Barrington School District	Haddon Heights School District	Lawnside School District	Merchantville School District

Course Name: Mathematics
Grade: XX

Board Approved: DATE OF BOARD APPROVAL

*All curriculum is aligned with the NJSLS in accordance with the Department's curriculum implementation timeline and includes all required components (NJ.A.C.6A:8)

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 **Exponents, Expressions, and Equations**	• 8.EE.A.1 • 8.G.C.9 • 8.EE.A.3 • 8.EE.A.4 • 8.NS.A.1 • 8.NS.A.2 • 8.EE.B.5 • 8.EE.B.6	• Work with integer exponents • Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres • Know that there are numbers that are not rational, and approximate them by rational numbers • Understand the connections between proportional relationships, lines, and linear equations	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning. of others. MP.4 Model with mathematics.
Unit 1: ***Suggested Open Educational Resources***	8.EE.A.1 Extending the Definitions of Exponents 8.G.C.9 A Canister of Tennis Balls 8.EE.A.3 Ant and Elephant 8.EE.A.4 Giantburgers 8.NS.A.1 Converting Decimal Representations of Rational Numbers to Fraction Representations 8.NS.A.2 Irrational Numbers on the Number Line 8.EE.B.5 Who Has the Best Job? 8.EE.B.6 Slopes Between Points on a Line		

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Unit 2 **Functions, Equations, and Solutions**	• 8.F.A.1 • 8.F.A.2 • 8.F.A.3 • 8.F.B.4* • 8.F.B.5 • 8.EE.C.7 • 8.EE.C.8*	• Define, evaluate, and compare functions • Use functions to model relationships between quantities • Analyze and solve linear equations and simultaneous linear equations	MP.5 Use appropriate tools strategically.. MP.6 Attend to precision.
Unit 2: ***Suggested Open Educational Resources***	8.F.A.1 Function Rules 8.F.A.2 Battery Charging 8.F.A.3 Introduction to Linear Functions 8.F.B.4 Chicken and Steak, Variation 1 8.F.B.4 Baseball Cards 8.EE.C.7 The Sign of Solutions 8.EE.C.7 Coupon versus discount 8.EE.C.8a Intersection of Two Lines 8.EE.C.8 How Many Solutions		MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3 **Geometry: Pythagorean Theorem, Congruence**	• 8.EE.A.2 • 8.G.C.9 • 8.G.B.6 • 8.G.B.7 • 8.G.B.8* • 8.G.A.1 • 8.G.A.2	• Work with radicals and integer exponents • Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres • Understand and apply the Pythagorean Theorem • Understand congruence and similarity using physical models, transparencies, or geometry software	

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and Similarity Transformations	• 8.G.A.3 • 8.G.A.4 • 8.G.A.5		
Unit 3: ***Suggested Open Educational Resources***	8.G.B.6 Converse of the Pythagorean Theorem 8.G.B.7 Running on the Football Field 8.G.B.8 Finding isosceles triangles 8.G.A.1 Reflections, Rotations, and Translations 8.G.A.2 Congruent Triangles 8.G.A.3 Effects of Dilations on Length, Area, and Angles 8.G.A.4 Are They Similar 8.G.A.5 Street Intersections 8.G.A.5 Similar Triangles II 8.G.A.5 Triangle's Interior Angles		MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning. of others. MP.4 Model with mathematics.
Unit 4 **Statistics and Probability: Scatterplots and Association**	• 8.SP.A.1 • 8.SP.A.2 • 8.SP.A.3 • 8.SP.A.4 • 8.F.B.4* • 8.G.B.8* • 8.EE.C.8c*	• Investigate patterns of association in bivariate data • Use functions to model relationships between quantities • Understand and apply the Pythagorean Theorem • Analyze and solve linear equations and simultaneous linear equations	MP.5 Use appropriate tools strategically.. MP.6 Attend to precision.

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Unit 4: ***Suggested Open Educational Resources***	8.SP.A.1 Texting and Grades 1 8.SP.A.2 Animal Brains 8.SP.A.3 US Airports 8.SP.A.4 What's Your Favorite Subject 8.SP.A.4 Music and Sports 8.F.B.4 Delivering the Mail 8.G.B.8 Finding the distance between points 8.EE.C.8 Kimi and Jordan	MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.

Unit 1 Grade 8		
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**
• 8.EE.A.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. • 8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): • Exponents as simplified representation of repeated multiplication. Students are able to: • apply properties of exponents to numerical expressions. • generate equivalent numerical expressions using positive and negative integer exponents. • find volume of cones, cylinders and spheres using to solve real world problems. Learning Goal 1: Apply the properties of integer exponents to write equivalent numerical

	MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	expressions; apply formulas to find the volume of a cone, a cylinder, or a sphere when solving real-world and mathematical problems.
● 8.EE.A.3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): ● Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10. Students are able to: ● estimate very large and very small quantities with numbers expressed in the form of a single digit times an integer power of 10. ● compare numbers written in the form of a single digit times an integer power of 10 and express how many times as much one is than the other. Learning Goal 2: Estimate and express the values of very large or very small numbers with numbers expressed in the form of a single digit times an integer power of 10. Compare numbers expressed in this form, expressing how many times larger or smaller one is than the other.
● 8.EE.A.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	MP. 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in	Concept(s): No new concept(s) introduced Students are able to: ● multiply and divide numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. ● add and subtract numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. ● use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. ● interpret scientific notation that has been generated by technology (e.g. recognize 4.1E-2 and 4.1e-2 as 4.1 x 10^{-2}).

