Pre Algebra

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CCCS born on 9/2012
Addendum 5/2016
NJSLS born on 8/2017

Grade 7 Pre-Algebra Curriculum Overview

The Pre-Algebra 7 course prepares students for the study of algebraic concepts. The course will extend the key concepts developed in grade 6. It will expand the study of the number system to include the real number system, focusing on performing operations with rational numbers. Additional topics include modeling relationships with variables, equations and inequalities, ratio and proportional reasoning, percent applications, the study of angle relationships, triangles, quadrilaterals, circles, area, circumference, surface area, and volume. Students will be introduced to probability and statistics.

Suggested Course Sequence*:

Unit	Name	Number of Days for Student Master of Content and Skills
1	The Number System: Integers	25
2	The Complex Number System	29
3	Expressions, Equations, and Inequalities	28
4	Ratios and Proportions	30
5	Geometry: Angle Relationships, Triangles, and Quadrilaterals	17
6	Geometry: Circles, Surface Area and Volume	24
7	Statistics and Probability	20

Prerequisite: 6th grade math

The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 48 minutes of seat time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.

Content Area: Pre-Algebra
Unit Title: Unit 1 - The Number System: Integers
Grade Level: 7

Unit Summary:
Students will extend their knowledge of the real number system to include integer operations and applications.

Interdisciplinary Connections:
Science: Elevation, temperature, positively and negatively charged ions
World Cultures: Timelines, taxes, debt, graphing
Economics/ Finance: Profit and debt, stock market, deposit and withdrawals
Physical Education: Gains and losses in sports

21st Century Themes and Skills:
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.NS.A.1a	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
	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, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?*
NJSLS.7.NS.A.1b	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
	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.
	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.
NJSLS.7.NS.A.1c	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

	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. 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.
NJSLS.7.NS.A.1d	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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. d. Apply properties of operations as strategies to add and subtract rational numbers.
NJSLS.7.NS.A.2a	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide 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.
NJSLS.7.NS.A.2b	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.
NJSLS.7.NS.A.2c	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. c. Apply properties of operations as strategies to multiply and divide rational numbers.
NJSLS.7.NS.A.2d	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions 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.
NJSLS.7.NS.A.3	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 3. Solve real-world and mathematical problems involving the four operations with rational numbers.

NJSLS.7.EE.A.1	A. Use properties of operations to generate equivalent expressions.
	1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
NJSLS.7.EE.B.3	B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
	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.*
NJSLS.7.EE.B.4	B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
	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.
Technology Standards:	
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

Unit Essential Question(s):
- How do students use numbers to function in their daily lives?
- How does applying the number properties help aid students in mental computations?
- To what extent does the ability to recognize and apply estimation skills help students determine appropriate solutions of situations in their daily world?
- To what extent does the application of the order of operations affect how data is communicated/ shared globally?
- How does choosing the appropriate calculation tool make the process for determining solutions more efficient?
- To what extent does the element of checking for "reasonableness" affect the problem solving process?

Unit Enduring Understandings:
- As the number of numerical representations and algorithmic procedures students are exposed to increases, the more often they can apply them to various situations in their daily world.
- Applying mental math strategies and estimation skills is often sufficient to solve real-world situations rather than calculating the exact answer.
- Mathematical expressions must be simplified according to an established set of rules in order for data to be shared consistently on a global basis.
- There are real-world situations for which efficiently determining a solution warrants the use of mental math, paper and pencil, or technology.
- Checking for "reasonableness" of a solution is a critical element of the problem solving process.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...

Subsets:
- Identify and write subsets using proper notation.
- Describe and roster a subset of numbers.
- Identify a subset using a number line.

Opposites and Absolute Value:
- Two numbers that are the same distance from zero on the number line are called opposites.
- The sum of a number and its opposite is always zero.
- The absolute value of a number is always positive.

Integer Operations:
- Perform integer operations: addition, subtraction, multiplication, and division.

Properties and Order of Operations:
- Properties of numbers can be used to make mental computations easier.
- There are rules that must be followed when performing operations with integers.
- Simplify integer expressions using the order of operations.
- The order of operations used to simplify whole number expressions applies to integer expressions as well as any expression involving elements of the complex number system.
- Recognize and create equivalent expressions with integers.
- Solve word problems modeling real-world situations involving integers.

