Pre-Algebra Honors &Accelerated

Unit 1: Number Fluency

Content Area: Mathematics

Course & Grade Level: Pre-Algebra H&A, grade 6

Summary and Rationale

Students will develop a unified understanding of different representations of all real numbers, this includes rational numbers. This unit explores many representations of real numbers using exponents, scientific notation, fractions, decimals, square and cube roots among representations. In this unit, students extend their understandings of addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers.

Recommended Pacing

44 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice

CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
7	Look for and make use of structure.

Standard: The Number System 6.NS.A Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

CPI #	Cumulative Progress Indicator (CPI)
1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Standard: The Number System 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.

CPI #	Cumulative Progress Indicator (CPI)
2	Fluently divide multi-digit numbers using the standard algorithm.
3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Standard: The Number System 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.	
CPI #	**Cumulative Progress Indicator (CPI)**
5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
7	Understand ordering and absolute value of rational numbers.
Standard: The Number System 7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
3	Solve real-world and mathematical problems involving the four operations with rational numbers.
Standard: The Number System 8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi 2$).
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
RST.6-8.9.	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
New Jersey Student Learning Standards for 21st Century Life and Careers	
Career Ready Practices	
CPI #	**Cumulative Progress Indicator (CPI)**
CRP2.	Apply appropriate academic and technical skills.
CRP4.	Communicate clearly and effectively and with reason
CRP7.	Employ valid and reliable research strategies.
New Jersey Student Learning Standards for Technology	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
New Jersey Student Learning Standards for Science	
CPI #	**Cumulative Progress Indicator (CPI)**
MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of pure substance when thermal energy is added or removed.
Instructional Focus	
Unit Enduring Understandings	
● Mathematical problem solvers apply a variety of strategies and methods to solve problem situations. ● Number sense develops through experience. ● Numerical operations apply to all real numbers. ● Our number system is complex and formed by many sets of numbers.	
Unit Essential Questions	
● How does finding the common characteristics among similar problems help me to be a more efficient problem solver? ● What kinds of experiences help develop number sense? ● How do I determine the best numerical representation (pictorial, symbolic, objects) for a given situation? ● How are mathematical operations between different sets of numbers related? ● How can real numbers be used to quantify situations and events? ● Which representation of a rational number is most appropriate for the given situation? ● How do exponents simplify work with very large and very small numbers?	

Objectives

Students will know:

- The definitions of absolute value, additive inverse, base, cube root, exponent, integer, opposites, perfect cube, perfect square, power, radical sign, radicand, rational number, repeating decimal, square root, scientific notation, and terminating decimal.
- That every rational number has a decimal expansion that terminates or repeats.
- That every quotient of integers (non-zero divisor) is a rational number.
- That numbers that are not rational are irrational.

Students will be able to:

- Fluently add, subtract, multiply and divide integers.
- Identify, describe, and find the absolute values of integers.
- Apply properties of operations to simplify expressions with integers and/or rational numbers.
- Find GCF and LCM using a variety of strategies (Boot/Ladder, Prime Factorization, & Venn Diagrams).
- Fluently add, subtract, multiply and divide rational numbers.
- Compare irrational numbers using rational approximations.
- Evaluate square roots and cube roots, including those resulting from solving equations.
- Use the properties of integer exponents to generate equivalent expressions.
- Use scientific notation to express large or small quantities.
- Perform operations with numbers expressed in scientific notation.

Evidence of Learning

Assessment

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of MAP and NJSLA data.

Competencies for 21st Century Learners

X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Resources

Core Text: Big Ideas Accelerated, 2017, by Larson, R. and Bosell, L.

Unit 2: Foundations of Algebra	
Content Area: Mathematics	
Course & Grade Level: Pre-Algebra H&A, grade 6	
Summary and Rationale	
Students will work closely with the equations that define linear functions and their graphs. Work with these functions is grounded in logical reasoning. Skill with manipulations of expressions will be accomplished with intent and based on properties of arithmetic and the laws of equality. Students will continue to expand and hone their abilities to use algebraic equations to model situations.	
Recommended Pacing	
23 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
Standard: Expressions and Equations 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Write and evaluate numerical expressions involving whole-number exponents.
2	Write, read, and evaluate expressions in which letters stand for numbers.
3	Apply the properties of operations to generate equivalent expressions.
4	Identify when two expressions are equivalent.
Standard: Expressions and Equations 6.EE.B Reason about and solve one-variable equations and inequalities.	
CPI #	**Cumulative Progress Indicator (CPI)**
5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
7	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.

