Branchburg Township Public Schools

Office of Curriculum and Instruction

Pre-Algebra 7 Math Curriculum

Adopted by the Board of Education October 2022

This curriculum is aligned with the 2016 New Jersey Student Learning Standards in Mathematics

Curriculum Scope and Sequence			
Math Area	Math	**Course Title/Grade Level:**	Pre-Algebra 7

Topic/Unit Name		Suggested Pacing (Days/Weeks)
Topic/Unit #1	The Number System	5 - 6 weeks
Topic/Unit #2	Ratios & Proportions	5 - 6 weeks
Topic/Unit #3	Expressions & Equations	6 - 7 weeks
Topic/Unit #4	Proportional Relationships	4 - 5 weeks
Topic/Unit #5	Statistics & Probability	4 - 5 weeks
Topic/Unit #6	Geometry	8 - 9 weeks

Topic/Unit 1 Title	The Number System	Approximate Pacing	5 - 6 weeks

STANDARDS

NJSLS (Math)

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

Standards for Mathematical Practice

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.
7 Look for and make use of structure.
8 Look for and express regularity in repeated reasoning.

Interdisciplinary Connections:

NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
For example: Students discuss in groups where to place parentheses is an order of operations problem so they can arrive at the greatest and least solutions.
NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
For example: Use evidence to explain why integer rules work in mathematical reflections.

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills
8.1.8.DA.5: Test, analyze, and refine computational models. *For example: Students use an ExploreLearning Gizmo to explore adding and subtracting positive and negative numbers using colored chips. They look for patterns to determine a rule for adding and subtracting integers. Then students develop their own algorithm to use when adding and subtracting integers.*	**9.1.8.FP.5:** Determine how spending, investing, and using credit wisely contributes to financial-well-being. *For example: Students discuss what it means to be "in the red" and "in the black" in terms of their finances. They use red and black integer chips to solve problems involving positive and negative numbers. This can be related to money.*

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

-What is the sum of a number and its opposite?
-How do you find the sum/difference/product/quotient of rational numbers?
-How do you apply the Order of Operations to evaluate expressions involving rational numbers?
-For what operations does the Commutative Property work?

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: negative number, positive number, opposites, integers, rational numbers, number sentence, absolute value, sum, Commutative Property, difference, inverse operations, product, quotient, Order of Operations	***Students will be able to:*** * read and write rational numbers, and find the absolute value of a rational number * graph a rational number on a number line * add rational numbers with the same signs * add rational numbers with different signs * add rational numbers to solve a real-world problem * subtract rational numbers * subtract rational numbers to solve a real-world problem *Ex. Four students were scheduled to give book reports in 1 hour. After the first report, 2/3 hour remained. The next two reports took 1/6 hour and 1/4 hour. What fraction of the hour remained?* * multiply rational numbers * multiply more than two rational numbers * divide rational numbers * divide rational numbers to solve a real-world problem *Ex. Cheryl is organizing her movie collection. If each movie case is 3/4 inch wide, how many movies can fit on a shelf 5 1/4 feet wide?* * apply the order of operations to rational numbers

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions

Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	In the Chips: Students connect the operations of addition and subtraction (including the relationships between these two operations) to the manipulation of black and red chips. Black chips indicate positive values, and red chips indicate negative values. Algorithms are then derived based upon their findings. Integers, Opposites, and Absolute Values Gizmo: Students use draggable points on a number line to explore opposites and absolute values.
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Mathematical Reflections How can you change a subtraction problem into an addition problem? Fall Math MAP Assessment (used to measure individual student growth over time)
RESOURCES	
Core instructional materials: -Connected Mathematics: Accentuate the Negative -Glencoe Math Course 2 (McGraw-Hill)	
Supplemental materials: -Explore Learning Gizmos: Integers, Opposites, and Absolute Value, Adding and Subtracting Integers with Chips, Order of Operations (#5 A-F) -Hands-On Resources: Versatiles, black and red integer chips, number lines -Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com - (TpT) Kobe Bryant: Order of Operations practice worksheet with biographical passage connection - 9/11 remembrance activity (Diversity/Genocide)	
Modifications for Learners	
See appendix	

Topic/Unit 2 Title	Ratios & Proportions	Approximate Pacing	5 - 6 weeks

STANDARDS

NJSLS (Math)

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 ½ mile in each ¼ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour, equivalently 2 miles per hour.