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on subsets of numbers, nested boxes, hierarchy, naming a set
Quiz on additive inverses and opposites, absolute value, ordering integers, and adding and subtracting integers
Quiz on multiplying and dividing integers
Quiz on properties, order of operations, and equivalent expressions
Test on Unit 1

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:

- Special Education Students
  - o Limit items per page
  - o Increase font size
  - o Extra time
  - o Small group instruction/ testing
- English Language Learners
  - o Give assessments orally
  - o Give outline of a lesson
  - o Provide notes
  - o Give written list of instructions

- At-Risk Students
  - o Give students a peer buddy
  - o Reduce or modify assignments
  - o Give student a behavior contract
- Gifted and Talented Students
  - o Provide more challenging material
  - o Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Subsets of numbers	Identify subsets of numbers through description, roster, and graphing on a number line; use proper notation when naming a set	2
Opposites, absolute value, and ordering integers	Identify a number's opposite; know that a number and its opposite combine to make 0 (additive inverses); identify the absolute value of a given number; order integers from least to greatest, and from greatest to least	4
Adding and subtracting integers	Model integer addition and subtraction using counters (using the concept of zero pairs) and a number line; students will discover algorithm through practice	3
Multiplying and dividing integers	Multiply and divide integers through repeated addition of integers and patterns, and through inverse operations and patterns; use concept of "the opposite of" when multiplying or dividing with negatives; expand and simplify powers with both positive and negative bases; students will discover algorithm through repeated practice	2
Properties, order of operations, equivalent expressions	Use properties to compute expressions mentally; use order of operations when simplifying expressions; write and identify equivalent expressions	5
Integer word problems	Solve word problems involving real-world situations and scenarios using properties, integer operations, and order of operations	3

Teacher Notes:

25 total days spent on Unit 1 (including 4 quiz days, 1 test day, and 1 review day)

Additional Resources:
Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra	
Unit Title: Unit 2 - The Complex Number System	
Grade Level: 7	

Unit Summary:
Students will extend their knowledge of the real number system to include operations and applications of rational numbers.

Interdisciplinary Connections:
Science: Elevation, temperature, sea level
World Cultures: Maps
Economics/ Finance: Profit and debt, stock market, deposit and withdrawals, bank accounts, stock values
Physical Education: Statistics in sports
Cooking: Measuring and "doubling" recipes

21ˢᵗ Century Themes and Skills:
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.NS.A.1a	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
	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, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?*
NJSLS.7.NS.A.1b	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
	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.
	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.
NJSLS.7.NS.A.1c	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

	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. 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.
NJSLS.7.NS.A.1d	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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. d. Apply properties of operations as strategies to add and subtract rational numbers.
NJSLS.7.NS.A.2a	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide 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.
NJSLS.7.NS.A.2b	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.
NJSLS.7.NS.A.2c	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. c. Apply properties of operations as strategies to multiply and divide rational numbers.
NJSLS.7.NS.A.2d	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions 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.
NJSLS.7.NS.A.3	A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 3. Solve real-world and mathematical problems involving the four operations with rational numbers.

Technology Standards:	
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

Unit Essential Question(s):
- How do students use numbers to function in their daily lives?
- What is the relationship between the subsets of the complex number system?
- To what extent does the ability to recognize and apply estimation skills help students determine appropriate solutions of situations in their daily world?
- How does choosing the appropriate calculation tool make the process for determining solutions more efficient?
- To what extent does the element of checking for "reasonableness" affect the problem solving process?
- How can you use a number line to order rational numbers?

Unit Enduring Understandings:
- As the number of numerical representations and algorithmic procedures students are exposed to increases, the more often they can apply them to various situations in their daily world.
- Applying mental math strategies and estimation skills is often sufficient to solve real-world situations rather than calculating the exact answer.
- As students are exposed to the hierarchy of the subsets of the complex number system, their awareness of the complexity of the relationships between the subsets increases.
- As algorithmic procedures are performed on different numbers, the result often extends into subsets within the hierarchy of the complex number system.
- There are real-world situations for which efficiently determining a solution warrants the use of mental math, paper and pencil, or technology.
- Checking for "reasonableness" of a solution is a critical element of the problem solving process.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...
Rational vs. Irrational Numbers:
- A rational number is a number than can be written as the ratio of two integers.
- Rational numbers can be converted to decimals.
- A terminating decimal is a decimal that ends.
- A repeating decimal is a decimal that has a pattern that repeats.
- The square root of a non-perfect square number is irrational.
- Categorize a variety of numerical expressions as a rational or irrational number.

Fractions:
- Add and subtract signed fractions.
- Multiply various types of signed fractions: proper x proper, proper x improper, proper x whole number including "fractional part" of a whole number, proper x mixed number, etc.
- Apply the distributive property to multiply a whole number times a mixed number.
- Multiply a fractional based raised to a whole number power.
- Demonstrate an understanding of division of signed fractions as it relates to multiplication of fractions through the use of patterns.
- Divide expressions involving integers, proper fractions, improper fractions, and mixed numbers.
- Define and apply the concept of a reciprocal or multiplicative inverse.
- Simplify complex fractions.

- Specific outcomes exist regarding division problems.
- State more than 1 expression as the reciprocal or multiplicative inverse for a given expression.
- Specific algorithms ("rules") are used to perform operations with fractions.
- The order of operations used to simplify whole number expressions applies to rational expressions, as well as expressions involving elements of the real number system.

Decimals:
- Add and subtract signed decimals.
- Multiply signed decimals.
- Divide signed decimals.
- Specific outcomes exist regarding division problems.
- Specific algorithms ("rules") are used to perform operations with decimals.
- The order of operations used to simplify whole number expressions applies to rational expressions, as well as expressions involving elements of the real number system.