8	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
Standard: Expressions and Equations 6.EE.C Represent and analyze quantitative relationships between dependent and independent variables	
CPI #	**Cumulative Progress Indicator (CPI)**
9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
Standard: Expressions and Equations 7.EE.A Use properties of operations to generate equivalent expressions.	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
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.
Standard: Expressions and Equations 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
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.
Standard: Expressions and Equations 8.EE.B Understand the connections between proportional relationships, lines, and linear equations.	
CPI #	**Cumulative Progress Indicator (CPI)**
5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
Standard: Expressions and Equations 8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.	
CPI #	**Cumulative Progress Indicator (CPI)**
7	Solve linear equations in one variable.

New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
RST.6-8.7.	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for 21st Century Life and Careers	
Career Ready Practices	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
New Jersey Student Learning Standards for Technology	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Instructional Focus

Unit Enduring Understandings

- Equations are powerful tools for exploring, reasoning about, and representing situations.
- Algebraic properties can generate equivalent expressions and equations even when their symbolic forms differ.
- The solution set to an inequality is a specific, infinite set.
- There are many ways to represent the solution set to an inequality.

Unit Essential Questions

- How do the properties of operations help us simplify and transform expressions and equations?
- How can equations and inequalities be used to represent situations?
- What makes a solution to a real-life problem reasonable?
- What does the solution to an inequality represent in the context of the situation?

Objectives

Students will know:

- The difference between an expression and equation.
- The definitions of coefficient, constant, equations, equivalent expression, evaluate, factoring, inequality, inverse, like terms, literal equation, simplest form, solution ofan equation, solution of an inequality, solution set, terms, and variable.
- How to read and interpret a graph of inequality.
- That rewriting expressions in different forms can show how the quantities are related.

Students will be able to:

- Factor out the GCF in algebraic and numerical expressions.
- Apply properties of operations to generate and identify equivalent expressions. (Distributive, Additive Inverse, Associative, Commutative).
- Add, subtract, factor, and expand linear expressions with rational coefficients (combining like terms).
- Write, graph, and solve one-step equations and inequalities that include integers and/or rational numbers.
- Write, graph, and solve two-step equations and inequalities that include integersand/or rational numbers.
- Solve multi-step equations including equations with variables on both sides.
- Solve literal equations for a given variable.
- Write an equation in two variables and analyze the relationship between the independentand dependent variables using graphs and tables.
- Graph proportional relationships, interpreting the unit rate as the slope.
- Derive y=mx and y=mx+b.

Evidence of Learning

Assessment

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of MAP and NJSLA data.

Competencies for 21st Century Learners

X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Resources

Core Text: Big Ideas Accelerated, 2017, by Larson, R. and Bosell, L.

Unit 3: Ratio and Proportional Relationships

Content Area: Mathematics

Course & Grade Level: Pre-Algebra H&A, grade 6

Summary and Rationale

Students will extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students will model and graph proportional relationships and begin to understand the unit rate informally as a measure of the steepness of the related line, called the slope. They will distinguish proportional relationships from other relationships.

Recommended Pacing

35 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice

CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
6	Attend to precision.
8	Look for and express regularity in repeated reasoning.

Standard: Ratios and Proportional Relationships 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.

CPI #	Cumulative Progress Indicator (CPI)
1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
2	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠0, and use rate language in the context of a ratio relationship.
3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

Standard: Ratios and Proportional Relationships 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.

CPI #	Cumulative Progress Indicator (CPI)
1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
2	Recognize and represent proportional relationships between quantities.
3	Use proportional relationships to solve multistep ratio and percent problems.

New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
RST.6-8.7.	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for 21st Century Life and Careers	
Career Ready Practices	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
Standard: Strand A: Income and Careers Number Standard Statement	
CPI #	**Cumulative Progress Indicator (CPI)**
9.1.8.A.1	Explain the meaning and purposes of taxes and tax deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay.
New Jersey Student Learning Standards for Technology	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Instructional Focus

Unit Enduring Understandings

- In a proportion, the ratios of two quantities remain constant as the corresponding values of the quantities change.
- Proportional reasoning can be used to quantify and compare situations, events and models.
- Problems involving equivalent ratios can be solved using a variety of models.
- Slope is a representation of rate of change.

Unit Essential Questions

- How are proportional relationships displayed in different representations?
- What is the most efficient method to find the missing value in a proportion?
- How can you tell if a relationship is proportional?
- How can ratios and proportional reasoning be applied to mathematical models such as scale drawings?
- Why is unit rate important for analyzing a proportional relationship?
- How is slope used to measure, model and calculate change?
- What types of relationships can be modeled by linear graphs?

