students engage in developing probability models and thereby engage in MP.4. For many probability situations, more than one model may be developed and applied to answer real-world questions; therefore, students construct viable arguments and critique the reasoning of others (MP.3). | |
| **MP.4** Model with mathematics. |

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| **Unit 10: Compound Probability** | **Possible time frame**:  6 days |
| This unit will extend the students’ work with probability to include finding probabilities of compound events. Students are not expected to calculate the probability of a compound event arithmetically; rather, they will be expected to find the probability of a compound event using organized lists, tables, tree diagrams, and simulations. Students should understand that the probability of a compound event is analogous to the probability of a simple event in that both are ratios comparing the number of favorable outcomes within a sample space to the entire sample space. Students will design and use simulations to generate frequencies for compound events. This unit should provide students with an appreciation of how probability can be applied in a real-world context. | |
| **Supporting Cluster Standards** | **Standards Clarification** |
| **Investigate chance processes and develop, use, and evaluate probability models.**  **7.SP.C.8** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.   1. 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. 2. 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. 3. 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?* | Students will need a strong conceptual understanding of probability to be able to engage with compound probability. (7.SP.C.5 from Unit 9)  Students use proportional reasoning and percentages when working with probability. (7.RP.A.3 from Unit 6)  **7.SP.C.8**  This standard does not include finding probability of compound events arithmetically. Neither the Addition nor the Multiplication Rule should be taught in this course. |

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| **Focus Standards of Mathematical Practice** | |
| **MP.4** Model with mathematics. | In this unit, students continue modeling with mathematics (MP.4). Students use appropriate tools (e.g. organized lists, tables, tree diagrams) (MP.5) and attend to precision (MP.6) as they create and use probability models. |
| **MP.5** Use appropriate tools strategically. |
| **MP.6** Attend to precision. |

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| **Unit 11: Area, Volume, and Surface Area** | | **Possible time frame**:  10 days |
| In many ways this unit is a culmination of geometric work beginning in the 3rd grade. Throughout the courses, geometric measurement is used to support students’ basic numeracy and provide them with an opportunity to apply their understandings of arithmetic in a different context. This unit is no different as it will reinforce students’ procedural skill and fluency in working with non-negative rational numbers. Additionally, the focus of this unit is on irregular figures which distinguish this unit from similar units on area, volume, and surface are in previous courses. All two- and three-dimensional objects used in this unit should be a composition of triangles, quadrilaterals, polygons, cubes, and right prisms. This will require students to be able to recognize and decompose the objects into pieces they can work with. To support their work with irregular two- and three-dimensional objects, students will slice three dimensional figures to describe the resulting two-dimensional figure. | | |
| **Additional Cluster Standards** | | **Standards Clarification** |
| **Draw, construct, and describe geometrical figures and describe the relationships between them.**  **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.  **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**  **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.G.B.6** In mastering this standard, students should have the opportunity to work with non-negative rational numbers including fractions and decimals. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.4** Model with mathematics. | Students select appropriate tools (MP.5) and look for and make use of structure (MP.7) as they investigate 3-dimensional figures. They also model with mathematics as they solve multi-step real-life measurement problems (MP.4). | |
| **MP.5** Use appropriate tools strategically. |
| **MP.7** Look for and make use of structure. |