Subsets and Equivalent Expressions:
- Apply previous knowledge of order of operations to simplify expressions including rational numbers and perfect squares.
- Order and compare rational numbers.
- Define, recognize, and give examples of elements of the real number system.
- Describe, roster, and/ or graph subsets of the real number system.
- Recognize and create equivalent expressions, including those with rational numbers.
- Solve real-world problems involving fractions (recipe problems, etc.) and decimals (money problems, etc.)

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on rational numbers, fractions <-> decimals, and irrational numbers
Quiz on adding and subtracting fractions
Quiz on multiplying and dividing fractions and order of operations with fractions
Test on rational and irrational numbers, converting f<->d, and operations with fractions
Quiz on operations with decimals and order of operations with decimals
Quiz on order of operations, ordering rational numbers, and subsets
Test on operations with decimals, order of ops, ordering rational numbers, subsets, and equivalent expressions

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:
- Special Education Students
  - Limit items per page
- At-Risk Students
  - Give students a peer buddy

- o Increase font size
- o Extra time
- o Small group instruction/ testing
- English Language Learners
  - o Give assessments orally
  - o Give outline of a lesson
  - o Provide notes
  - o Give written list of instructions
- o Reduce or modify assignments
- o Give student a behavior contract
- Gifted and Talented Students
  - o Provide more challenging material
  - o Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Rational numbers, fractions and decimals	Identify rational numbers; convert from fractions to decimals, and vice versa; identify irrational numbers	5
Adding and subtracting fractions	Add and subtract fractions	3
Multiplying and dividing fractions	Multiply and divide fractions	3
Order of operations with fractions	Use order of operations to simplify numeric expressions, specifically, expressions including rational numbers	2
Adding and subtracting decimals	Add and subtract decimals	1
Multiplying and dividing decimals	Multiply and divide decimals	3
Order of operations with decimals	Use order of operations to simplify numeric expressions, specifically, expressions including rational numbers	1
Order of operations, ordering rational numbers, subsets and equivalent expressions	Simplify expressions using the order of operations, including expressions with rational numbers and perfect squares; order rational numbers on the number line; identify subsets of numbers through description, roster, and graphing on a number line (including rational numbers); use proper notation when naming a set; write and identify equivalent expressions (including rational numbers)	2

Teacher Notes:
29 total days spent on Unit 2 (including 5 quiz days, 2 test days, and 2 review days)

Additional Resources
Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra	
Unit Title: Unit 3 - Expressions, Equations, and Inequalities	
Grade Level: 7	

Unit Summary:

Students will simplify algebraic expressions involving rational numbers. They will also solve multi-step equations and inequalities.

Interdisciplinary Connections:

Geometry: Area and perimeter

Architecture/ Landscaping: Area and perimeter

Science: Temperature and elevation

Economica: Cost, budget, stocks

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.

CRP3. Attend to personal health and financial well-being.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence

Standards (Content and Technology):

CPI#:	Statement:
Content Standards	
NJSLS.7.EE.A.1	A. Use properties of operations to generate equivalent expressions.
	1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
NJSLS.7.EE.A.2	A. Use properties of operations to generate equivalent expressions.
	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."
NJSLS.7.EE.B.4a	B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
	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. What is its width?***

NJSLS.7.EE.B.4b	B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 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. 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.*

Technology Standards:

8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

Unit Essential Question(s):	**Unit Enduring Understandings:**
- How are variables, expressions, equations, and inequalities used to represent real-world phenomenon? - What are the relationships between expressions, equations, and inequalities? - To what extent does the application of the order of operations affect how data is communicated/ shared globally?	- Variables, expressions, equations, and inequalities are used to translate the representation of real-world situations from verbal to symbolic, which often models the extension of a specific instance to a general rule or formula. - Similarities and differences between expressions, equations, and inequalities are reflected in the use of different symbols, procedures for determining the solution(s), and the type/ number of solution(s). - Mathematical expressions, equations, and inequalities must be simplified according to an established set of rules in order for data to be communicated/ shared consistently on a global basis.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...
<u>Expressions:</u>
- Translate words into math.
- Know the difference between expressions and equations.
- Define coefficient, term, like or similar terms.
- Simplify linear expressions by combining like terms.
- Expand linear expressions by using the distributive property with a rational coefficient.
- The order of operations is a process used to simplify and/ or evaluate expressions, equations, and formulas so the outcome is accurate and consistent.

<u>Equations:</u>
- Solve one-step equations involving rational coefficients.
- Solve two-step equations involving rational coefficients.
- Discuss and apply properties of real numbers: commutative, associative, identity, inverse, and distributive.
- Properties are a tool used to perform computations.

- The order of operations is a process used to simplify and/ or evaluate expressions, equations, and formulas so the outcome is accurate and consistent.
- Solve multi-step equations involving combining like terms, the distributive property, variables on both sides (all with rational coefficients).
- Define and use solution set.
- The order of operations in conjunction with the properties must be applied to determine the solution set of a multi-step equation.
- The procedures used to determine the solution set of a multi-step equation involving whole numbers applies to multi-step equations involving rational numbers.
- Equations can be written to represent and solve real-life problems.

