Audubon Public Schools

Grade 8: Math

Curriculum Guide

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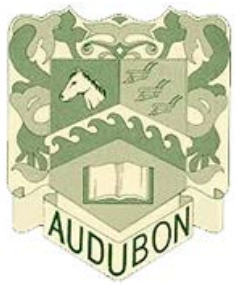

Course Description

Grade 8: Math

In addition to strengthening skills previously covered, this course will help students to think mathematically and to understand the basic structure of mathematics through experience with an appreciation of abstract concepts. This course is also designed to help students develop an ever increasing proficiency in the application of mathematics and prepare them for successful experiences in both algebra and geometry. The content of this course introduces a new language which is used to develop an understanding of the basic structure of the real number system. Topics included are sets, integers, equations and inequalities, polynomials, irrational numbers and graphing. This course will also help students develop an ever increasing proficiency in the application of mathematics and prepare them for successful experiences in both algebra and geometry and on the State mandated PARCC Algebra 1 exam at the end of this course

Overview / Progressions

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1	● 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 ● 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.4 Model with mathematics. MP.5 Use appropriate tools strategically.
Unit 2	● 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	MP. 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.

		simultaneous linear equations	MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	
Unit 3	● 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 ● 8.G.A.3 ● 8.G.A.4 ● 8.G.A.5	● 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	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. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	
Unit 4	● 8.EE.B5 ● 8.SP.A.1 ● 8.SP.A.2 ● 8.SP.A.3 ● 8.SP.A.4	● Investigate patterns of association in bivariate data	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6	

	• 8.F.B.4* • 8.G.B.8* • 8.EE.C.8c*	• Use functions to model relationships between quantities • Construct and analyze scatterplots	Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning	

Subject: Math	**Grade: 8**	**Unit: 1**	**1st Marking Period**
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,	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	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.	

cylinders, and spheres and use them to solve real-world and mathematical problems.	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.	• 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 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 repeated reasoning.	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 4.1×10^{-2}). 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	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.

decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.		• 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., $\square^2$). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ 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	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools	Concept(s): • Quantitative relationships can be represented in different ways. Students are able to: • graph 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.*	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.	• 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.

Formative Assessments	Summative Assessments
• Quick Writing • Whiteboard work	• Test • Midterm

• Mathematical Discourse Questions • Exit tickets • Checks for Understanding • Quizzes • Small group activities • Standard Mastery on I Ready • ● Growth Monitoring on I Ready • ● Diagnostic Assessments on I Ready • ● Pre-Assessment • ● Teacher's observation	• Paper • Common Assessment • Post Unit Assessment • Benchmark • Standardized Testing
Suggested Primary Resources	**Suggested Supplemental Resources**
Exemplar tasks or illustrative models could be provided. *PARCC Released Items:* *https://prc.parcconline.org/assessments/parcc-released-items* *PARCC Practice Tests Unit 1 : TestNav* *https://parcctrng.testnav.com/client/index.html#login?username=17MT08PTOE01010 100&password=PCPRACTICE*	*District/school resources and supplementary resources that are texts as well as digital resources used to support the instruction.* *digits online* *http://mymathuniverse.com/digitsREALIZE*
Cross-Curricular Connections & 21st Century Skills	
• Open ended math problems using language from ELA • The math of physical science	

Essential Questions	
What is the difference between rational and irrational? Between which 2 whole numbers does the number fall? Find the perimeter of a square given the area is an irrational number? Approximate the value and display on a number line.	

Subject: Math	Grade: 8	Unit 2 1st/2nd Marking period
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	MP.2 Reason abstractly and quantitatively.	Concept(s): • A linear function is defined by the equation $y = mx + b$.

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.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	• 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 non-linear. • 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 non-linear 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 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.	MP.6 Attend to precision. MP.2 Reason abstractly and quantitatively. 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: • 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 non-linear). • 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. 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	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. 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.

expressions using the distributive property and collecting like terms.		
• 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 mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether*	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 in context.

the line through the first pair of points intersects the line through the second pair.		