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

7.RP.A.2a - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

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

7.RP.A.2c - Represent proportional relationships by equations. For example, if total cost *t* is proportional to the number n of items purchased at a constant price *p*, the relationship between the total cost and the number of items can be expressed as $t = pn$.

7.RP.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.

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

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

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.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 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

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.

Standards for Mathematical Practice

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.
7 Look for and make use of structure.
8 Look for and express regularity in repeated reasoning.

Interdisciplinary Connections:

NJSLSA.W5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
For example: Students can submit mathematical reflections via Google Classroom and ask the teacher to give feedback before officially submitting them for a grade.
NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
For example: Students discuss the idea of scaling up and scaling down in multiple word problem situations - ie. scaling up recipes.

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.1.8.AP.4: Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. **8.2.8.ED.2**: Identify the steps in the design process that could be used to solve a problem. *For example: Students are given a multi-step word problem and asked to find a total of an item after a discount and sales tax are applied. Students come up with a step-by-step process using the Distributive Property (ie. multiplying by 107% for sales tax and multiplying by 80% for a 20% discount) in order to solve such a problem.*	**9.1.8.EG.3:** Explain the concept and forms of taxation and evaluate how local, state and federal governments use taxes to fund public activities and initiatives. *(Students calculate sales tax using decimal operations and using two steps to find the total cost - ie. finding the tax and adding it to the total. They also learn about the meaning and purpose of sales tax.)* **9.1.8.CP.1:** Compare prices for the same goods or services. *(Students complete "better buy" problems involving them to compare the value of goods that come in different sized packages in the same unit of measure. They calculate the unit rate to determine which product offers the best value.)*

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

How do unit rates help us compare costs?
How do you scale up/down ratios to find equivalent ratios?
How can the percent proportion be used to find the percent, the part, or the whole?

How do you find sales tax, tips, and discount and how does it apply in a real-world situation?	
STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: part-to-part comparison, part-to-whole comparison, scale up/scale down, rate, unit rate, proportion, buying price, markup, selling price, commission	***Students will be able to:*** * find unit rates * compare using unit rates * find a unit rate to solve a real-world problem * simplify complex fractions * use a complex fraction to find a unit rate * find the percent of a number * use percents greater than 100% * solve a real-world example involving the percent of a number * solve a problem involving a percent less than 1% * solve problems involving percents by using the percent proportion * use the percent proportion to find the percent * use the percent proportion to find the part * use the percent proportion to find the whole *Ex. A pair of sneakers is on sale for $51. This is 75% of the original price. What was the original price of the shoes?* * solve a real-world example involving the percent proportion * solve problems involving percent increase and percent decrease * find the percent of change * solve problems involving financial literacy, such as sales tax, tips, and markup * find the total cost with sales tax * find the total bill with tip * find the total bill with tax and tip * solve a real-world problem involving markup * solve problems involving discount * find the sale price

	* find the sale price with tax * find the original price *Ex. A cell phone is on sale for 30% off. If the sale price is $239.89, what was the original price?*
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Part-to-part and Part-to-whole Comparisons Gizmo: Students will use the simulation to compare a ratio represented by an area with its percent and fraction forms. (Activity A & B) Managing Money: Students are provided with a list of recent transactions (debts, income, gifts, etc.) and required to manage their finances based upon given constraints.
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Mathematical Reflections: If an item is on sale for 10% off the original price, but a 10% sales tax is added to the discounted price, does that mean the total cost is the original price?
RESOURCES	
Core instructional materials: -Connected Mathematics: Comparing and Scaling -Glencoe Math Course 2 (McGraw-Hill)	
Supplemental materials: -Explore Learning Gizmos: Beam to Moon (Activity A & B), Part-to-Part and Part-to-Whole Ratios (Activity A & B), Percents and Proportions (Activity A & B), Percent of Change (Activity A & B)	