	repeated reasoning.	Learning Goal 3: Perform operations using numbers expressed in scientific notation, including problems where both decimals and scientific notation are used. In real-world problem-solving situations, choose units of appropriate size for measurement of very small and very large quantities and interpret scientific notation generated when technology has been used for calculations.
● 8.NS.A.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.	MP. 2 Reason abstractly and quantitatively.	Concept(s): ● Numbers that are not rational are irrational. ● Every number has a decimal expansion. Students are able to: ● compare decimal expansions of rational and irrational numbers. ● represent a rational number with its decimal expansion, showing that it repeats eventually. ● convert a decimal expansion (which repeats eventually) into a rational number. Learning Goal 4: Represent a rational number with its decimal expansion, showing that it eventually repeats, and convert such decimal expansions into rational numbers.
● 8.NS.A.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., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations*.	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): ● Rational approximation of irrational numbers Students are able to: ● compare irrational numbers by replacing each with its rational approximation. ● locate rational approximations on a number line. ● estimate the value of expressions containing irrational numbers. Learning Goal 5: Use rational numbers to approximate irrational numbers, locate irrational numbers on a number line, and estimate the value of expressions

		containing irrational numbers.
• 8.EE.B.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Quantitative relationships can be represented in different ways. Students are able to: • graph proportional relationships. • interpret unit rate as the slope of a graph. • compare two different proportional relationships that are represented indifferent ways (table of values, equation, graph, verbal description). Learning Goal 6: Graph proportional relationships, interpreting slope as unit rate, and compare two proportional relationships, each represented in different ways.
• 8.EE.B.6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): No new concept(s) introduced Students are able to: • show, using similar triangles, and explain why the slope, m, is the same between any two distinct points on a non-vertical line. • derive, from two points, the equation $y = mx$ for a line through the origin. • derive, from two points, the equation $y = mx + b$ for a line intercepting the vertical axis at b. Learning Goal 7: Derive the equation of a line ($y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b) and use similar triangles to explain why the slope (m) is the same between any two points on a non-vertical line in the coordinate plane.

Unit 1 Grade 8 What This May Look Like	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**

Exit Slips *Class Assignments* *Homework* *Extended Response* *Teacher Observations* *Reflex Math* *Warm-ups* *Mini Quizzes* *Proficiency Scales*	*MAP Assessment* *Link It Testing* *End of Unit Assessment*

Focus Mathematical Concepts

Prerequisite skills: Identify parts of a power. Show relationships among variables in a variety of ways including the use of words, tables, graphs, and symbols. Identifying variables to determine appropriate range of values for independent and dependent variables. Collecting data and using patterns in tables to make predictions. Information be interpreted through a variety of representations. A linear function such as y=mx has a constant rate of change between the two variables. Through a graph, table, or an equation identify the constant of proportionality. Understand the place value system. Apply and extend previous understandings of arithmetic to algebraic expressions. Apply and extend previous understandings of numbers to the system of rational numbers.

Common Misconceptions: Students fail to realize a ratio can be a fraction and all fractions are ratios: Students believe repeating decimals are irrational: Students commonly believe that decimals with a pattern are rational. Students often misunderstand the relationship between rational numbers and its subgroups. Students do not see the fraction bar as an operation: A fraction is a division problem and a division problem can be represented with a fraction. Students do not see irrational numbers as numbers that do not repeat or terminate. Students believe all linear relationships are proportional. Students commonly think that an exponent means to multiply the base times the exponent. Students mistakenly apply the sign of the exponent to the base, that is students think x^-n = -x^n. Students do not understand that square root problems have two possible answers and this should be denoted using a symbol. Students commonly believe that the E on a calculator display means an error as opposed to an exponent in scientific notation. Students reverse coordinates when representing the slope. Students think slope can be calculated as y/x for relationships that are not proportional. Some students do not pay attention to the scale on a graph, assuming that the scale units are always “one”. Students believe that volume is a number that results from substituting other numbers into a formula rather than a measure related to the amount of space occupied.