Formative Assessments	Summative Assessments
● Mathematical Discourse Questions ● Exit tickets ● Checks for Understanding ● Quizzes ● Small group activities ● Standard Mastery on I Ready ● Growth Monitoring on I Ready ● Diagnostic Assessments on I Ready ● Pre-Assessment ● Teacher's observation	● Post Unit Assessment ● Benchmark ● Standardized Testing

Suggested Primary Resources	Suggested Supplemental Resources
Exemplar tasks or illustrative models could be provided. *PARCC Released Items:* *https://prc.parcconline.org/assessments/parcc-released-items* *PARCC Practice Tests Unit 1 : TestNav* *https://parcctrng.testnav.com/client/index.html#login?username=17MT08PTOE01010 100&password=PCPRACTICE*	*District/school resources and supplementary resources that are texts as well as digital resources used to support the instruction.* *digits online* *http://mymathuniverse.com/digitsREALIZE*

Cross-Curricular Connections & 21st Century Skills
● Open ended math problems using language from ELA

- The math of physical science

Essential Questions	
How can we solve linear equations in one variable for one solution, no solution, or infinitely many solutions? How can we multiply and divide numbers with exponents? Why do we need to use scientific notation? Why would we need to use roots? How can a linear system be used to find multiple unknowns?	

Subject: Math	Grade:8	Unit 3 2nd/3rd Marking period
• 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 $\sqrt{2}$ 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 $\sqrt{2}$ 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 between them.	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 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. *r 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.

Formative Assessments	Summative Assessments
● Mathematical Discourse Questions ● Exit tickets ● Checks for Understanding ● Quizzes ● Small group activities ● Standard Mastery on I Ready ● Growth Monitoring on I Ready ● Diagnostic Assessments on I Ready ● Pre-Assessment ● Teacher's observation	● Post Unit Assessment ● Benchmark ● Standardized Testing

Suggested Primary Resources	Suggested Supplemental Resources
Exemplar tasks or illustrative models could be provided. *PARCC Released Items:* *https://prc.parcconline.org/assessments/parcc-released-items*	*District/school resources and supplementary resources that are texts as well as digital resources used to support the instruction.* *digits online* *http://mymathuniverse.com/digitsREALIZE*

PARCC Practice Tests Unit 1 : TestNav *https://parcctrng.testnav.com/client/index.html#login?username=17MT08PTOE01010 100&password=PCPRACTICE*	

Cross-Curricular Connections & 21st Century Skills
• Open ended math problems using language from ELA • The math of physical science

Essential Questions	
When can the Pythagorean theorem be applied? What is the sum of the interior angles of a specific polygon? What is the sum of the angles in a triangle? What are vertical angles? What is a linear pair? Are the lines parallel or perpendicular? How do we determine the missing side of a right triangle?	

Subject: Math	Grade: 8th	Unit 4: 4th Marking Period
• 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	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).

closeness of the data points to the line.		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 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.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • 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*	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.

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?		
• 8.F.B.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	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. 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	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

between two points in a coordinate system.		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.

Formative Assessments	Summative Assessments
● Mathematical Discourse Questions ● Exit tickets ● Checks for Understanding ● Quizzes ● Small group activities	● Post Unit Assessment ● Benchmark ● Standardized Testing

● Standard Mastery on I Ready ● Growth Monitoring on I Ready ● Diagnostic Assessments on I Ready ● Pre-Assessment ● Teacher's observation	

Suggested Primary Resources	Suggested Supplemental Resources
Exemplar tasks or illustrative models could be provided. *PARCC Released Items:* *https://prc.parcconline.org/assessments/parcc-released-items* *PARCC Practice Tests Unit 1 : TestNav* *https://parcctrng.testnav.com/client/index.html#login?username=17MT08PTOE01010 100&password=PCPRACTICE*	*District/school resources and supplementary resources that are texts as well as digital resources used to support the instruction.* *digits online* *http://mymathuniverse.com/digitsREALIZE*

Cross-Curricular Connections & 21st Century Skills
● Open ended math problems using language from ELA ● The math of physical science

Essential Questions	
What is the best way to determine a line of best fit? How can we use scatter plots to identify patterns?	