Inequalities:
- The order of operations is a process used to simplify and/ or evaluate expressions, equations, and formulas so the outcome is accurate and consistent.
- Define and use solution set.
- Multiplying or dividing each side of an inequality by the same negative number requires the direction of the inequality symbol to be reversed.
- Graph an inequality on a number line.
- Write an inequality based on a given graph.
- Tell whether a value is a solution of an inequality.
- Solve one-step inequalities involving rational coefficients.
- Solve two-step inequalities involving rational coefficients.
- The procedures used to determine the solution set of multi-step equations applies to multi-step inequalities involving rational numbers.
- The solutions to an inequality could have more than one solution or no solutions.
- The solutions of an inequality can be graphed on a number line.
- An open circle is used to graph an inequality on a number line when the number is not a solution.
- A closed circle is used to graph an inequality on a number line when the number is a solution.
- Inequalities can be written to represent and solve real-life problems.

Absolute Value Equations:
- Solve one- and two-step absolute value equations.

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on translating words into math, expressions vs. equations, coefficients, terms, and similar terms, and combining like terms (including rational coefficients)
Quiz on one- and two-step equations (including word problems)
Quiz on multi-step equations (including word problems)
Test on words into math, expressions, and equations (including word problems)
Quiz on inequalities and absolute value equations
Test on inequalities and absolute value equations (including word problems)

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:

- Special Education Students
  - o Limit items per page
  - o Increase font size
  - o Extra time
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- English Language Learners
  - o Give assessments orally
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  - o Provide notes
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- At-Risk Students
  - o Give students a peer buddy
  - o Reduce or modify assignments
  - o Give student a behavior contract
- Gifted and Talented Students
  - o Provide more challenging material
  - o Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Translate words into math; expressions vs. equations	Translate words into math and math into words; identify coefficients, terms, like terms; combine like terms; simplify expressions; compare expressions and equations	5
Equations	Solve one-step, two-step, and multi-step equations, all with integer and rational coefficients	7
Inequalities	Identify a solution set given a graph, and vice versa; solve one- and two-step inequalities	4
Absolute value equations	Solve absolute value equations	2
Word Problems	Write expressions (and assign a variable) given a scenario; solve word problems using equations, inequalities, and absolute value equations.	2

Teacher Notes:
28 total days spent on Unit 3 (including 4 quiz days, 2 test days, and 2 review days)

Additional Resources
Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra	
Unit Title: Unit 4 - Ratios and Proportions	
Grade Level: 7	

Unit Summary:
Students will extent their prior knowledge of ratios and proportions to solve problems that require proportional reasoning, including unit rates, scale drawings, and slope, and direct variation.

Interdisciplinary Connections:
Medicine: Heart rates
Chemistry: Mixture problems
Economics: Profit and loss, rate of ray rate of change, loans and debt
Consumer Science: Shopping, budgeting, discount, markup, tax
Statistics: Percent of error
Geography: Scale factors

21st Century Themes and Skills:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.RP.A.1	A. Analyze proportional relationships and use them to solve real-world and mathematical problems.
	1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
NJSLS.7.RP.A.2 a	A. Analyze proportional relationships and use them to solve real-world and mathematical problems.
	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.
NJSLS.7.RP.A.2 b	A. Analyze proportional relationships and use them to solve real-world and mathematical problems.

	2. Recognize and represent proportional relationships between quantities. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
NJSLS.7.RP.A.2c	A. Analyze proportional relationships and use them to solve real-world and mathematical problems. 2. Recognize and represent proportional relationships between quantities. 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.
NJSLS.7.RP.A.2 d	A. Analyze proportional relationships and use them to solve real-world and mathematical problems. 2. Recognize and represent proportional relationships between quantities. 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.
NJSLS.7.RP.A.3	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.
NJSLS.7.EE.B.3	B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 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.*
Technology Standards:	
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

Unit Essential Question(s):	Unit Enduring Understandings:
- In what ways can the relationship between two quantities be analyzed, determined, and represented? - How are rates used to describe real-life problems? - What is slope? - What is direct variation and how can a graph be used to show the relationship between two quantities that vary directly? - To what extent can proportional reasoning be used as a strategy to solve real-world mathematical problems?	- A relationship between two quantities can be represented as a ratio and/ or a rate which incorporates prior knowledge of fractions, decimals, and percents. - Recognizing, representing, and using proportional reasoning is the foundational piece for solving mathematical problems in the real world. - Proportional relationships can be represented in tables, graphs, equations, diagrams, and verbal descriptions. - Slope is a measure of the steepness of a line.

• In what ways can the concept of proportional reasoning be represented? • How are percents used to solve real-life problems?	• Slope is the constant of proportionality (unit rate). • Solving percent application problems relevant to real-world situations requires the understanding and use of proportional reasoning.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...