-Hands-On Resources: Versatiles -Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com - (TpT) Walter McAfee: equivalent ratios practice worksheet with biographical passage connection - voter preference/electoral college/census data activity with part-to-whole comparison connection (Diversity/Amistad)
Modifications for Learners
See appendix

Topic/Unit 3 Title	Expressions & Equations	Approximate Pacing	6 - 7 weeks

STANDARDS

NJSLS (Math)

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.
7.NS.A.1d - Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.A.2 - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
7.NS.A.2a - Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
7.NS.A.2c - Apply properties of operations as strategies to multiply and divide rational numbers.
7.NS.A.3 - Solve real-world and mathematical problems involving the four operations with rational numbers.
7.RP.A.2b - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
7.RP.A.2c - Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.
7.RP.A.2d - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
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 = 1.05*a* means that “increase by 5%” is the same as “multiply by 1.05.”
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 ¾ 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.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.
7.EE.B.4a - Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
7.EE.B.4b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. 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.
8.EE.C.7b. - Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
8.EE.C.8a - Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

Standards for Mathematical Practice
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.
7 Look for and make use of structure.
8 Look for and express regularity in repeated reasoning.

Interdisciplinary Connections:

RL.7.1. Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
For example: Using examples from the textbook to help explain reasoning in mathematical reflections.
W.7.4. Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience.
For example: Students explain the process of solving an equation, in great detail, in the form of a mathematical reflection.

Computer Science & Design Thinking:	**Career Readiness, Life Literacies and Key Skills:**
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. *For example: Students use digital tools to conceptualize and model algebraic equations, 2-step equations, and multi-step equations.*	**9.1.8.CP.2:** Analyze how spending habits affect one's ability to save. *(Students write 2-step equations to help solve various "savings" problems. For example, if you have $50 saved and you earn $10 per week, for how many weeks will you need to work in order to save $150? $200?)*
UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS	
-How do multiplication, addition, and subtraction play a role in the Distributive Property? -How do you simplify expressions? -How do inverse operations help us to solve equations and inequalities? -How does the order of operations aid us in solving multi-step equations or inequalities? -Why and how would you simplify both sides of an equation or inequality before solving? -How and when would you represent a real-world situation using an algebraic equation or inequality? -Explain how to solve an equation with variables on both sides.	
STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: Distributive Property, coefficient, constant	***Students will be able to:*** * apply the Distributive Property to rational numbers * evaluate simple algebraic expressions * write and simplify expressions * apply the Distributive Property to rewrite algebraic expressions *Ex. Use the Distributive Property to write an expression equal to 5(-x - 13)* * write equivalent expressions * identify parts of an expression * add linear expressions * subtract linear expressions * use the additive inverse to subtract expressions

	* find the GCF * factor algebraic expressions * solve one-step addition and subtraction equations * solve one-step multiplication and division equations * solve one-step equations with decimal coefficients * solve one-step equations with fractional coefficients * solve two-step equations *Ex. Solve 3x + 3 = 2x + 9* * solve two-step equations of the form p(x+q)=r * solve inequalities by using the Addition and Subtraction Properties of Inequality * solve and graph an inequality * solve inequalities by using the Multiplication or Division Properties of Inequality * solve two-step inequalities and represent the solution on the number line
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Solving Linear Inequalities In One Variable Gizmo (Activity A & B): Students will use the simulation to solve one-step inequalities in one variable and graph the solution on a number line. Expressions & Equations Matching Review: Students work in teams to pair game cards with their appropriate match while completing against the opposing team to finish first.

Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Mathematical Reflections: Write an expression that represents the sum of any two consecutive integers, and use it to explain why the sum of any two consecutive integers is always an odd number. Winter Math MAP Assessment (used to measure individual student growth over time) Mid Year Test (used to assess students' retention of math concepts)

RESOURCES

Core instructional materials:
-Connected Mathematics: Variables and Patterns, Common Core Additional Investigations, Moving Straight Ahead
-Glencoe Math Course 2 (McGraw-Hill)

Supplemental materials:
-Explore Learning Gizmos: Equivalent Algebraic Expressions I (all levels), Equivalent Algebraic Expressions II (all levels), Simplifying Algebraic Expressions I (all levels), Simplifying Algebraic Expressions II (all levels), Solving Algebraic EquationsI (all levels), Solving Algebraic Equations II (all levels), Modeling One-Step Equations, Modeling and Solving Two-Step Equations, Solving Two-Step Equations (Activity A #1-4), Solving Linear Inequalities in One Variable
-Hands-On Resources: Versatiles
-Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com
- (TpT) Hidden Figures: simplifying expressions practice worksheet with biographical passage connection

Modifications for Learners

See appendix

Topic/Unit 4 Title	Proportional Relationships	Approximate Pacing	4 - 5 weeks

STANDARDS

NJSLS (Math)

7.RP.A.2 - Recognize and represent proportional relationships between quantities.
7.RP.A.2a - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
7.RP.A.2b - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
7.RP.A.2c - Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.
7.RP.A.2d - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
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.
7.NS.A.2d - Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
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.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.
7.EE.B.4a - Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

8.EE.B.5 - Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
8.F.A.3 - Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.
8.F.B.4 - Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Standards for Mathematical Practice
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.

Interdisciplinary Connections:

Science Cross-Cutting Concept: Scale, Proportion, and Quantity
In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.
For example: Students use tables, graphs, and equations involving rational numbers to determine if relationships are proportional.
Science Cross-Cutting Concept: Systems and System Models
A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.
For example: Students are introduced to a system of equations when comparing the costs of t-shirts from two companies. One company has a start-up fee and a cost per t-shirt and one company only charges a cost per t-shirt. Students use their created graph to make predictions and decisions. Students use the graph and also solve equations with variables on both sides to find the "break-even point".

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). *For example: Students chose to represent proportional relationships either in a table, a graph, or with an equation. They explain their choice to students in their group.*	**9.1.8.FP.2**: Evaluate the role of emotions, attitudes, and behavior (rational and irrational) in making financial decisions. *For example: Students create a graph consisting of two lines - one showing the cost of going to the movies with a membership, and one showing the cost of seeing a movie without a membership. They use the graph and/or equation to decide which financial option would be a better fit for them and their needs.*

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS
-How can two different unit rates depict the same relationship? -How could you determine whether a relationship is proportional given a table, graph, or equation? -How can you identify the constant of proportionality given a table or graph? -How can you determine if a relationship is linear from a table or graph? -How can you identify the rate of change in a relationship given a table, graph, or equation?

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: proportional relationship, constant of proportionality, linear relationship, rate of change, y-intercept, point of intersection	***Students will be able to:*** * identify proportional and nonproportional relationships * identify proportional relationships by graphing on the coordinate plane * use proportions to solve problems * write an equation using a unit rate * represent and identify constant rates of change using tables and graphs * explain what ordered pairs represent * compare constant rates of change *Ex. At Fabulous Fabian's Bakery, the expenses E to make n cakes per month is given by the equation E = 825 + 3.25n. The income I for selling n cakes is given by the equation I = 8.20n.*

	Write and solve an equation to find the number of cakes n needed to break even. * identify and explain what the constant of proportionality represents
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Walking Marathons: Students determine their walking rate in meters per second.They answer questions about time and distance using their constant walking rate and write an equation that represents the distance walked over time at their constant walking rate.
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Mathematical Reflections: How can you use a graph to find the constant of proportionality?
RESOURCES	
Core instructional materials: -Connected Mathematics: What Do You Expect? -Glencoe Math Course 2 (McGraw-Hill)	
Supplemental materials: -Explore Learning Gizmos: Linear Functions (Activity A & B) -Hands-On Resources: Versatiles -Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com - Special Olympics rates activity (Diversity)	
Modifications for Learners	
See appendix	

Topic/Unit 5 Title	Statistics & Probability	Approximate Pacing	4 - 5 weeks

STANDARDS

NJSLS (Math)

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.

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.

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.

7.SP.C.7a - Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

7.SP.C.7b - Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
7.SP.C.8 - Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
7.SP.C.8a - Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
7.SP.C.8b - Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
7.SP.C.8c - Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

Standards for Mathematical Practice
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.