Insert following units.

Appendix A

Unit 1

Audubon Public Schools
Engaging Students ~ Fostering Achievement ~ Cultivating 21st Century Global Skills
Written By: Bill Scully

Course Title: Grade 8 Math **Unit Name: Number System** **Grade Level: 8**

Content Statements This unit covers rational numbers including how to represent them using a decimal. It also covers Irrational numbers, and ways to estimate the value of irrational numbers	**NJSLS** 8.NS.1, 8.NS.2
Overarching Essential Questions How can we represent this decimal as a fraction? How can we determine the percent of change?	**Overarching Enduring Understandings** We use numbers in almost every area of mathematics. This will serve as a basis for further courses.

Unit Essential Questions What are rational numbers? What are irrational numbers? How can we estimate the value of expressions? How does the area of a square relate to the square of a number? The area determines the perfect square number. If it is not a perfect square, the area provides a means for estimation. Why do numbers have both positive and negative roots? The square root of a number is any number which when multiplied by itself equals the number. A product, when multiplying two positive factors, is always the same as the product when multiplying their opposites (e.g., $7 \cdot 7 = 49$ and 77 How are the real numbers related? Some numbers can appear in more than one subset (e.g., 4 is an integer, a whole number, a counting or natural number, and a rational number.). The attributes (characteristics) of one subset can be contained in whole or in part in another subset. What is the role of the order of operations when simplifying numerical expressions? The order of operations prescribes the order to use to simplify a numerical expression. How does the different ways rational numbers can be represented help us compare and order rational numbers?	**Unit Enduring Understandings** Rational numbers are the numbers we use every day as part of the real number system. Irrational numbers consist of all the numbers that cannot be expressed as a fraction of integers. To estimate the value of an expression with an irrational number, substitute the irrational number with its approximate decimal value, to the nearest hundredth. Use rational numbers to approximate irrational numbers, locate irrational numbers on a number line, and estimate the value of expressions containing irrational numbers.

Key Vocabulary Consecutive Negative Root Positive Root Square Root Irrational Number Rational Number Perfect Square	

Unit Rationale	**Unit Overview**
Numbers are everywhere in the world, this unit will show how to use numbers in real situations and use the numbers to solve problems.	Develop number sense and the ability to represent and use numbers in a variety of formats
Activities: Plickers Quizlet & Quizlet Live Kahoot Desmos- Polygraph rational Desmos-Polygraph irrational Desmos- decimal challenge	**Suggested Timeline:** 3 weeks Topic 1: Rational and Irrational Numbers

Teacher notes and Elaborations

For percent increase the change will result in a positive number. Percent decrease determines the rate of decline and may be calculated using the same ratio as percent increase. However, the change will result in a negative number (e.g., a 12% decrease is equal to -12%).

A proportion is an equation stating that two ratios are equal.
Ratios are part of a large web of mathematical concepts and skills known as proportional reasoning that make use of ideas from multiplication, division, fractions, and measurement.
Proportional reasoning is the ability to make and use multiplicative comparisons among
Use newspaper advertisements to compare items on sale and determine the best buy.
Use menus to find the cost of a meal for you and a friend, including sales tax and tip.
Students can compare the difference of paying cash for item to the cost of buying the item on credit.
Write simple computer programs or use spreadsheets to show such things as salary for a month with commission and total price with tax.