District/School Tasks	**District/School Primary and Supplementary Resources**
Things to add throughout the year: *Number/Pattern talks* *Which One Doesn’t Belong* *Exit Tickets*	*Websites:* *http://www.mymathuniverse.com/digitsSNP* *www.brainpop.com* *www.illustractivemathematics.org*

Questioning (specific questions, anticipated responses both correct and incorrect) *Warm-ups* *Error Analysis* *Performance Tasks* *3-ACT tasks* *Launch – Explore – Summarize Tasks* *Reteach Worksheets*	*http://www.mathpickle.com Grade K to 12 math games and puzzles* *www.illuminations.nctm.org* *http://www.estimation180.com 180 days of estimation problems* *www.commoncoresheets.com* *Georgiastandards.org* *https://njctl.org New Jersey Center for Teaching & Learning* *www.achievethecore.com* *http://www.khlanacademy.org/commoncore.com* *http://www.mathtalks.net/ - number and pattern talks* *http://www.diagnosticquestions.com– hinge questions* *https://tedd.org/mathematics/ - https://www.engageny.org/common-core-curriculum* *Additional Resources:* *Interactive Notebook* *Common Core State Standards Flip Book* *Go Math; my.hrw.com (Lawnside and Haddon Heights)* *Big Ideas Math bigideasmath.com/ (Merchantville)*

Interdisciplinary Connections		
ELA	**Social Studies**	**Science**
RH.6-8.1 RH.6-8.2 RH.6-8.7 RH.6-8.9 RH.6-8.10 WHST.6-8.1.A to E WHST.6-8.2 WHST.6-8.2.a. WHST.6-8.2.b WHST.6-8.2.c WHST.6-8.4 WHST.6-8.6		K-2ETS1-1 2-ESS2-2 2-ESS2-3 3-ESS3-2 3-LS4-4 3-ESS2-1 3-ESS2-2 3-ESS3-1 3-5ETS1-1 3-5ETS1-2 3-5ETS1-3 4-PS3-4 4-ESS2-1 4-ESS2-2

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WHST.6-8.7 WHST.6-8.8 WHST.6-8.9 L.6-8.1 L.6-8.6 SL.6-8.1 SL.6-8.4 SL.6-6.5 SL.6-8.6		

21st Century Skills/Career Education	**Technology**	
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. 9.1.8.B.6 9.1.8.F.1 9.2.8.B.3 9.2.8.B.7 9.3.12.AR-JB.3 9.3.GV.1 9.3.GV-FIR.1 9.3.GV-GOV.1 9.3.GV-GOV.2 9.3.GV-GOV.3	8.1.8.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations. - Understand and use technology systems. - Select and use applications effectively and productively. 8.1.8.D.1 to 5 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behavior. - Advocate and practice safe, legal, and responsible use of information and technology. - Demonstrate personal responsibility for lifelong learning. - Exhibit leadership for digital citizenship. 8.1.8.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. - Plan strategies to guide inquiry. - Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.	

9.3.GV-SEC.4 9.3.IT.4 9.3.IT-WD.10 9.3.ST.2 9.3.ST.6 9.3.ST-ET.1 9.3.ST-SM.4	- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. - Process strategies to guide inquiry.	

Modifications and Accommodations		
Special Education Students	**English Language Learners**	**Students at Risk of School Failure**
small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system TPR Total Physical Response	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system
Gifted and Talented	**Students with 504 Plans**	
extension project leveled text leadership roles intentional grouping targeted learning from assessment DOK higher order questions	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary	

Blooms - analyze, evaluate, create	modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	

Unit Duration: Instructional Days
How long will the unit take to complete? 42 days

Unit 2 Grade 8		
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**
● 8.F.A.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically.	Concept(s): ● A function is a rule. ● If a rule is a function, then for each input there is exactly one output. Students are able to: ● use function language. ● describe a function as providing a single output for each input. ● determine whether non-numerical relationships are functions. ● describe a function as a set of ordered pairs. ● read inputs and outputs from a graph. ● describe the ordered pairs as containing an input, and the corresponding output. Learning Goal 1: Define a function as a rule that assigns one output to each input and

		determine if data represented as a graph or in a table is a function.
• 8.F.A.2. Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Functions (quantitative relationships) can be represented in different ways. • Functions have properties; properties of linear functions. Students are able to: • analyze functions represented algebraically, as a table of values, and as a graph. • interpret functions represented by a verbal description. • given two functions, each represented in a different way, compare their properties. Learning Goal 2: Compare two functions each represented in a different way (numerically, verbally, graphically, and algebraically) and draw conclusions about their properties (rate of change and intercepts).
• 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • A linear function is defined by the equation $y = mx + b$. • The graph of a linear function is a straight line. Students are able to: • analyze tables of values, graphs, and equations in order to classify a function as linear or nonlinear. • determine if equations presented in forms other than y = mx + b (for example 3y – 2x = 7) define a linear function. • give examples of equations that are nonlinear functions. • show that a function is not linear using pairs of points. Learning Goal 3: Classify functions as linear or non-linear by analyzing equations, graphs, and tables of values; interpret the equation $y = mx + b$ as defining a linear function.
• 8.F.B.4. Construct a function to model a linear relationship between two quantities. Determine the rate of	MP.6 Attend to precision. MP.2 Reason abstractly and	Concept(s): • As with equations, two (x,y) values can be used to construct a function.

change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	quantitatively. MP.7 Look for and make use of structure.	Students are able to: ● determine the rate of change and initial value of a function from a description of a relationship. ● determine the rate of change and initial value of a function from two (x, y) values by reading from a table of values. ● determine the rate of change and initial value of a function from two (x, y) values by reading these from a graph. ● construct a function in order to model a linear relationship. ● interpret the rate of change and initial value of a linear function in context. Learning Goal 4: Model a linear relationship by constructing a function from two (x,y) values. Interpret the rate of change and initial value of the linear function in terms of the situation it models, and in terms of its graph or a table of values.
● 8.F.B.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: ● analyze a graph. ● provide qualitative descriptions of graphs (e.g. where increasing or decreasing, linear or nonlinear). ● given a verbal description, sketch a graph of a function based on the qualitative features described. Learning Goal 5: Sketch a graph of a function from a qualitative description and give a qualitative description of a graph of a function.
● 8.EE.C.7. Solve linear equations in one variable. 8EE.C.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): ● Linear equations may have an infinite number of solutions. ● Linear equations may have no solution or a single solution.