Objectives

Students will know:

- The definitions of linear expression, interest, linear equation, literal equation, markup, percent error, percent of change, percent of decrease, percent of increase, principal, rise, run, simple interest, solution of a linear equation, solution set, slope, slope intercept form, x-intercept, and y-intercept.
- The language to define a ratio and describe a relationship between two quantities using proportionality.

Students will be able to:

- Use ratio reasoning to convert measurement units.
- Find unit rates associated with ratios of fractions, areas, and other quantities in like or different units.
- Make tables of equivalent ratios and plot the pairs of values on a coordinate plane.
- Use tape diagrams, double number line diagrams, tables, equations, and graphs to solve equivalent ratio problems.
- Identify the constant of proportionality (unit rate) in graphs, equations, diagrams, and verbal descriptions.
- Use similar triangles to explain why the slope is the same between any two points on a line.
- Decide whether two quantities are proportional using ratio tables and graphs.
- Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions.
- Represent proportional relationships with models including equations.
- Explain what a point (x,y) means on proportional graph in context, particularly (0,0) and (1,r) where r is the unit rate.
- Use proportionality to solve ratio problems.
- Find the part and the whole of ratio relationships.
- Identify equivalent expressions.
- Compare fractions, decimals, and percents. (thirds, fourths, fifths, eighths, tens)
- Use proportionality to solve percent problems.
- Use a percent equation to solve percent problems.
- Solve percent problems involving percents of increase and decrease, and simple interest.
- Use scale drawing to compute actual lengths and areas.
- Write both an algebraic expression and an algebraic equation to represent a sequence.
- Graph proportional relationships, interpreting the unit rate as the slope.
- Compare proportional relationships represented in different ways (graph, equation, …)
- Derive y=mx and y=mx+b.

Evidence of Learning			
Assessment			
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of MAP and NJSLA data.			
Competencies for 21st Century Learners			
X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner
Resources			
Core Text: Big Ideas Accelerated, 2017, by Larson, R. and Bosell, L.			

Unit 4: Geometry

Content Area: Mathematics

Course & Grade Level: Pre-Algebra H&A, grade 6

Summary and Rationale

Students will continue their work with area from Grade 5, solving more complex, multi-step problems. As students connect their understanding of ratio with similarity in geometric figures, they will analyze simple drawings that indicate the relative size of quantities. They will reason about relationships among two-dimensional figures using scale drawings and they gain familiarity with the relationships between angles formed by intersecting lines. This will provide a foundation for work on congruence and similarity in Geometry. Students will work with three-dimensional figures as they solve authentic mathematical problems.

Recommended Pacing

36 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice

CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
8	Look for and express regularity in repeated reasoning.

Standard: Geometry 6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

CPI #	Cumulative Progress Indicator (CPI)
1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = B h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Standard: Geometry 7.G.A. Draw, construct, and describe geometrical figures and describe the relationships between them.	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
Standard: Geometry 8.G.B Understand and apply the Pythagorean Theorem.	
CPI #	**Cumulative Progress Indicator (CPI)**
7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.
Standard: Geometry 8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres	
CPI #	**Cumulative Progress Indicator (CPI)**
9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
RST.6-8.7.	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for 21st Century Life and Careers	
Career Ready Practices	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
New Jersey Student Learning Standards for Technology	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Instructional Focus

Unit Enduring Understandings

- Geometric awareness develops through practice in visualizing, diagramming, and constructing.
- Geometric images provide the context in which properties can be noticed, definitions can be made and by which formulas can be derived.
- Geometry can be used to model many real life situations and to solve everyday problems.

Unit Essential Questions

- How are spatial relationships represented in sketches, drawings, and constructions?
- How are area, surface area, and volume found by deriving and applying formulas and using various strategies?
- How can the application of the attributes of geometric figures support mathematical reasoning and problem solving?
- How can angle relationships be used to solve problems?
- How can geometric properties and theorems be used to describe, model, and analyze situations?

Objectives

Students will know:

- The definitions of adjacent angles, circle, center, circumference, complementary angles, composite figure, concave polygon, congruent angles, congruent sides, convex polygon, cross section, diameter, exterior angles of a polygon, hemisphere, hypotenuse, indirect measurement, interior angles, interior angles of a polygon, kite, lateral surface area, legs, pi, Pythagorean theorem, regular polygon, regular pyramid, scale drawing, scale factor, scale model, semi-circle, similar solids, slant height, sphere, supplementary angle, transversal, and vertical angles.
- That pi is irrational and how to estimate it.
- Appropriate units for perimeter, area, and volume (linear, square and cubic).