Given an order form from a catalog, have the student order 2 to 5 items from the catalog, compute the sales tax, read the table to find the shipping and handling, and compute the final price.
Use practical exercises so that students come to recognize that ratios are not directly measurable, but that they contain two units and that the order of the items in the ratio pair of a proportion is critical. Twenty-three persons per square mile is different from 23 square miles per person. They need to understand the multiplicative nature of ratios to avoid such mistakes as, 18 boys:15 girls = 19 boys:16 girls, and to recognize non examples of ratios. For instance, doubling linear dimensions does not double area.
Students should begin to build other major ideas, including proportion and slope. Ratios themselves can be extended to include more than two numbers, as in a recipe that has five ingredients

Teacher Notes and Elaborations:
The square root of a number is any number which when multiplied by itself equals the number. Whole numbers have both positive and negative roots. The square root of 36 is 6 and 6 , where 6 is the positive root and 6 is the negative root. This can be expressed as (±6 is read as “plus or minus 6”).
A perfect square is a whole number whose square root is an integer (e.g., The square root of 25 is 5 and 5 ; thus, 25 is a perfect square.). The product of an integer and itself is a perfect square. Students can use grid paper and estimation to determine what is needed to build a perfect square.
The set of rational numbers includes the set of all numbers that can be expressed as fractions in the form a/b,where $b \neq 0$ (e.g., 25,1,-4, 2.3 , 75%, 4.59).
Consecutive terms immediately follow each other in some order. For example 5 and 6 are consecutive whole numbers. Any whole number other than a perfect square has a square root that lies between two consecutive whole numbers. The square root of a whole number that is not a perfect square is an irrational number (e.g., 2 is an irrational number). An

irrational number cannot be expressed exactly as a ratio (fraction). Estimation can be used to express a non-perfect square root to the nearest whole number (e.g., 11 is between 9 and 16. The 11 is a little more than 3 because 11 is closer to 9 than to 16. Therefore 11 estimated to the nearest whole number is 3

Unit 2

Audubon Public Schools

Engaging Students ~ Fostering Achievement ~ Cultivating 21st Century Global Skills
Written By: Bill Scully
Course Title: Grade 8 Math Unit Name: Expressions and Equations Grade Level: 8

Content Statements Solve linear equations in one variable for a solution. Simplifying expressions with exponents and numbers in scientific notation. Solve equations by writing equivalent equations and find the solutions for equations with two variables.	**NJSLS** **8.EE.1, 8.EE.3, 8.EE.4, 8.EE.7a, 8.EE.7b, 8.EE.2, 8.EE.6, 8.EE.5, 8.EE.8a, 8.EE.8b, 8.EE.8c**
Overarching Essential Questions How can we solve linear equations in one variable for one solution, no solution, or infinitely many solutions? How can we multiply and divide numbers with exponents? Why do we need to use scientific notation?	**Overarching Enduring Understandings** When solving a linear equation in one variable, isolate the variable by using inverse operations. When multiplying two numbers in scientific notation, multiply their coefficients and add their exponents.

Why would we need to use roots? How can a linear system be used to find multiple unknowns? Numbers can be represented as decimals, fractions, percents, and in scientific notation. It is often useful to convert numbers to be compared and/or ordered to one representation (e.g., fractions, decimals or percents). What is a rational number? A rational number is any number that can be written in fraction form. When are numbers written in scientific notation? **Key Vocabulary** absolute value algebraic expression coefficient evaluate exponent grouping symbols numerical expression order of operations perfect square radical simplify square root substitution variable	When dividing two numbers in scientific notation, divide their coefficients and subtract their exponents. You can use scientific notation to estimate certain measurements and how much bigger one measurement is in terms of another. You can use roots to solve equations where a variable is raised to a power. When solving a system of linear equations, graph the system to determine the intersecting solution. When solving a system of linear equations, use substitution and elimination to determine the intersecting solution by the use of inverse operations. When solving a special systems of linear equations, determine if the system has no solution or infinite amount of solutions.