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Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). 8.EE.C.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.		Students are able to: ● give examples of linear equations in one variable with one solution *(x = a),* infinitely many solutions *(a = a),* or no solutions *(a = b.)* ● transform a given equation, using the properties of equality, into simpler forms. ● transform a given equation until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results *(a and b are different numbers)*. ● solve linear equations that have fractional coefficients; include equations requiring use of the distributive property and collecting like terms. Learning Goal 6: Apply the distributive property and collect like terms to solve linear equations in one variable that contain rational numbers as coefficients. Use an equivalent equation of the form $x = a$, $a = a$, or $a = b$ (where a and b are different numbers) to describe the number of solutions.
● 8.EE.C.8. Analyze and solve pairs of simultaneous linear equations. 8.EE.C.8a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. 8.EE.C.8b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* 8.EE.C.8c. Solve real-world and	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): ● Simultaneous linear equations may have an infinite number of solutions. ● Simultaneous linear equations may have no solution or a single solution. ● Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs. Students will be able to: ● solve systems of two linear equations in two variables algebraically. ● estimate solutions of a linear system of two equations by graphing. ● solve simple cases of a linear system of two equations by inspection. ● solve real-world and mathematical problems leading to two linear equations in two variables. Learning Goal 7: Solve systems of linear equations in two variables algebraically and by inspection. Estimate solutions by graphing, explain that points of intersection satisfy both equations simultaneously, and interpret solutions

mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*		in context.

Unit 2 Grade 8 What This May Look Like	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Exit Slips *Class Assignments* *Homework* *Extended Response* *Teacher Observations* *Reflex Math* *Warm-ups* *Mini Quizzes* *Proficiency Scales*	*MAP Assessment* *Link it Testing* *End of Unit Assessment*

Focus Mathematical Concepts

Prerequisite skills: Represent proportional relationships by equations. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.
Include use of coordinates and absolute value to find distances between points with the same first coordinate. Students should be able to solve two step equations and combine like terms. Students should be able to create an expression or equation from a description or table.

Common Misconceptions: Some students will mix up x- and y-axes on the coordinate plane, or mix up the ordered pairs. Students commonly think that vertical lines are linear functions. Students may misunderstand what the graph represents in context. Students commonly mislabel a table as a function, because they mix up the inputs and outputs. Students think that variables always have one specific value. Students believe the variable is always on the left side of the equation. Students commonly combine unlike terms such as 5x+ 2y. When students are simplifying expression with the distributive property, students commonly don't multiply and show $x \cdot x = x\ 2$. As students begin to build and work with expressions containing more than two operations, students tend to set aside the order of operations. When moving terms to one side of the equal sign, students may forget to place a zero on one side of the equal side. Students may confuse when to combine like terms and when to use inverse operations. Students commonly forget that the negative sign in front of

a variable is really a coefficient of -1. When solving equations, some students may think x=0 means there are zero solutions. Students forget to combine like numbers to write the equation in slope intercept form. Students confuse one-variable and two-variable equations. Students commonly think that vertical lines are linear functions. Some students will mix up x- and y-axes on the coordinate plane, or mix up the ordered pairs. Students often confuse a recursive rule with an explicit formula for a function. Students mistakenly believe that linear functions (with a constant rate of change) are the only type of functions. Students commonly do not recognize a constant rate of change when entries in a table are absent.

Students frequently attempt to "solve" expressions. When solving systems of equations, students may not realize a solution to a system is an ordered pair and will stop after finding one variable.

District/School Tasks	**District/School Primary and Supplementary Resources**
Things to add throughout the year: *Number/Pattern talks* *Which One Doesn't Belong* *Exit Tickets* *Questioning (specific questions, anticipated responses both correct and incorrect)* *Warm-ups* *Error Analysis* *Performance Tasks* *3-ACT tasks* *Launch – Explore – Summarize Tasks* *Reteach Worksheets*	*Websites:* *http://www.mymathuniverse.com/digitsSNP* *www.brainpop.com* *www.illustractivemathematics.org* *http://www.mathpickle.com Grade K to 12 math games and puzzles* *www.illuminations.nctm.org* *http://www.estimation180.com 180 days of estimation problems* *www.commoncoresheets.com* *Georgiastandards.org* *https://njctl.org New Jersey Center for Teaching & Learning* *www.achievethecore.com* *http://www.khlanacademy.org/commoncore.com* *http://www.mathtalks.net/ - number and pattern talks* *http://www.diagnosticquestions.com– hinge questions* *https://tedd.org/mathematics/ - https://www.engageny.org/common-core-curriculum* *Additional Resources:* *Interactive Notebook* *Common Core State Standards Flip Book* *Go Math; my.hrw.com (Lawnside and Haddon Heights)* *Big Ideas Math bigideasmath.com/ (Merchantville)*

