Grade Seven Mathematics

Domain	*Ratios and Proportional Relationships*	
Cluster	*Analyze proportional relationships and use them to solve real-world and mathematical problems.*	**Pacing** **6 weeks** **3rd Quarter**

Standards	Content Elaborations
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 ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour, equivalently 2 miles per hour.* **Learning Targets:** • I can compute a unit rate by repeating (iterating) or partitioning a given rate. • I can compute unit rate by multiplying or dividing both quantities by the same factor. • I can explain the relationship between composed units and multiplicative comparison to express a unit rate. 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. **Learning Targets:**	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

- I can determine whether two quantities are proportional by examining the relationship given in a graph, a table, an equation, or verbally.
- I can identify the constant of proportionality when given with a proportional relationship in the form of a table, a graph, an equation, a diagram, or verbally.
- I can write an equation that represents a proportional relationship.
- I can use words to explain the importance of a specific point on the graph of a proportional relationship, including, but not limited to (0, 0) and (l, r).

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.

Learning Targets:
- I can use proportional reasoning to solve real-life ratio problems, including those with more than one step.
- I can use proportional reasoning to solve real-life percent problems, including those with more than one step.

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1).

7.NS.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.

Content Vocabulary	**Academic Vocabulary**
- ratio - rate - unit rate - proportional relationship - constant of proportionality - equivalent ratios - origin - percent	- identify - explain
Formative Assessments - performance tasks	**Summative Assessments** - Teacher created assessments

- interviews - pretests - quizzes	PARCC
Resources - UCSMP Transitions - Websites - PARCC Model Content Frameworks	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*The Number System*	
Cluster	*Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.*	**Pacing** **6 weeks** **1st Quarter**

Standards	Content Elaborations
1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding 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. d. Apply properties of operations as strategies to add and subtract rational numbers. **Learning Targets:** • I can describe real-life situations where the opposite numbers added together equal zero. • I can use a number line or positive/negative counters to show that an integer plus the opposite will always equal zero. • I can use a number line to show addition as the distance from a given number in one direction, or the other direction, depending on the sign of the value being added. • I can describe the addition of integers by comparing the values to real-life situations. • I can rewrite a subtraction problem as an addition problem by using the additive inverse, reversing the order of values.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

- I can show the distance between two integers is the absolute value of the difference.
- I can describe real-life situations represented by subtraction of integers.
- I can use the operation properties to add and subtract rational numbers.

2. ***Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.***
   a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
   b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
   c. Apply properties of operations as strategies to multiply and divide rational numbers.
   d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

Learning Targets:
- I can use patterns and properties to develop ways to multiply integers.
- I can describe real-life situations represented by multiplying integers.
- I can use the connection between multiplication and division to develop ways to divide integers.
- I can tell why the property of closure exists for the division of rational numbers but not for whole numbers.
- I can describe real-life situations that are represented by dividing integers.
- I can guess the quotient related to the original problem.
- I can apply the procedures for multiplying and dividing integers to all rational numbers.
- I can use long division to convert a rational number to a decimal number.
- I can make certain that a number is rational based on its equivalent

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1).

7.NS.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.

decimal.

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

   Learning Targets:
   - I can solve real-world problems involving adding, subtracting, multiplying, and dividing rational numbers.

Content Vocabulary	**Academic Vocabulary**
- additive inverse - absolute value - rational number - integer - terminating decimal - repeating decimal - complex fraction	- apply - solve
Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests - quizzes	- Teacher created assessments - PARCC
Resources	**Enrichment Strategies**
- UCSMP Transitions - Websites - PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Expressions and Equations*	
Cluster	*Use properties to generate equivalent expressions.*	**Pacing** **6 weeks** **1st and 2nd Quarters**

Standards	Content Elaborations
1. *Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.* **Learning Targets:** • I can use the commutative and associative properties to add linear equations with rational coefficients (-4x + (3+x) = 4x + (x = 3) = (-4x+x) + 3 = -3x + 3). • I can use the distributive property to add and/or subtract linear equations with rational coefficients (-1/5 x + 3/5x = (-1/5 + 3/5) = 2/5 x). • I can use the distributive property to factor a linear equation with rational coefficients (6x+9 = 3(3x+3)). • I can use the distributive property to expand a linear equation with rational coefficients (2/3(9x+6) = (2/3 X 9x) + (2/3 x 6) = 6x + 4). 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."* **Learning Targets:** • I can use equivalent expressions to understand the relationships between quantities.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1).