Unit Essential Questions How can we solve for x? What are the different ways to solve an equation with the variable on both sides? How can tables, and graphs, and equations be used to represent verbal descriptions of quantitative relationships? How can the rate of change be found in various representations of linear data?	**Unit Enduring Understandings** Use algebra to model situations and answer questions about them.
Unit Rationale Students need to understand how to simplify expressions with exponents and numbers in scientific notation. They will see how linear equations can represent proportional and nonproportional relationships.	**Unit Overview** Develop the ability to employ the appropriate techniques for manipulating algebraic expressions and utilizing algebraic procedures.
Activities: Desmos - mini golf marble slides Desmos- graphing stories Desmos-systems of equations Desmos-racing dots Desmos-match my line Desmos-Picture perfect Desmos-t-shirt offers Desmos solving systems of equations Plickers	**Suggested Timeline:** 16 weeks Topic 2: Linear Equations in One Variable Topic 3: Integer Exponents Topic 4: Scientific Notation Topic 5: Proportional Relationships, Lines, and Linear Equations Topic 6: Systems of Two Linear Equations

Quizlet & Quizlet Live Kahoot Desmos-Lego prices(slope)	

Unit 3

Audubon Public Schools
Engaging Students ~ Fostering Achievement ~ Cultivating 21st Century Global Skills
Written By: Bill Scully
Course Title: Grade 8 Math Unit Name: Geometry Grade Level: 8

Content Statements	**NJSLS**
Examine the Pythagorean Theorem and identify a proof for it. Find the volumes of cones, cylinders and spheres. Transform figures using dilations, translations, rotations and reflections.	**8.G.7, 8.G.6, 8.G.9, 8.G.3, 8.G.8, 8.G.1c, 8.G.1a, 8.G.1b, 8.G.2, 8.G.4, 8.G.5,**
Overarching Essential Questions	**Overarching Enduring Understandings**
How can we determine the missing angles? What is the relationship between the different angles?	Geometry occurs in many situations, from architecture to floor patterns.

Unit Essential Questions	Unit Enduring Understandings
When can the Pythagorean theorem be applied? What is the sum of the interior angles of a specific polygon? What is the sum of the angles in a triangle? What are vertical angles? What is a linear pair? Are the lines parallel or perpendicular? How does the volume of a three-dimensional figure differ from its surface area? Volume is the amount a container holds. Surface area of a figure is the sum of the area on surfaces of the figure. How are the formulas for the volume of prisms and cylinders similar? In both formulas, the area of the base is multiplied by the height to find the volume. How are the formulas for the volume of cones and pyramids similar? What effect does changing one attribute of a rectangular prism by a scale factor have on the surface area of the prism? There is no direct relationship for surface area as there is for volume (e.g., If width triples, surface area will increase but it will not triple.). What effect does changing one attribute of a rectangular prism by a scale factor have on the volume of the prism? When the length, width or height of a rectangular prism is increased or decreased by a factor, the volume of the prism is also increased or decreased by that factor. How can the area of squares generated by the legs and the hypotenuse of a right triangle	The Pythagorean theorem can be applied to any right triangle? The sum of the interior angles of a polygon can be found by using the formula (n-2)*180, where n is the number of sides. Parallel lines never meet and perpendicular lines intersect at a right angle. A linear pair is to angles that form a straight line. **Teacher notes** How can the area of squares generated by the legs and the hypotenuse of a right triangle be used to verify the Pythagorean Theorem? For a right triangle, the area of a square with one side equal to the measure of the hypotenuse equals the sum of the areas of the squares with one side each equal to the measures of the legs of the triangle