Interdisciplinary Connections		
ELA		**Science**

SL.6-8.1 SL.6-8.4 SL.6-6.5 SL.6-8.6		MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave

21st Century Skills/Career Education	**Technology**	
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. 9.1.8B1 9.2.8A1 9.2.8E2 9.2.8E3 9.2.8E4 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. 9.1.8.B.6 9.1.8.F.1 9.2.8.B.3 9.2.8.B.7 9.3.12.AR-JB.3 9.3.GV.1 9.3.GV-FIR.1 9.3.GV-GOV.1 9.3.GV-GOV.2 9.3.GV-GOV.3 9.3.GV-SEC.4	8.1.8.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations. - Understand and use technology systems. - Select and use applications effectively and productively. 8.1.8.D.1 to 5 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behavior. - Advocate and practice safe, legal, and responsible use of information and technology. - Demonstrate personal responsibility for lifelong learning. - Exhibit leadership for digital citizenship. 8.1.8.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. - Plan strategies to guide inquiry. - Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. - Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. - Process strategies to guide inquiry.	

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

9.3.IT.4 9.3.IT-WD.10 9.3.ST.2 9.3.ST.6 9.3.ST-ET.1 9.3.ST-SM.4		

Modifications and Accommodations		
Special Education Students	**English Language Learners**	**Students at Risk of School Failure**
small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system TPR Total Physical Response	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system
Gifted and Talented	**Students with 504 Plans**	
extension project leveled text leadership roles intentional grouping targeted learning from assessment DOK higher order questions Blooms - analyze, evaluate, create	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise)	

	provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	

Unit Duration: Instructional Days
How long will the unit take to complete? 42 days

Unit 3 Grade 8		
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**
● 8.EE.A.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. ● 8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): ● Square root and cube roots; perfect squares and perfect cubes ● Inverse relationship between powers and square roots Students are able to: ● give the value of square roots of small perfect squares. ● solve equations of the form $x^2 = p$, where p is a positive rational number. ● use the square root symbol to represent solutions to equations of the form $x^2 = p$. ● give the value of cube roots of small perfect cubes. ● solve equations of the form $x^3 = p$, where p is a positive rational number. ● use the cube root symbol to represent solutions to equations of the form $x^3 = p$. ● show or explain that √2 is an irrational number. ● use volume formulas to find a single unknown dimension of cones, cylinders and

		spheres when solving real world problems. Learning Goal 1: Evaluate square roots and cubic roots of small perfect squares and cubes respectively and use square and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ where p is a positive rational number; identify $\sqrt{2}$ as irrational. Learning Goal 2: Apply the formula for the volume of a cone, a cylinder, or a sphere to find a single unknown dimension when solving real-world and mathematical problems.
● 8.G.B.6. Explain a proof of the Pythagorean Theorem and its converse.	MP.2 Reason abstractly and quantitatively.	Concept(s): ● Pythagorean Theorem ● If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle (Pythagorean theorem converse). Students are able to: ● given a proof of the Pythagorean theorem, explain the proof. ● given a proof of the converse of the Pythagorean theorem, explain the proof. Learning Goal 3: Explain a proof of the Pythagorean Theorem and its converse.
● 8.G.B.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: ● determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems involving two dimensional spaces. ● determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems involving three dimensional spaces. Learning Goal 4: Apply the Pythagorean Theorem to determine unknown side lengths of right triangles in two and three dimensional cases when solving

		real-world and mathematical problems.
• 8.G.B.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • determine the distance between two points in a coordinate plane by drawing a right triangle and applying the Pythagorean Theorem. Learning Goal 5: Use the Pythagorean Theorem to determine the distance between two points in the coordinate plane.
• 8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations: 8.G.A.1a. Lines are transformed to lines, and line segments to line segments of the same length. 8.G.A.1b. Angles are transformed to angles of the same measure. 8.G.A.1c. Parallel lines are transformed to parallel lines.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • A property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged. Students are able to: • show and explain that performing rotations, reflections, and translations on lines results in a line. • show and explain that performing rotations, reflections, and translations on line segments results in a line segment and does not alter the length of the line segment. • show and explain that performing rotations, reflections, and translations on angles results in an angle and does not alter the measure of the angle. • show and explain that performing rotations, reflections, and translations on parallel lines results in parallel lines. • explain that a property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged. Learning Goal 6: Explain and model the properties of rotations, reflections, and translations with physical representations and/or geometry software using pre-images and resultant images of lines, line segments, and