Students will be able to:

- Measure and describe relationships among supplementary, complementary, vertical and adjacent angles.
- Represent proportional relationships with equations.
- Use scale drawings to compute actual lengths and areas.
- Calculate the area of triangles, and special quadrilaterals (parallelograms and trapezoids).
- Use values of pi to estimate and calculate the circumference and area of circles.
- Use nets to find surface areas of 3D figures.
- Calculate the volume of prisms, cones, cylinders, and spheres using a variety of rational number measurements.
- Find the missing dimension given the area or volume of a figure.
- Find perimeters and areas of composite two-dimensional figures, including semi-circles.
- Solve real-world problems involving surface areas and volumes of objects composed of prisms, pyramids, and cylinders.
- Classify and determine the measure of angles created when parallel lines are cut by a transversal.
- Demonstrate that the sum of the interior angle measures of a triangle is 180 degrees and apply this fact to find the unknown measures of angles and the sum of the angles of polygons.
- Use similar triangles to solve problems involving indirect measurement.
- Use the Pythagorean Theorem to find missing measures of right triangles and distances between points in the coordinate plane.

Evidence of Learning			
Assessment			
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of MAP and NJSLA data.			
Competencies for 21st Century Learners			
X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner
Resources			
Core Text: Big Ideas Accelerated, 2017, by Larson, R. and Bosell, L.			

Unit 5: Probability and Statistics

Content Area: Mathematics

Course & Grade Level: Pre-Algebra H&A, grade 6

Summary and Rationale

Building on and reinforcing their understanding of numbers, students will begin to develop their ability to think statistically. Students will recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. Students will learn to describe and summarize numerical data sets using different data displays. Random processes can be described mathematically by using a probability model: a list or description of the possible outcomes (the sample space), each of which is assigned a probability. Interpreting these probabilities relies on an understanding of independence and conditional probability. In this unit, students will explore ways to calculate probabilities to describe seemingly random events.

Recommended Pacing

12 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
Standard: Statistics and Probability 6.SP.A Develop understanding of statistical variability	
CPI #	**Cumulative Progress Indicator (CPI)**
2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
Standard: Statistics and Probability 6.SP.B Summarize and describe distributions.	
CPI #	**Cumulative Progress Indicator (CPI)**
4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how itwas measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of thedata distribution and the context in which the data were gathered.
Standard: Statistics and Probability 7.SP.C Investigate chance processes and develop, use, and evaluate probability models.	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
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.
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.
8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
RST.6-8.7.	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

New Jersey Student Learning Standards for 21st Century Life and Careers	
Career Ready Practices	
CPI #	**Cumulative Progress Indicator (CPI)**
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.
New Jersey Student Learning Standards for Technology	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Instructional Focus

Unit Enduring Understandings

- The way that data is collected, organized and displayed influences interpretation.
- The probability of an event's occurrence can be predicted with varying degrees of confidence.
- Permutations and combinations can be used as efficient strategies to explore large quantities.

Unit Essential Questions

- In what ways can data be expressed so that it is accurate meaning is concisely presented to a specific audience?
- How can data collection assist in making predictions about an event?
- What tools are effective in finding the probability of simple and compound events?
- What are the most efficient ways to count large quantities?

Objectives

Students will know:

- The definitions of biased sample, compound event, dependent events, event, experiment, experimental probability, independent events, favorable outcomes, fundamental counting principle, outcomes, population, probability, relative frequency, sample, sample space, simulation, theoretical probability, and unbiased sample.
- When to use the appropriate measure of central tendency.
- That a measure of variation summarizes how all of the values in a data set vary with a single number.
- The definitions of representative samples (random sampling) and populations.
- That probability is the likelihood of an event occurring, expressed as a number from 0 to 1.

Students will be able to:

- Recognize and create statistical questions that anticipate useful data results.
- Calculate mean, median, mode and range.
- Display data on a histogram, box-and-whisker plots, line plot and scatter plot.
- Generate multiple samples of data to draw inferences about a population.
- Select and justify a measure of central tendency (mean, median, or mode) that best represents a set of data.

- Describe any overall patterns in a set of data, as well as any striking deviations from the overall pattern (outliers).
- Develop probability models and use them to find probabilities.
- Find the probabilities of compound events.

Evidence of Learning

Assessment

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of MAP, NJSLA data and the Average Student Project

Competencies for 21st Century Learners

X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Resources

Core Text: Big Ideas Accelerated, 2017, by Larson, R. and Bosell, L.