be used to verify the Pythagorean Theorem? For a right triangle, the area of a square with one side equal to the measure of the hypotenuse equals the sum of the areas of the squares with one side each equal to the measures of the legs of the triangle How are vertical, adjacent, complementary and supplementary angles related? Adjacent angles are any two non-overlapping angles that share a common side and a common vertex. Vertical angles will always be nonadjacent angles. Supplementary and complementary angles may or may not be adjacent. What are the relationships between the angles formed when two parallel lines are cut by a transversal? When two parallel lines are cut by a transversal, several pairs of angles are formed. Pairs of alternate interior angles, and vertical angles are congruent. Adjacent angles, and same side (consecutive) interior angles are supplementary. **Key Vocabulary** angle of rotation center of rotation clockwise counterclockwise dilation image line of reflection orientation origin	

original figure preimage reflection rotation scale factor	
Unit Rationale Geometry is an essential life skill and can be used in many career fields. Geometry will be used determine how much material can fit in an object.	**Unit Overview** Students will examine the Pythagorean theorem and identify a proof for it. Students will also find the volumes of cones, cylinders, and spheres; examine congruent and similar figures.
Activities: Plickers Quizlet & Quizlet Live Kahoot Desmos-Exploring length with geoboards Desmos-Volume of a sphere Desmos-Polygraph triangles Desmos-Area vs perimeter	**Suggested Timeline/Content Structure:** 9 weeks Topic 9: Congruence Topic 10: Similarity Topic 11: Using the Pythagorean Theorem Topic 12: Surface Area and Volume

Teacher notes and Elaborations:

How can the area of squares generated by the legs and the hypotenuse of a right triangle be used to verify the Pythagorean Theorem?

For a right triangle, the area of a square with one side equal to the measure of the hypotenuse equals the sum of the areas of the squares with one side each equal to the measures of the legs of the triangle

Lines that have one and only one point in common are known as intersecting lines. When two lines intersect, four non-overlapping angles are formed.

Parallel lines are lines that are in the same plane and never intersect because they are always the same distance apart. They have no points in common. The symbol || indicates parallel lines.
Perpendicular lines are lines that intersect at right angles.
Two angles are congruent if they have the same measure.
A vertex is a common point to the two sides of an angle or a polygon.
When two lines intersect two types of angle pairs are formed: vertical angles and adjacent supplementary angles. Adjacent angles are any two non-overlapping angles that share a common side and a common vertex. Vertical angles are all nonadjacent angles formed by two intersecting lines. Vertical angles are congruent and share a common vertex. The adjacent angles are supplementary. Nonadjacent angles do not share a common side.
Complementary angles are any two angles such that the sum of their measures is 90°. When complementary angles are adjacent, they form a right angle. Supplementary angles are any two angles such that the sum of their measures is 180°. When supplementary angles are adjacent, they form a straight angle. A straight angle is an angle whose measure is 180º.
A transversal is a line that intersects two or more coplanar lines in different points forming 8 angles. Interior angles lie between the two lines. Alternate interior angles are on opposite sides of the transversal. Same side (consecutive) interior angles are on the same side of the transversal. Exterior angles lie outside the two lines. Alternate exterior angles are on opposite sides of the transversal.
If two parallel lines are cut by a transversal, then alternate interior angles are congruent. If two parallel lines are cut by a transversal, then same side(consecutive) interior angles are supplementary.
Given parallel lines and the transversal (t), students should identify, classify, and describe angle relationships
Parallel lines are lines that are in the same plane and never intersect because they are always the same distance apart. They have no points in common. The symbol || indicates parallel lines.
Perpendicular lines are lines that intersect at right angles.
Two angles are congruent if they have the same measure.
A vertex is a common point to the two sides of an angle or a polygon.

When two lines intersect two types of angle pairs are formed: vertical angles and adjacent supplementary angles. Adjacent angles are any two non-overlapping angles that share a common side and a common vertex. Vertical angles are all nonadjacent angles formed by two intersecting lines. Vertical angles are congruent and share a common vertex. The adjacent angles are supplementary. Nonadjacent angles do not share a common side. Complementary angles are any two angles such that the sum of their measures is 90°. When complementary angles are adjacent, they form a right angle. Supplementary angles are any two angles such that the sum of their measures is 180°. When supplementary angles are adjacent, they form a straight angle. A straight angle is an angle whose measure is 180º. A transversal is a line that intersects two or more coplanar lines in different points forming

Unit 4
Audubon Public Schools
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Written By: Bill Scully
Course Title: Grade 8 Math Unit Name: Functions Grade Level: 8

Content Statements Examine the inputs and outputs of a function; compare functions; define and evaluate functions. Systems of Equations	**NJSLS** 8.F.1, 8.F.3, 8.F.2, 8.F.4, 8.F.5,
Overarching Essential Questions What is a function?	**Overarching Enduring Understandings** Use functions to model relationships between quantities
Unit Essential Questions What is a Function? What is the difference between linear and nonlinear functions? How do you use two equations to solve for two variables? Use real-life situations where the rate is constant. Have students graph several points, determine the line, and then answer questions from the graph. Students may stack chairs or Styrofoam cups with a rim, measure the stacks as one more is added and keep a record of the heights. Then students will predict the height for a given number of cups or chairs, use words to describe the situation, and verify their work by comparing to the model. Students compare different pay scales, deciding which is a better deal. For example: Is it better to be paid a salary of $35.00 per week or to be paid $8.00 per hour? They will	**Unit Enduring Understandings** A function is one of the most important mathematical concepts in terms of its application in the real world. A function can be used to describe how changing one variable affects another variable. When a function is represented by a graph, a line represents a linear function and a curve represents a nonlinear function. An example would be how functions are used to tell the boiling point at water at different altitudes, the speed of a skydiver at different times in a freefall, or the amount of money earned after different amounts of time.

create a table comparing the pay for different numbers of hours worked and decide at what point the hourly rate becomes a better deal. **Key Vocabulary** continuous function discrete function function relation	
Unit Rationale Students need to 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. Functions are used to tell the boiling point of water at different altitudes, the speed of a skydiver at different times in a freefall, or the amount of money earned after different amounts of time.	**Unit Overview** Students examine the inputs and outputs of a function, called the domain and range. Students will write their own function to represent a real-life relationship and interpret the situation that it models; and describe a function qualitatively by reading a graph or sketching it to show its features.
Activities: Desmos- T shirt offers Desmos-Wafers and creme Desmos- Desmos-Which is steepest Plickers Quizlet & Quizlet Live Kahoot	**Suggested Timeline:** 4 weeks Topic 7: Defining and Comparing Functions Topic 8: Linear Functions

Teacher Notes and Elaborations:
A relation is any set of ordered pairs. For each first member (domain), there may be many second members (range). A function is a relation in which there is one and only one second member (range) for each first member (domain). As a table of values, a function has a unique value assigned to the second variable for each value of the first variable. As a graph, a function is any curve (including straight lines) such that any vertical line would pass through the curve only once. Some relations are functions; all functions are relations.
Functions can be represented as tables, graphs, equations, physical models, or in words. Information given in any one of these ways can be represented in the other ways.
The following function is represented below as a table, graph, rule/equation, and in words.
It costs Carl $45.00 to set up his hot dog stand. He sells each hot dog for $.75.

(equation/rule): $y = 0.75x - 4$
(words): For every hot dog (x) Carl sells he makes a profit (y) is equal to the cost of each hot dog (0.75) times the number of hot dogs sold (x) minus $45 to set up the stand.

Graphs of functions can be discrete or continuous. In a discrete function graph, there are separate, distinct points. A line is not used to connect these points on a graph. The points between the plotted points have no meaning and cannot be interpreted. In a graph of a continuous function every point in the domain can be interpreted, therefore it is possible to connect the points on the graph with a continuous line as every point on the line answers the original question being asked.
An example of a discrete function is "Mary always has three times as many books as Miguel". This is discrete because Miguel can only have complete books, not fractional parts. An example of a continuous function is "Tanya works two hours more than Carla". This is continuous because Carla can work fractional parts of hours.