Ratios and Rates:
- Recall the definitions of ratio, rate, unit rate, and proportion.
- Expressing and simplifying ratios correctly are the foundational skill sets needed to successfully work with the concepts of proportional reasoning.
- Simplify unit rates, including those with complex fractions.
- Determine the unit rate from a given rate and express the unit rate in word form and as a fraction.
- Solve a variety of problems modeling real-world phenomenon using proportional reasoning, including unit rates with complex fractions and "better buy" problems.

Proportions:
- Decide whether two quantities are proportional using ratio tables and graphs.
- Represent proportional relationships using equations.
- Solve proportions using equivalent fractions and/ or cross products.
- Use proportions to convert measurement units.
- Proportional reasoning is a process that is commonly used to solve a variety of problems that model real-world phenomenon.

Scale Factor, Congruence, and Similarity:
- Define scale factor, congruence, and similarity.
- Solve real-world applications involving scale drawings, scale models, and similar figures.
- Solve a variety of problems modeling real-world phenomenon using proportional reasoning, including scale drawings.

Slope and Direct Variation:
- Define slope and determine the slope of a line from a graph.
- Slope is the rate of change between any two points on a line.
- Slope is the ratio of the change in y to the change in x.
- The slope of a line is the same between any points on the line because lines have a constant rate of change.
- Explain what a point (x, y) means on a proportional graph in context, particularly (0, 0) and (1, r).
- Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions.
- Direct variation shows the proportional relationship between two quantities.
- Identify direct variation from graphs and equations.
- Use direct variation models to solve problems.

Percents:
- Percent, fraction, and decimal equivalencies are used interchangeably to represent "parts of a whole".
- Percents can be greater than 100% or less than 1%.
- Convert fraction/ decimal/ percent equivalents from memory: ½, ¼, ⅛, ⅕, 1/10, 1/20, and ⅓.
- Calculate common percent values mentally (10%, 20%, 5%, 25%, 50%, 75%, 200%, etc.).
- Apply the concept of symmetry to calculate percent values mentally (e.g. 40% of 50 = 50% of 40)
- Memorizing, estimating, and mentally calculating common percent values are tools used to check for reasonableness when calculating exact percent values.

- Applying the correct relationship between fraction/ decimal/ percent equivalents is key to determining the most appropriate/ efficient method to solve a problem involving percents.
- Define sales tax, discount, commission, gratuities (tax), simple interest, principle, percent increase, percent decrease, markup, and percent of error.
- Solve three types of percent equations using the proportion method: Find the percent of a number; Find a number when the percent is known; Find what percent one number is of another number.
- Use estimation to check for reasonableness of percent computations.
- Find percent of increase and decrease.
- Find percent of change and percent of error.
- Solve a variety of word problems modeling real-world phenomenon involving percents: sales tax, discount, commission, gratuities (tax), simple interest, principle, percent increase, percent decrease, markup, and percent of error.
- The order in which the computation steps of a multi-step percent problem are completed impacts the final result (e.g. Calculate the sales tax after the discount has been applied vs. before it has been applied).

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on ratios, rates, and unit rates
Quiz on determining if two quantities are proportional and solving proportions
Quiz on scale factors, congruence, and similarity
Quiz on slope, constant of proportionality, and direct variation
Quiz on converting fractions/ decimals/ percents and percent word problems
Test on ratios and rates, proportions, scale factors, congruence, similarity, slope, constant of proportionality, direct variation, and percents

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:
- Special Education Students
  - Limit items per page
  - Increase font size
  - Extra time
  - Small group instruction/ testing
- English Language Learners
  - Give assessments orally
  - Give outline of a lesson
  - Provide notes
- At-Risk Students
  - Give students a peer buddy
  - Reduce or modify assignments
  - Give student a behavior contract
- Gifted and Talented Students
  - Provide more challenging material
  - Allow students to help struggling students once content is mastered

o   Give written list of instructions

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Ratios and rates	Find ratios and rates; compute unit rates and determine "better buys" (including complex fractions)	3
Proportions	Determine if two quantities are proportional; solve proportions using equivalent fractions and/ or cross products (including converting measurement units)	4
Scale factors, congruence, and similarity	Find a scale factor; find a missing measurement given a scale factor; determine if two figures are similar; find a missing measurement in a set of similar figures	3
Slope	Determine slope from a graph; find slope from a graph using the concept of a unit rate [(0, 0) and (1, r)]; determine if two quantities are proportional; find the constant of proportionality; determine if two quantities vary directly with one another	6
Percents	Convert between fractions/ decimals/ percents; find the percent of a number; solve word problems involving percents (tax, commission, sale, etc.) using proportions	7

Teacher Notes:
30 total days spent on Unit 4 (including 5 quiz days, 1 test days, and 1 review days)

Additional Resources
Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra	
Unit Title: Unit 5 - Geometry: Angle Relationships, Triangles, and Quadrilaterals	
Grade Level: 7	

Unit Summary:

Students will define and describe angle relationships and geometric properties of triangles and quadrilaterals. Students will incorporate their prior knowledge of expressions and equations to problem solve.