Interdisciplinary Connections:

NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
For example: Students continually discuss in groups whether or not probability games are fair or unfair based on the probabilities on losing and winning.
NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
For example: Students use multiple visual displays to present data. They make double dot plots and double box-and-whisker plots, and use them to interpret data.

Computer Science & Design Thinking:	**Career Readiness, Life Literacies and Key Skills:**

8.1.8.DA.5: Test, analyze, and refine computational models *For example: Students find the five-number summary for two sets of data, enter both data sets into a box-and-whisker plot maker website, and use the models to compare their measures of center and variability (ie. 50% of the data is between 75 and 86, which is higher than the other data set's middle 50% between 60 and 75).* *For example: Students use an ExploreLearning Gizmo to explore probability simulations such as a spinning wheel, and picking marbles out of a bag.*	**9.2.8.CAP.20:** Identify the items to consider when estimating the cost of funding a business. *For example: Students assume the role of a carnival worker and develop fair and unfair games based on the probability of winning the games.*

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

-What is the difference between theoretical probability and experimental probability?
-How could you use the theoretical probabilities of two events to help you decide if a particular game is fair?
-How are tree diagrams and area models alike?
-How can data from a small sample help you make predictions about a larger population?
-How do you determine the most appropriate way of measuring a data's center and variability?
-What is the most effective way of choosing a reliable random sample from a population?

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: probability, experimental probability, theoretical probability, equally likely, outcome, fair game, tree diagram, area model, independent events, dependent events	***Students will be able to:*** * find the probability of a simple event and its complement * find and compare experimental and theoretical probabilities * use probability to predict future events * find probabilities of compound events *Ex. Alana tosses 2 number cubes. She wins if she rolls a sum of 10. Find P(Alana wins).* * find the outcomes by making a list * find the outcomes by making a tree diagram * find the outcomes by making an area model * determine if outcomes are equally likely * determine if a game of chance is fair

	* use multiplication to count the number of outcomes and find probabilities * find the probability of independent and dependent events * predict actions of a larger group by using a sample * compare two populations * analyze the visual overlap of two numerical data distributions
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Carnival Project: Students work in groups to design a carnival game. Groups must create a proposal for their game and make predictions, physically construct the game itself and run the activity during the scheduled carnival, as well as provide instructions to contestants and keep record of wins/losses throughout. Choosing Random Samples: Students explore variability as it relates to sample data and statistics. They select random samples of 50 from a population of 100, and they analyze the samples to help them draw conclusions about the population. Statistics & Probability Escape Room: Students work in groups to complete several "challenge" problems, each allowing them to "unlock" one component of the escape room lock box. Successful completion of each challenge is required to "escape".
Benchmark Assessments (used to establish baseline achievement data and measure progress towards	Mathematical Reflections: How could you use the theoretical probabilities of two events to help you decide if a particular game is fair?

grade level standards; given 2-3 X per year)	

RESOURCES

Core instructional materials:
-Connected Mathematics: What Do You Expect?
-Glencoe Math Course 2 (McGraw-Hill)

Supplemental materials:
-Explore Learning Gizmos: Probability Simulations, Spin the Big Wheel, Theoretical and Experimental Probability, Permutations and Combinations, Independent and Dependent Events, Box-and-Whisker Plots, Polling: City, Polling: Neighborhood
-Hands-On Resources: Versatiles, number cubes and spinners
-Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com
- box-and-whisker plot Holocaust cross-curricular activity (Diversity/Genocide)

Modifications for Learners

See appendix

Topic/Unit 6 Title	Geometry	Approximate Pacing	8 - 9 weeks

STANDARDS

NJSLS (Math)

7.RP.A.2 - Recognize and represent proportional relationships between quantities.
7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
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.2 - Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
7.G.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.
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.5 - Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Standards for Mathematical Practice
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.

Interdisciplinary Connections:

NJSLSA.SL4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
For example: Students work in teams to find the volume and surface area of composite figures. They present their findings to the teacher and explain how each section was found.
Science and Engineering Practices: Developing and Using Models
A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.
For example: Draw three-dimensional shapes, draw and label an image given the preimage and a scale factor, and draw nets if necessary to calculate the surface areas of three-dimensional shapes.