Unit 5
Audubon Public Schools
Engaging Students ~ Fostering Achievement ~ Cultivating 21st Century Global Skills
Written By: Bill Scully
Course Title: Grade 8 Math Unit Name: Statistics and Probability Grade Level: 8

Content Statements The unit covers the making and use of scatter plots to identify patterns. It also covers the use of slope and the y-intercept, and making and using 2-way tables to summarize data	**NJSLS** **8.SP.1, 8.SP.2, 8.SP.3, 8.SP.4,**
Overarching Essential Questions How is data used? What is a scatter plot?	**Overarching Enduring Understandings** Data is used to draw conclusions and make judgments and decisions. A scatter plot is a graph that plots the values of 2 variables as ordered pairs.

What is a trend line?	A trend line is a line that is drawn to approximate missing data.
Unit Essential Questions What is the best way to determine a line of best fit? How can we use scatter plots to identify patterns. **Key Vocabulary** comparison inference line of best fit negative relationship no relationship positive relationship prediction scatterplot	**Unit Enduring Understandings** There are different graphs for different types of data, and the data can be used to analyze each situation.
Unit Rationale Statistics are an invaluable tool when making decisions based on data. The Department of Transportation may base a decision about whether to repave a road on the mean number of vehicles that use the road on a weekly basis. Newspapers and magazines frequently use graphs to present some aspect of the news, such as how the season's top movies compare at the box office.	**Unit Overview** Select and use appropriate statistical methods to gather, record, organize and analyze data. Use scatter plots and trend lines to interpret data

Activities:	**Suggested Timeline/Content Structure:**
Desmos exploring dilations Desmos scatter plot capture Plickers Quizlet & Quizlet Live Kahoot	2 weeks Topic 14- Scatter Plots Topic 15- Analyzing Categorical Data

Teacher Notes and Elaborations:

Comparisons, predictions, and inferences are made by examining characteristics of a data set, displayed in a variety of graphical representations, to draw conclusions. The information displayed in different graphs may be examined to determine how data are or are not related, ascertaining differences between characteristics (comparisons), trends to suggest what new data might be like (predictions), and/or "what could happen if" (inferences).

Mean, median, and mode are often used when making comparisons and drawing conclusions.

A scatter plot illustrates the relationship between two sets of data. A scatterplot consists of points. No lines are drawn to connect the points. The coordinates of the point represent the measures of the two attributes of the point. Scatterplots can be used to predict trends and to estimate a line of best fit.

In a scatter plot, each point is represented by an independent and dependent variable. The independent variable is graphed on the horizontal axis and the dependent variable is graphed on the vertical axis

Appendix

Differentiation	
Enrichment	● Utilize collaborative media tools ● Provide differentiated feedback ● Opportunities for reflection ● Encourage student voice and input ● Model close reading ● Distinguish long term and short term goals
Intervention & Modification	● Utilize “skeleton notes” where some required information is already filled in for the student ● Provide access to a variety of tools for responses ● Provide opportunities to build familiarity and to practice with multiple media tools ● Leveled text and activities that adapt as students build skills ● Provide multiple means of action and expression ● Consider learning styles and interests ● Provide differentiated mentors ● Graphic organizers

ELLs	• Pre-teach new vocabulary and meaning of symbols • Embed glossaries or definitions • Provide translations • Connect new vocabulary to background knowledge • Provide flash cards • Incorporate as many learning senses as possible • Portray structure, relationships, and associations through concept webs • Graphic organizers

21st Century Skills

- Creativity
- Innovation
- Critical Thinking
- Problem Solving
- Communication
- Collaboration

Integrating Technology

- Chromebooks
- Internet research
- Online programs
- Virtual collaboration and projects
- Presentations using presentation hardware and software