Interdisciplinary Connections:

Architecture: Recognizing geometry within, blueprints

Construction: Planning and measuring

Art: Use of patterns and geometric figures

Family and Consumer Science: Patterns in fashion

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.G.A.1	A. Draw, construct, and describe geometrical figures and describe the relationships between them.
	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.
NJSLS.7.G.A.2	A. Draw, construct, and describe geometrical figures and describe the relationships between them.
	2. Draw (with technology, with ruler and protractor, as well as freehand) 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.
NJSLS.7.G.A.3	A. Draw, construct, and describe geometrical figures and describe the relationships between them.
	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.
NJSLS.7.G.B.5	B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
	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.
Technology Standards:	
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

| 8.1.8.A.4 | Graph and calculate data within a spreadsheet and present a summary of the results. |
| 8.1.8.A.5 | Create a database query, sort and create a report and describe the process, and explain the report results |

Unit Essential Question(s):	Unit Enduring Understandings:
- To what extent can proportional reasoning be used as a strategy to solve real-world mathematical problems involving geometric concepts? - In what ways can the concept of proportional reasoning reflecting geometric concepts be represented? - How is classification utilized to develop an understanding of angle relationships, triangles, and quadrilaterals? - To what extent do the relationships of the angle measures of a triangle determine its existence, classification, and/ or special properties? - To what extent can proportional reasoning be used as a strategy to solve real-world mathematical problems involving scale drawings and models?	- Proportional reasoning is a common strategy used for solving mathematical problems involving geometric concepts in the real world. - Proportional relationships can be represented in geometric figures, diagrams, tables, and graphs. - Scale drawings have proportional relationships. - Angle measures and/ or their location in geometric diagrams are used to classify angle relationships. - Angles measures and side lengths can be used to classify triangles and quadrilaterals. - A triangle's existence is determined by the relationship of its sides and angles. - Angles measures and/ or their location in geometric diagrams are used to find missing angles or the sum of angles in a geometric shape/ diagram.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...

Geometric Symbols and Angles:
- There is proper notation when naming points, lines, line segments, rays, and planes.
- There is proper notation when naming angles.
- Name and locate angles.
- Angles can be classified based on their measurement and/ or location in a geometric figure.
- Define and identify vertical angles, adjacent angles, complementary and supplementary angles.

Triangles:
- Triangles can be classified based on their sides and angles.
- The sum of the angles in a triangle totals 180 degrees.
- Equations can be used to find missing angle measures.

Quadrilaterals:
- Quadrilaterals can be classified based on their properties.
- The sum of the angles in a quadrilateral totals 360 degrees.
- Equations can be used to find missing angle measures.

Scale and Scale Factors:
- Scale and scale factors are used to represent actual distances and/ or measures.
- Scale drawings can be used to find actual distances and/ or measures.
- Apply scale and scale factor to determine proportional relationships in real-life applications.
- Find missing measurements in real-life applications using proportions.

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on basic geometry terms, angles, classifying angles, and angle relationships
Quiz on triangles and quadrilaterals
Quiz on scale factors, scale drawings, finding missing measures in polygons
Test on geometry terms, angles, triangles, quadrilaterals, scale factors, scale drawings, and finding missing measures in polygons

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:
- Special Education Students
    o Limit items per page
    o Increase font size
    o Extra time
    o Small group instruction/ testing
- English Language Learners
    o Give assessments orally
    o Give outline of a lesson
    o Provide notes
    o Give written list of instructions
- At-Risk Students
    o Give students a peer buddy
    o Reduce or modify assignments
    o Give student a behavior contract
- Gifted and Talented Students
    o Provide more challenging material
    o Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Geometry and Angles	Define and correctly name all basic geometry terms, including point, line, line segment, ray, and plane; name and classify angles	4
Triangles	Classify triangles by angles and/ or sides; know that triangles add up to 180 degrees; find missing measures in triangles	2
Quadrilaterals	Classify quadrilaterals by properties; know that quadrilaterals add up to 360 degrees; find missing measures in quadrilaterals	2

Scale factors and scale drawings	Use scale factors to find missing measures in polygons; use similarity to determine if two figures are similar; find missing measure given figures are similar	3

Teacher Notes:

17 total days spent on Unit 4 (including 3 quiz days, 1 test day, and 2 review days)

Additional Resources

Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra

Unit Title: Unit 6 - Geometry: Circles, Surface Area and Volume

Grade Level: 7

Unit Summary:

Students will use pi and its estimates to calculate area and circumference of circles and composite figures. Students will solve real-world problems involving surface areas and volumes of objects composed of prisms, pyramids, and cylinders.