		angles.
● 8.G.A.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): ● A two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Students are able to: ● given two congruent figures, describe a transformation or sequence of transformations that shows the congruence between them. Learning Goal 7: Describe and perform a sequence of rotations, reflections, and/or translations on a two dimensional figure in order to prove that two figures are congruent.
● 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning. of others. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: ● describe, using coordinates, the resulting two-dimensional figure after applying dilations with scale factor greater than, less than, and equal to 1. ● describe, using coordinates, the resulting two-dimensional figure after applying translation, rotation, and reflection. Learning Goal 8: Use the coordinate plane to locate images or pre-images of two-dimensional figures and determine the coordinates of a resultant image after applying dilations, rotations, reflections, and translations.
● 8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): ● A two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. ● Congruent figures are also similar. Students are able to: ● describe a transformation or sequence of transformations that show the similarity

between them.		between them given two similar two-dimensional figures. Learning Goal 9: Apply an effective sequence of transformations to determine that figures are similar when corresponding angles are congruent and corresponding sides are proportional. Write similarity statements based on such transformations.
• 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning. of others.	Concept(s): No new concept(s) introduced Students are able to: • give informal arguments to establish facts about the angle sum of triangles. • give informal arguments to establish facts about exterior angles of triangles. • give informal arguments to establish facts about the angles created when parallel lines are cut by a transversal. • give informal arguments to establish the angle-angle criterion for similarity of triangles. Learning Goal 10: Give informal arguments to justify facts about the exterior angles of a triangle, the sum of the measures of the interior angles of a triangle, the angle-angle relationship used to determine similar triangles, and the angles created when parallel lines are cut by a transversal.

Unit 3 Grade 8 What This May Look Like	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Exit Slips *Class Assignments* *Homework* *Extended Response* *Teacher Observations* *Reflex Math* *Warm-ups* *Mini Quizzes*	*MAP Assessment* *Link It Testing* *End of Unit Assessment*

Proficiency Scales	

Focus Mathematical Concepts

Prerequisite skills: A solid understanding for the following: multiply fractions, finding square roots and cube roots, vertical line is the y-axis, horizontal line is the x-axis, x and y values, input and output, y-intercept, absolute value and slope. Understand the coordinate plane including knowing the 4 quadrants. Understanding parallel lines. Reasoning skills. Following a set of directions and substitute numbers in a formula. Students should be familiar with complementary, supplementary, and vertical angles.
Common Misconceptions: Square Root: Students may only express the positive square root in the solution. Emphasize that students must write the ± symbol when they take the square root of each side. Cube root: Some students may want to write a negative symbol in front of the cube root symbol instead of inside it. Explain that the cube root is of the entire number, including the negative. Some students may think they need both positive and negative solutions, which is true for square roots (and other even roots).
Pythagorean Theorem: Students may not be able to recall the exact name or meaning of each of the properties needed for the Pythagorean Theorem. Students need to be reminded of the keywords from the properties to connect them to the correct operation at each stage of the proof.
Students need to be reminded that c, and not c^2, represents the hypotenuse length. Also, to solve for c, you take the square root of each side. Some students may try to divide by 2. Students may think when taking the square root of a^2 + b^2, they may use a process similar to the distributive property and take the square roots of the numbers individually.
Students used right triangles to find the slope of a line. You may want to distinguish between the slope of a line and the distance between points on a line.
Properties of Rotations, reflections and translations: When students write rules, make sure they write the expression for each coordinate from the original to the image rather than the other way around. Reinforce the importance of consistency. Show students how reversing the direction leads to very different results.

Reflections: Review the properties of vertical and horizontal lines to help students understand the changes in x- and y-coordinates when a figure is reflected across a line. Rotations: Students need to be reminded that positive rotations move counterclockwise. Imagine the hour hand of a clock
moving backwards--this is the direction of the rotation. To help them remember, point out that there is a connection between the direction of rotations and the order of quadrants on the coordinate plane (I, II, III, IV).
Congruence: Disregarding how the shapes are labeled could lead to the wrong transformation or combination of transformations. Remind
students to read the vertices very carefully before mapping.
Volume: Encourage students to check their answers to be sure they did not make an error. Some students may substitute the wrong measurement in a particular place.

District/School Tasks	**District/School Primary and Supplementary Resources**
Things to add throughout the year: *Number/Pattern talks* *Which One Doesn't Belong* *Exit Tickets* *Questioning (specific questions, anticipated responses both correct and incorrect)* *Warm-ups* *Error Analysis*	*Websites:* *http://www.mymathuniverse.com/digitsSNP* *www.brainpop.com* *www.illustractivemathematics.org* *http://www.mathpickle.com Grade K to 12 math games and puzzles* *www.illuminations.nctm.org* *http://www.estimation180.com 180 days of estimation problems*

Performance Tasks *3-ACT tasks* *Launch – Explore – Summarize Tasks* *Reteach Worksheets*	*www.commoncoresheets.com* *Georgiastandards.org* *https://njctl.org New Jersey Center for Teaching & Learning* *www.achievethecore.com* *http://www.khlanacademy.org/commoncore.com* *http://www.mathtalks.net/ - number and pattern talks* *http://www.diagnosticquestions.com– hinge questions* *https://tedd.org/mathematics/ - https://www.engageny.org/common-core-curriculum* *Additional Resources:* *Interactive Notebook* *Go Math; my.hrw.com (Lawnside and Haddon Heights)* *Big Ideas Math bigideasmath.com/ (Merchantville)*

Interdisciplinary Connections		
ELA L.6-8.1 L.6-8.6 SL.6-8.1 SL.6-8.4 SL.6-6.5 SL.6-8.6		**Science** MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

21st Century Skills/Career Education	**Technology**	
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.	8.1.8.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations. - Understand and use technology systems. - Select and use applications effectively and productively. 8.1.8.D.1 to 5 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behavior.	

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

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. 9.1.8.B.6 9.1.8.F.1 9.2.8.B.3 9.2.8.B.7 9.3.12.AR-JB.3 9.3.GV.1 9.3.GV-FIR.1 9.3.GV-GOV.1 9.3.GV-GOV.2 9.3.GV-GOV.3 9.3.GV-SEC.4 9.3.IT.4 9.3.IT-WD.10 9.3.ST.2 9.3.ST.6 9.3.ST-ET.1 9.3.ST-SM.4	- Advocate and practice safe, legal, and responsible use of information and technology. - Demonstrate personal responsibility for lifelong learning. - Exhibit leadership for digital citizenship. 8.1.8.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. - Plan strategies to guide inquiry. - Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. - Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. - Process strategies to guide inquiry.	

Modifications and Accommodations		
Special Education Students	**English Language Learners**	**Students at Risk of School Failure**
small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking	small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking

leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system TPR Total Physical Response	leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system
Gifted and Talented extension project leveled text leadership roles intentional grouping targeted learning from assessment DOK higher order questions Blooms - analyze, evaluate, create	**Students with 504 Plans** small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	

Unit Duration: Instructional Days
How long will the unit take to complete? 42 days

Unit 4 Grade 8		
Content Standards	**Suggested Standards for Mathematical**	**Critical Knowledge & Skills**

	Practice	
• 8.SP.A.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	MP.3 Construct viable arguments and critique the reasoning. of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Association in data (bivariate measurement data) Students are able to: • construct and interpret scatter plots. • analyze patterns of association between the two quantities represented in a scatter plot. • describe clustering, outliers, positive or negative association, linear or non-linear association when explaining patterns of association in a scatter plot. Learning Goal 1: Construct and interpret scatter plots for bivariate measurement data and describe visual patterns of association (clusters, outliers, positive or negative association, linear association and nonlinear association, strong, weak, and no association).
• 8.SP.A.2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.	MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Straight lines are used to model *approximately* linear relationships between quantitative variables. Students are able to: • informally fit a line (of best fit) to a scatter plot that suggests a linear association. • informally assess the model's fit by judging the closeness of the data points to the line (line of best fit). Learning Goal 2: For scatter plots that suggest a linear association, informally fit a straight line and informally assess the model's fit.
• 8.SP.A.3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and	MP.2 Reason abstractly and quantitatively.	Concept(s): No new concept(s) introduced Students are able to:

intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	MP.4 Model with mathematics. MP.6 Attend to precision. MP.7 Look for and make use of structure.	• given the equation for a linear model (line of best fit), interpret the slope and intercept. • given the equation for a linear model, solve problems in the context of measurement data. Learning Goal 3: Use a linear model (equation) representing measurement data to solve problems, interpreting the slope and intercept in the context of the situation.
• 8.SP.A.4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Categorical data: patterns of association can also be observed in bivariate categorical data through analyzing two-way tables containing frequencies or relative frequencies. Students are able to: • construct and interpret a two-way frequency table containing data on two categorical variables. • construct and interpret a two-way relative frequency table containing data on two categorical variables. • describe any association between the two categorical variables using relative frequencies calculated for rows or columns. Learning Goal 4: Construct two-way frequency tables and two-way relative frequency tables, and describe possible associations between two variables.
• 8.F.B.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • As with equations, two (x,y) values can be used to construct a function. Students are able to: • construct a function in order to model a linear relationship. • interpret the rate of change and initial value of a linear function in context.

function in terms of the situation it models, and in terms of its graph or a table of values.		Learning Goal 5: Model a linear relationship by constructing a function from two (x,y) values. Interpret the rate of change and initial value of the linear function in terms of the situation it models, and in terms of its graph or a table of values.
• 8.G.B.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. • 8.G.B.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems in two and three dimensions. • determine the distance between two points in a coordinate plane by applying the Pythagorean Theorem. Learning Goal 6: Apply the Pythagorean Theorem to determine unknown side lengths of right triangles in two and three dimensions to solve real-world and mathematical problems and to determine the distance between two points in the coordinate plane.
• 8.EE.C.8. Analyze and solve pairs of simultaneous linear equations. 8.EE.C.8c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.1 Make sense of problems and persevere in solving them. MP.7 Look for and make use of structure.	Concept(s): • Simultaneous linear equations may have an infinite number of solutions. • Simultaneous linear equations may have no solution or a single solution. • Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs. Students will be able to: • solve systems of two linear equations in two variables algebraically. • estimate solutions of a linear system of two equations by graphing. • solve simple cases of a linear system of two equations by inspection. • solve real-world and mathematical problems leading to two linear equations in two variables. Learning Goal 7: Solve real world and mathematical problems leading to two linear

		equations in two variables, interpreting solutions in context.

Unit 4 Grade 8 What This May Look Like	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Exit Slips *Class Assignments* *Homework* *Extended Response* *Teacher Observations* *Reflex Math* *Warm-ups* *Mini Quizzes* *Proficiency Scales*	*MAP Assessment* *Link It Testing* *End of Unit Assessment*

Focus Mathematical Concepts
Prerequisite skills: A solid understanding of the following: x and y values, y-intercept, function, slope (positive & negative), constant rate of change, percents, reading tables and graphs. Interpret and analyse information from a graph, equation or table. *Common Misconceptions: When making scatter plots, line graphs, or bar graphs, students need to be reminded to put the dates or times on the x-axis. The reason for this is because the time is the independent variable, and the independent variable goes on the x-axis. Students may reverse the coordinates while finding the slope. Encourage them to find the change in y-coordinates in the same order they find the change in x-coordinates. When creating a line of best fit, students may think the line needs to go through as many points as possible rather a best representation. Students may substitute the values given to the wrong variable. Have students write down what quantity each variable represents using the axis labels on the scatter plot. Categorical Data: Emphasize that numbers without units are likely to be categorical data.*

District/School Tasks	District/School Primary and Supplementary Resources
Things to add throughout the year: *Number/Pattern talks* *Which One Doesn't Belong* *Exit Tickets* *Questioning (specific questions, anticipated responses both correct and incorrect)* *Warm-ups*	*Websites:* *http://www.mymathuniverse.com/digitsSNP* *www.brainpop.com* *www.illustractivemathematics.org* *http://www.mathpickle.com Grade K to 12 math games and puzzles* *www.illuminations.nctm.org*

Error Analysis *Performance Tasks* *3-ACT task* *Launch – Explore – Summarize Tasks* *Reteach Worksheets*	*http://www.estimation180.com 180 days of estimation problems* *www.commoncoresheets.com* *Georgiastandards.org* *https://njctl.org New Jersey Center for Teaching & Learning* *www.achievethecore.com* *http://www.khlanacademy.org/commoncore.com* *http://www.mathtalks.net/ - number and pattern talks* *http://www.diagnosticquestions.com– hinge questions* *https://tedd.org/mathematics/ - https://www.engageny.org/common-core-curriculum* *Additional Resources:* *Interactive Notebook* *Common Core State Standards Flip Book* *Go Math; my.hrw.com (Lawnside and Haddon Heights)* *Big Ideas Math bigideasmath.com/ (Merchantville)*

Interdisciplinary Connections		
ELA		**Science**
RH.6-8.1 RH.6-8.2 RH.6-8.7 RH.6-8.9 RH.6-8.10 WHST.6-8.1.A to E WHST.6-8.2 WHST.6-8.2.a. WHST.6-8.2.b WHST.6-8.2.c WHST.6-8.4 WHST.6-8.6 WHST.6-8.7 WHST.6-8.8 WHST.6-8.9		K-2ETS1-1 2-ESS2-2 2-ESS2-3 3-ESS3-2 3-LS4-4 3-ESS2-1 3-ESS2-2 3-ESS3-1 3-5ETS1-1 3-5ETS1-2 3-5ETS1-3 4-PS3-4 4-ESS2-1 4-ESS2-2

L.6-8.1 L.6-8.6 SL.6-8.1 SL.6-8.4 SL.6-6.5 SL.6-8.6		

21st Century Skills/Career Education	**Technology**	
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. 9.1.8.B.6 9.1.8.F.1 9.2.8.B.3 9.2.8.B.7 9.3.12.AR-JB.3 9.3.GV.1 9.3.GV-FIR.1 9.3.GV-GOV.1 9.3.GV-GOV.2 9.3.GV-GOV.3 9.3.GV-SEC.4 9.3.IT.4 9.3.IT-WD.10 9.3.ST.2	8.1.8.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations. - Understand and use technology systems. - Select and use applications effectively and productively. 8.1.8.D.1 to 5 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behavior. - Advocate and practice safe, legal, and responsible use of information and technology. - Demonstrate personal responsibility for lifelong learning. - Exhibit leadership for digital citizenship. 8.1.8.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. - Plan strategies to guide inquiry. - Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. - Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. - Process strategies to guide inquiry.	

9.3.ST.6 9.3.ST-ET.1 9.3.ST-SM.4		

Modifications and Accommodations		
Special Education Students small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	**English Language Learners** small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system TPR Total Physical Response	**Students at Risk of School Failure** small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system
Gifted and Talented extension project leveled text leadership roles intentional grouping targeted learning from assessment DOK higher order questions Blooms - analyze, evaluate, create	**Students with 504 Plans** small group/intentional grouping preferred seating direct instruction provide background knowledge provide individual/small group assistance provide student friendly definitions for vocabulary modified assignments (reduce/revise) provide notes/study guides restate/rephrase graphic organizers, labels, word banks	

	visuals chunking leveled text read text, use audio when available kinesthetic activities extended time breaks check-in/check-out system	

Unit Duration: Instructional Days
How long will the unit take to complete? 42 days