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Content Vocabulary	**Academic Vocabulary**
• linear expression • coefficient • like terms	• apply

Formative Assessments	**Summative Assessments**
• performance tasks • interviews • pretests • quizzes	• Teacher created assessments • PARCC

Resources	**Enrichment Strategies**

• UCSMP Transitions • Websites • PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Expressions and Equations*	
Cluster	*Solve real-life and mathematical problems using numerical and algebraic expressions and equations.*	**Pacing** **6 weeks** **1st and 2nd Quarters**

Standards	Content Elaborations
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.* **Learning Targets:** • I can solve real-world problems using rational numbers, in any form, including multi-step problems. • I can apply the properties of operations to fluently compute with rational numbers, in any form. • I can use mental math and estimation strategies to determine if my solution is reasonable. **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.* 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.*	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

What is its width?
   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 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.

Learning Targets:
- I can use a variable to represent an unknown quantity.
- I can write a simple algebraic equation [such as px + q = r and p(x = q) = r], when p, q, and r are rational numbers; to represent real-life problems.
- I can compare an arithmetic answer to an algebraic answer.
- I can write a simple algebraic inequality [such as px + q > r or px + q < r], when p, q, and r are rational numbers; to represent real-life problems.
- I can solve a simple algebraic inequality and graph the solution on a number line.
- I can describe the solution to an inequality in relation to the problem.

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1).

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Content Vocabulary	**Academic Vocabulary**
- rational number	

Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests - quizzes	- Teacher created assessments - PARCC

Resources	**Enrichment Strategies**
- UCSMP Transitions - Websites	

• PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Geometry*	
Cluster	*Draw, construct, and describe geometrical figures and describe the relationships between them.*	**Pacing** **7 weeks** **2nd and 3rd Quarters**

Standards	Content Elaborations
1. *Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.* **Learning Targets:** • I can use a scale drawing to determine actual dimensions and area of a given geometric figure. • I can use a different scale to reproduce a similar scale drawing. **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.* **Learning Targets:** • I can draw a geometric shape with specific conditions. • I can construct a triangle with 3 side lengths, 3 angle measurements, or a combination of side and angle measurements. • I can tell when 3 specific measurements will give 1 unique angle, more than 1 possible triangle, or no triangle possible. **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.* **Learning Targets:** • I can name the 2-D figure that represents a particular segment of a 3-D figure.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

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Content Vocabulary	**Academic Vocabulary**
- right rectangular prism - right rectangular pyramid	
Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests - quizzes	- Teacher created assessments - PARCC
Resources	**Enrichment Strategies**
UCSMP Transitions	

• Websites • PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Geometry*	
Cluster	*Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.*	**Pacing** **7 weeks** **2nd and 3rd Quarters**

Standards	Content Elaborations
4. *Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle.* **Learning Targets:** • I can state the area formula for a circle. • I can state the circumference formula for a circle. • I can find area and circumference of a circle by using the correct formula. • I can find the diameter or radius of a circle, given the circumference. • I can find area and circumference of a circle by using a ratio and algebraic reasoning. **5.** *Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and use them to solve simple equations for an unknown angle in a figure.* **Learning Targets:** • I can show the relationships between supplementary, complementary, and vertical angles. • I can use angle relationships; write algebraic equations for unknown angles. • I can use algebraic reasoning and angle relationships to solve problems with more than 1 step. **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.* **Learning Targets:** • I can find the area of 2-D figures.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

• I can find surface area and volume of 3-D figures. • I can solve real-life problems involving area, surface area, and volume.	• Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6). **Fluency Expectations or Examples of Culminating Standards** **7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1). **7.NS.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.
Content Vocabulary • diameter • altitude • area • surface area • supplementary angles • circumference • complementary angles • pi • vertical angles • width • adjacent angles • height • length • area • base • volume	**Academic Vocabulary**
Formative Assessments • performance tasks	**Summative Assessments** • Teacher created assessments

• interviews • pretests • quizzes	• PARCC
Resources • UCSMP Transitions • Websites • PARCC Model Content Frameworks	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	Statistics and Probability 7.SP.1	
Cluster	*Use random sampling to draw inferences about a population.*	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations
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 representation samples and support valid inferences.** **Learning Targets:** • I can explain when a guess about a population can be made by examining a sample population. • I can explain why the validity of a given sample depends on whether or not that sample represents the population. • I can state that random sampling tends to create representative samples.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** <u>**Examples of Key Advances from Grade 6 to Grade 7**</u> • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

7.EE.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.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 to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1).

7.NS.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.

Content Vocabulary	**Academic Vocabulary**
- sample - population - random sample - representative sample	
Formative Assessments - performance tasks - interviews - pretests - quizzes	**Summative Assessments** - Teacher created assessments - PARCC

Resources	Enrichment Strategies
• UCSMP Transitions • Websites • PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Statistics and Probability 7.SP.2*	
Cluster	*Use random sampling to draw inferences about a population.*	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations
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.* **Learning Targets:** • I can make guesses about a population based on my data generated by a random sample. • I can create many samples from the same population and study the estimates or predictions based on how the sample can be different.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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Content Vocabulary	**Academic Vocabulary**
• population • sample • random sample	

Formative Assessments	**Summative Assessments**
• performance tasks • interviews • pretests • quizzes	• Teacher created assessments • PARCC

Resources	Enrichment Strategies
• UCSMP Transitions • Websites • PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Statistics and Probability 7.SP.3*	
Cluster	*Draw informal comparative inferences about two populations.*	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations
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.* **Learning Targets:** • I can find the difference in the mean or median of 2 different data sets. • I can show how 2 data sets that are very different can have similar variabilities. • I can make guesses about the data sets by comparing these differences as it relates to the mean absolute deviation or interquartile range of either set of data.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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Content Vocabulary	**Academic Vocabulary**
- centers (also measures of center) - variabilities (also measures of variability) - mean - median - mean absolute deviation - interquartile range	assess
Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests	- Teacher created assessments - PARCC

• quizzes	
Resources • UCSMP Transitions • Websites • PARCC Model Content Frameworks	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	Statistics and Probability 7.SP.4

Cluster	Draw informal comparative inferences about two populations.	Pacing 5 weeks 3rd and 4th Quarters

<table>
<tr><td>Standards</td><td>Content Elaborations</td></tr>
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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.

   Learning Targets:
   - I can compare 2 populations by using means and/or medians of collected data from random samples.
   - I can compare 2 populations by using mean absolute deviations and/or interquartile ranges of data from random samples.

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Standards of Mathematical Practice

Mathematically proficient students:
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

From the K-8 Math Standards Progression.

<u>**Examples of Key Advances from Grade 6 to Grade 7**</u>

- In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers.

- Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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- Students solve a variety of problems involving angle measure, area, surface area, and volume (7.G.4-6).

Fluency Expectations or Examples of Culminating Standards

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Content Vocabulary	**Academic Vocabulary**
- measures of variability - measures of center - mean - median - mean absolute deviation - interquartile range - population - random sample	
Formative Assessments performance tasks	**Summative Assessments** Teacher created assessments

• interviews • pretests • quizzes	• PARCC
Resources • UCSMP Transitions • Websites • PARCC Model Content Frameworks	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Statistics and Probability 7.SP.5*	
Cluster	*Investigate chance processes and develop, use, and evaluate probability models.*	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations
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.* **Learning Targets:** • I can define probability as a ratio comparing favorable outcomes to all possible outcomes. • I can recognize and explain that probabilities are expressed as a number between zero (0) and one (1). • I can guess that a probability near 0 as unlikely to occur and a probability near 1 as likely to occur. • I can guess that a probability near 1/2 as being equally to occur as not to occur.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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Content Vocabulary	**Academic Vocabulary**
- likely - unlikely	

Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests - quizzes	- Teacher created assessments - PARCC

Resources	**Enrichment Strategies**
UCSMP Transitions	

• Websites • PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Statistics and Probability 7.SP.6*	
Cluster	*Investigate chance processes and develop, use, and evaluate probability models.*	

Standards	Content Elaborations
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.* **Learning Targets:** • I can collect data on a chance process to approximate its probability. • I can use probability to predict the number of times a particular event will occur given a specific number of trials. • I can use variability to explain why the experimental probability will not always exactly equal the theoretical probability.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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Content Vocabulary	**Academic Vocabulary**
- theoretical probability - experimental probability - relative frequency	
Formative Assessments - performance tasks - interviews - pretests - quizzes	**Summative Assessments** - Teacher created assessments - PARCC

Resources	Enrichment Strategies
- UCSMP Transitions - Websites - PARCC Model Content Frameworks	
Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	*Statistics and Probability 7.SP.7*	
Cluster	*Investigate chance processes and develop, use, and evaluate probability models.*	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations
7. ***Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observe frequencies; if the agreement is not good, explain possible sources of the discrepancy.*** a. 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.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* **Learning Targets:** • I can develop a simulation to model a situation in which all events are equally likely to occur. • I can utilize the simulation to determine the likely probability of specific events. • I can determine the probability of events that may not be equally likely to occur by utilizing a simulation model.	**Standards of Mathematical Practice** *Mathematically proficient students:* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. **From the K-8 Math Standards Progression.** **Examples of Key Advances from Grade 6 to Grade 7** • In grade 6, students learned about negative numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers. • Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship (7.RP.2a); they work with percents, including simple interest, percent increase and decrease, tax, markups and markdowns, gratuities and commission, and percent error (7.RP.3); they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks 1/2 mile in each 1/4 hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour) (7.RP.1); and they analyze proportional relationships in geometric figures (7.G.1).

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Content Vocabulary	**Academic Vocabulary**
- probability model - uniform probability model - frequency - relative frequency - theoretical probability - experimental probability	compare
Formative Assessments	**Summative Assessments**
- performance tasks - interviews - pretests	- Teacher created assessments - PARCC

● quizzes	

Resources
  ● UCSMP Transitions
  ● Websites
  ● PARCC Model Content Frameworks
	Enrichment Strategies

Integrations	**Intervention Strategies**

Grade Seven Mathematics

Domain	Statistics and Probability 7.SP.8	
Cluster	Investigate chance processes and develop, use, and evaluate probability models.	**Pacing** **5 weeks** **3rd and 4th Quarters**

Standards	Content Elaborations

8. **Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.**
  a. Understand *that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.*
  b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
  c. Design and use a simulation to generate frequencies for compound events.
  For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?
 	
Learning Targets:
• I can create a sample space of all possible outcomes for a compound event by using an organized list, a table, or tree diagram.
• I can use the sample space to compare the number of favorable outcomes to the total number of outcomes and determine the probability of the compound event.
• I can design and utilize a simulation to predict the probability of a compound event.
	Standards of Mathematical Practice
	
	Mathematically proficient students:
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	3. Construct viable arguments and critique the reasoning of others.
	4. Model with mathematics
	5. Use appropriate tools strategically.
	6. Attend to precision.
	7. Look for and make use of structure.
	8. Look for and express regularity in repeated reasoning.
	From the K-8 Math Standards Progression.
	
	Examples of Key Advances from Grade 6 to Grade 7
	
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Content Vocabulary • compound events • sample space • tree diagram • outcomes • favorable outcomes • simulation	**Academic Vocabulary** • investigate • utilize • design • represent
Formative Assessments • performance tasks • interviews • pretests	**Summative Assessments** • Teacher created assessments • PARCC

• quizzes	

Resources
   • UCSMP Transitions
   • Websites
   • PARCC Model Content Frameworks
	Enrichment Strategies

Integrations	**Intervention Strategies**