Interdisciplinary Connections:

Business and Economics: Minimizing costs of packaging

History: Impact of historical mathematicians and landmarks

Architecture: Shapes of roofs and buildings, pools, and playground

Landscaping: Enclosed areas, fencing, pools

Sports: Measuring distances

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.G.A.3	A. Draw, construct, and describe geometrical figures and describe the relationships between them.
	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.
NJSLS.7.G.B.4	B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
	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.
NJSLS.7.G.B.6	B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
	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.
Technology Standards:	
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
Unit Essential Question(s):	**Unit Enduring Understandings:**

- How is the method used to determine the perimeter and/ or area of a composite geometric figure related to isolated geometric shapes?
- In what ways are the cross-plane sections of three-dimensional figures related to two-dimensional figures?
- How is the method used to determine the perimeter, area, surface area, and/ or volume of a geometric figure related to its shape?

- The method used to determine area of a geometric figure depends on its specific properties.
- Composite figures are comprised of geometric figures including polygons and circles.
- Cross-plane sections of three-dimensional figures relate to two-dimensional figures with respect to the base and proportionality of the figure.
- The relationship between plane sections of three-dimensional figures and two-dimensional figures is dependent upon the shape of the base.
- The method used to determine the surface area and/ or volume of a figure depends upon its specific characteristics and/ or properties.

Unit Learning Targets/Objectives:

Students will (be able to, know that)...

Perimeter:
- The process for calculating the perimeter is the same for all geometric figures.

Circles:
- Define radius, diameter, and circumference.
- Find the radius and diameter of a circle.
- The circumference and area of a circle can be determined by pi and specific parts of a circle.
- Use pi to find the circumference of a circle by using the formula: pi*d or 2r*pi.
- Use pi to find the area of a circle by using the formula: pi*r^2

Composite Figures:
- Define composite figure.
- Composite figures are comprised of geometric figures including polygons and circles.
- Find the perimeter of composite figures, including circles or semicircles.
- Area of composite figures can be found using area of isolated geometric polygons.
- Find the area of composite figures, including circles or semicircles, by finding the areas of the isolated geometric figures contained.

Surface Area:
- The surface area of a right prism, cube, rectangular prism, triangular prism, and cylinder can be found using formulas to solve real-life applications.
- Use nets to find the surface area of three-dimensional figures such as rectangular and triangular prisms, triangular pyramids, and cylinders.
- Find the surface area of three-dimensional figures, such as rectangular and triangular prisms, triangular pyramids, and cylinders to solve real-life applications.

Volume:
- The volume of a right prism, cube, rectangular prism, triangular prism, and cylinder can be found using formulas to solve real-life applications.
- Find the volume of prisms and pyramids by using formulas to solve real-life applications.

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on perimeter of polygons, circumference, and area of a circle
Quiz on composite figures
Quiz on surface area
Quiz on volume
Test on perimeter, circumference, area, surface area, and volume

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:

- Special Education Students
  - Limit items per page
  - Increase font size
  - Extra time
  - Small group instruction/ testing
- English Language Learners
  - Give assessments orally
  - Give outline of a lesson
  - Provide notes
  - Give written list of instructions

- At-Risk Students
  - Give students a peer buddy
  - Reduce or modify assignments
  - Give student a behavior contract
- Gifted and Talented Students
  - Provide more challenging material
  - Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Perimeter	Find the perimeter of various polygons; find missing side measure given the perimeter	2
Circles	Identify and find the radius and diameter (from a figure, given one measure, etc.); find the circumference and area of a circle	6
Composite figures	Find the perimeter and area of composite figures by breaking the shape up into isolated geometric figures	4

Surface area	Find the surface area of three-dimensional figures by using nets, and then formulas	3
Volume	Find the volume of three-dimensional figures by using formulas	3

Teacher Notes:

24 total days spent on Unit 6 (including 4 quiz days, 1 test day, and 1 review day)

Additional Resources

Click links below to access additional resources used to design this unit:

Content Area: Pre-Algebra

Unit Title: Unit 7 - Statistics and Probability

Grade Level: 7

Unit Summary:
Students will develop a conceptual understanding of simple and compound probability and distinguish between dependent and independent events. Students will identify samples and populations and understand their impact on experiments.

Interdisciplinary Connections:
Science: Conduct experiments and analyze results, genetics
Meteorology: Predicting and reporting weather
Sports and Leisure: Predictions and analysis of results, games of chance
Social Studies: Population and environmental impact, surveys and polls
Technology: Password security
Education: Analyze data and test scores

21st Century Themes and Skills:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Standards (Content and Technology):

CPI#:	Statement:
Content Standards:	
NJSLS.7.SP.A.1	A. Use random sampling to draw inferences about a population.
	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.
NJSLS.7.SP.A.2	A. Use random sampling to draw inferences about a population.
	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.*
NJSLS.7.SP.B.3	B. Draw informal comparative inferences about two populations.
	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.*
NJSLS.7.SP.B.4	**B. Draw informal comparative inferences about two populations.**
	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.*
NJSLS.7.SP.C.5	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	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.
NJSLS.7.SP.C.6	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	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.*
NJSLS.7.SP.C.7a	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	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. **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.*
NJSLS.7.SP.C.7b	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	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. **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?*
NJSLS.7.SP.C.8a	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	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.**
NJSLS.7.SP.C.8b	**C. Investigate chance processes and develop, use, and evaluate probability models.**
	8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

	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.
NJSLS.7.SP.C.8c	C. Investigate chance processes and develop, use, and evaluate probability models. 8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 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?*

Technology Standards:

8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory
8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
8.A.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.