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| **Unit 12: Circles** | | **Possible time frame**:  10 days |
| This unit will be the first time the students have engaged with circles since the 4th grade where they gained a conceptual understanding of circles and their properties with an emphasis on angle measures. In this unit students will apply their conceptual understanding of area as well as their conceptual understanding of perimeter to circles. To allow the students to leave this unit and course with a deeper understanding of the formulas for area and circumference, students should be provided the opportunity to experimentally derive the formulas for area and circumference. This experience will also provide you the teacher an opportunity to introduce pi. After establishing the formulas for area and circumference, students will use them to solve real-world and mathematical problems in addition to providing an informal derivation of the relationship between the circumference and area of circle. | | |
| **Additional Cluster Standards** | | **Standards Clarification** |
| **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**  **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. | | **7.G.B.4** Irrational numbers are not introduced until the 8th grade. An approximate value of pi can be discovered by allowing the students to derive experimentally the formulas for area and circumference. The approximations that are discovered should be used for pi and the actual value of pi as an irrational number will be discussed in the 8th grade. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | In this unit, students engage in MP.7 and MP.8 as they relate formulas in this unit to particular real-world and mathematical problems. As students persevere in solving real-life and mathematical problems involving measurement (MP.1), they need to consider the units involved and attend carefully to the meaning of the quantities (MP.2). | |
| **MP.2** Reason abstractly and quantitatively. |
| **MP.7** Look for and make use of structure. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 13: Angles** | | | **Possible time frame**:  6 days |
| Similar to Unit 12 students will need to bring with them into this unit securely held knowledge from their 4th grade course. In their 4th grade course, students were introduced to the concept of an angle as a geometric shape formed wherever two rays share a common endpoint. Additionally students measure angles in whole-number degrees and learn to classify angles based on their size (limited to acute, right, and obtuse). Students also explored the relationship between adjacent angles (without using the term adjacent) discovering that the sum of the measures of adjacent angles equals the sum of the larger angle they form. This concept of adjacent angles and their sum will be formalized in this unit in addition to the concepts of vertical angles, complimentary angles, and supplementary angles. Each of these terms will be new to the students as well as the concepts of vertical, complimentary, and supplementary angles. The properties of these angle pairs should be discovered and formalized through explorations utilizing the students’ knowledge of angle measurements. Once the properties of these angle pairs are established, students will use them to solve multi-step problems and to write and solve simple equations for an unknown angle in a figure. | | | |
| **Additional Cluster Standards** | | **Standards Clarification** | |
| **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**  **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. | | Students will be expected to write and solve equations for an unknown angle in a figure. This unit would provide an opportunity to reinforce students’ fluency in solving equations; also, this unit would provide an opportunity to model real-world situations involving angles with equations and inequalities. (7.EE.B.4 from Unit 3)  **7.G.B.5** The standards do not explicitly address at any grade level the measure of a straight angle. It may need to be discovered by applying the students’ understanding of right angles and angle addition. | |
| **Focus Standards of Mathematical Practice** | | | |
| **MP.1** Make sense of problems and persevere in solving them. | Investigating and describing the relationships among geometrical figures requires that students look for and make use of structure (MP.7) as they construct and critique arguments (MP.3) that summarize and apply those relationships. | | |
| **MP.3** Construct viable arguments and critique the reasoning of others. |
| **MP.7** Look for and make use of structure. |

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| **Unit 14: Geometric Constructions** | | **Possible time frame**:  5 days |
| This unit is designed to engage students in geometry which will be the major focus for the remainder of the course. This unit emphasizes the construction of geometric figures with given conditions. Specifically, students are supposed to draw freehand, with a ruler and a protractor, and with technology two-dimensional geometric shapes. Students begin their work with geometric shapes in Kindergarten and continue that work throughout all of elementary math courses and middle grades math courses; however, this is the first time students are expected to draw geometric figures. Students will reengage with geometric constructions in high school during their Geometry course. The constructions the students do in this unit will focus on triangles and provide students the opportunity to formalize their understanding of what conditions define a unique triangle, more than one triangle, or no triangle. | | |
| **Additional Cluster Standards** | | **Standards Clarification** |
| **Draw, construct, and describe geometrical figures and describe the relationships between them.**  **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. | |  |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | In this unit, students choose appropriate tools (MP.5) to create constructions with various constraints. Investigating and describing the relationships among geometrical figures requires that students look for and make use of structure (MP.7) as they construct and critique arguments (MP.3) that summarize and apply those relationships. | |
| **MP.3** Construct viable arguments and critique the reasoning of others. |
| **MP.7** Look for and make use of structure. |