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). **8.2.8.ED.7:** Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches). *For example: Students use a rubber band stretcher to introduce the idea of scale factor. They recreate a figure that becomes enlarged using the rubber band stretcher. They determine this is not the best way to enlarge a shape, and discuss other ways to do so using measurements and technology.*	**9.4.8.CT.2:** Develop multiple solutions to a problem and evaluate short and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1). *For example: Students work in groups to investigate the properties of making unique triangles given specific side lengths and angle measurements.*

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

How does scale factor affect a shape's side lengths, angles, perimeter, and area?
How is finding the circumference of a circle similar/different from finding its area?
What types of angle pairs create congruent and supplementary angles?
How is finding the volume of any prism alike?
How is finding the surface area of any prism alike?
If you were given a certain number of cubes that could be arranged into a rectangular prism in more than one way, what can you say about the arrangement with the least surface area? With the most surface area?

What conditions determine a unique triangle?

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: similar, image, preimage, transformation, corresponding sides, corresponding angles, scale factor, similar figures, reciprocal, diameter, radius, circumference, vertical angles, adjacent angles, complementary angles, supplementary angles, dimensions, prism, face, base, edge, volume, surface area	***Students will be able to:*** * solve problems involving scale drawings * find the scale factor * find the circumference of circles * use the diameter to find the radius of a circle * use the radius to find the diameter of a circle * find the area of circles *Ex. A circular lawn has a circumference of 36 meters. What is the area of the lawn?* * find the volume of prisms * solve a real-world problem involving volume * find the volume of pyramids *Ex. A triangular pyramid has a volume of 44 cubic meters. The base has an 8-meter base and a 3-meter height. Find the height of the pyramid.* * find the surface area of prisms * solve a real-world example involving the surface area of a rectangular prism * find the surface area of pyramids * classify angles and identify vertical and adjacent angles * find missing measures * write and solve an equation to find a missing measure * identify pairs of complementary and supplementary angles * identify and classify triangles and find missing angle measures

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Investigation Quizzes and Unit Test

Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Now Problems, Exit Tickets Online formative assessment websites: www.edulastic.com, www.kahoot.com, www.quizizz.com Class Participation, Collaborative Group Work Discussions
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Circumference and Area of Circles Gizmo (Activity A, B & C): Students will utilize the simulation to resize a circle and compare its radius, circumference, and area, from which they will attempt to derive multiple formulas. Design Challenge (Building Triangles): Students will develop an understanding of the conditions that determine unique triangles. The challenge presented is to convey a lot of information with only a few words to produce a unique triangle. AngLegs are used as a manipulative to allow for investigation of various properties.
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Mathematical Reflections If you were given a certain number of cubes that could be arranged into a rectangular prism in more than one way, what can you say about the arrangement with the least surface area? With the most surface area? Cumulative Test (used to assess students' retention of math concepts) Spring Math MAP Assessment (used to measure individual student growth over time)
RESOURCES	
Core instructional materials: -Connected Mathematics: Stretching & Shrinking, Covering & Surrounding, Shapes & Designs, Filling & Wrapping -Glencoe Math Course 2 (McGraw-Hill)	
Supplemental materials: -Explore Learning Gizmos: Similar Figures (Activity A & B), Perimeters and Areas of Similar Figures (Activity A, B & C), Circumference and Area of Circles (Activity A, B & C), Triangle Angle Sum (Activity A & B), Area of Triangles (Activity A & B), Investigating Angle Theorems (Activity A & B), Triangle Inequalities (Activity A, B & C), Prisms and Cylinders (Activity A), Surface and Lateral Areas of Prisms (Activity A & B), Pyramids and Cones (Activity A), Surface and Lateral Area of Pyramids and Cones (Activity A)	

-Hands-On Resources: Versatiles, 3-dimensional models, angle rulers, AngLegs -Useful websites: www.Khanacademy.com, www.brainpop.com, www.flocabulary.com - (TpT) -LGBTQ figure-: practice worksheet with biographical passage connection
Modifications for Learners
See appendix