Unit Essential Question(s):	Unit Enduring Understandings:
- In an experiments, how can you determine the number of possible outcomes? - How can you describe the likelihood of an event and use relative frequencies to find both theoretical and experimental probabilities? - How can you represent sample spaces for independent and dependent compound events? - How can you determine whether a sample accurately represents a population?	- Understand representative samples (random sampling) and populations. - Use samples to draw inferences about populations. - Compare two populations from random samples using measures of center and variability. - Understand that probability is the likelihood of an event occurring, expressed as a number from 0 to 1. - Develop probability models and use them to find probabilities. - Find the probabilities of compound events.

Unit Learning Targets/Objectives:
Students will (be able to, know that)...
<u>Outcomes and Experiments:</u>
- Define experiment, outcome, event, favorable outcomes, sample space, population, sample, unbiased, and biased sample.
- An experiment is a procedure that has varying results.
- A population is an entire group of people or objects.
- A sample is a part of the population.
- Identify and count the outcomes of experiments.
- An unbiased sample (random sample) is representative of a population and a biased sample (not random) is not representative.
- Determine when samples are representative of populations.
- Use data from random samples to make predictions about populations.
- Use measures of center and variation to compare populations.
- Use random samples to compare populations.
- Use diagrams, tables, or a formula to find the number of possible outcomes.
- Sample space is the set of all possible outcomes.

- The Fundamental Counting Principle is a method to find the number of possible outcomes that can be extended for two or more events.
- Create a sample space using tables, tree diagrams, and The Fundamental Counting Principle.

Probability:
- The probability of an event is a number between 0 and 1 that measures the likelihood that the event will occur.
- Understand the concept of probability and the relationship between probability and likelihood.
- Find probabilities of events.
- Relate likelihoods to numeric probabilities (impossible, unlikely, equally likely, likely, and certain).
- A box-and-whisker plot highlights the variability (spread/ clusters) of a set of data and is often used to compare more than one set of data.
- Compare shapes of data distributions that represent two populations (parallel box and line plots).
- Each quartile of a box-and-whisker plot contains 25% of the data.
- The interquartile range contains 50% of the data.
- Use line plots and box-and-whisker plots to compare data sets that represent two populations.
- Define quartiles (lower/ first, median/ second, upper/ third), interquartile range, minimum/ lower extreme, maximum/ upper extreme.
- The relative frequency of an event is the fraction or percent of time that the event occurs.
- Find relative frequencies and use them to make predictions.

Theoretical Probability:
- Define theoretical probability.
- Theoretical probability is the ratio of favorable outcomes to possible outcomes.
- Use theoretical probabilities to find quantities.
- Compare theoretical and experimental probabilities.

Experimental Probability:
- Define experimental probability.
- Experimental probability is probability that is based on repeated trials.
- Compare theoretical and experimental probabilities.

Compound Probability:
- Define compound events, and dependent and independent events.
- A compound event consists of two or more events.
- Compound events may be independent or dependent events.
- Independent events are events where one event does not affect the likelihood of the other.
- Dependent events are events where one event does affect the likelihood of the other.
- Identify independent and dependent events and use formulas to find probabilities of oth.
- Find probabilities of compound events.

Formative Assessments:
Daily homework problems
Do nows
Exit tickets
Use of communicators during class
IXL
Classwork
Hand-in class assignments

Summative/Benchmark Assessment(s):
Quiz on experiments, populations, samples, sample spaces, and making predictions.
Quiz on box-and-whisker plots, theoretical, and experimental probabilities

Test on outcomes and experiments, probability, box-and-whisker plots, and compound probability

Resources/Materials (copy hyperlinks for digital resources):
Kuta Software
Online Textbook
Common Core Sheets
Online resources and worksheets

Modifications:
- Special Education Students
  - Limit items per page
  - Increase font size
  - Extra time
  - Small group instruction/ testing
- English Language Learners
  - Give assessments orally
  - Give outline of a lesson
  - Provide notes
  - Give written list of instructions
- At-Risk Students
  - Give students a peer buddy
  - Reduce or modify assignments
  - Give student a behavior contract
- Gifted and Talented Students
  - Provide more challenging material
  - Allow students to help struggling students once content is mastered

Lesson Name/Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Experiments, populations, and samples	Perform different types of experiments; determine sample spaces; biased vs. unbiased samples; make predictions about populations	5
Box-and-whisker plots	Create box-and-whisker plots; look at measures of center; compare data in different plots	2
Probability	Find the probability of an event in words; find theoretical probability; find experimental probability; compare theoretical and experimental probability	7
Compound probability	Find compound probability of >1 event; compare and find probability of both independent and dependent events	2

Teacher Notes:
20 total days spent on Unit 7 (including 2 quiz days, 1 test day, and 1 review day)

Additional Resources
Click links below to access additional resources used to design this unit: