SUBJECT AREA: Algebra 1 CC
GRADE LEVEL: 9
SEMESTER: Fall 2020-Spring 2021

UNIT TITLE/ESSENTIAL QUESTION(S)	UNIT SKILLS AND CONTENT (Skills should be identified from core content skills identified in Vertical Planning)	RESOURCES AND MATERIALS	FORMATIVE & SUMMATIVE ASSESSMENTS	COMMON CORE/CONTENT STANDARDS
Unit 1 - Elements of Algebra	Students will be able to determine the difference between rational and irrational numbers. Students will also be able to decipher a word problem in order to create an expression. Students will be able to follow the correct order of operations in order to evaluate expressions. Students will be able to simplify expressions by combining like terms. Students will be able to correctly convert units of measurement.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments Edpuzzle PAO Strategy Quiz 1	**A-SSE.1** Interpret expressions that represent a quantity in terms of its context.* **A-SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients. **A-SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.* **A-CED.1** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **N-RN.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. **N.Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Unit 2- Solving Equations and Inequalities	Students will be able to solve various equations and identify the steps that they took when solving by defining the properties used such as the inverse properties, combining like terms, the distributive property, cross products are equal, and the commutative property. Students will also be able to apply these properties to literal equations which ask students to rearrange a problem with mostly variables, and solve for one specific variable. Students will determine if an equation has one, infinite, or no solutions. Students will use their knowledge to solve inequalities and represent inequalities on a graph using the correct symbolization to represent them. Finally, students will be able to interpret real life problems about equations and inequalities, interpret these word problems to make the equation/inequality and solve for the unknown variable.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 2 Project	**A-CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. **A-CED.A.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V=IR$ to highlight resistance R.* **A-REI.A.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method **A-REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
Unit 3- Linear Equations/Functions	Students will be able to determine the parts of a linear equation including the slope and y-intercept. Students will be able to analyze information about a linear equation such as the amount of solutions it has. Student will be able to identify is a function is linear. Students will be able to graph linear equations correctly and determine features about its graph. Students will make a connection between arithmetic sequences and linear equations.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Project	**S-ID.C.7 I**nterpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **A.CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A.REI.D.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. ***F.IF.B.4*** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description

				of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. **F-IF.A.1:** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then (x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y=(x). **F-IF.A.2**: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **F-IF.B.6** : Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **F-BF.A.1:** Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context **F-LE.222**: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). **F-LE.523**: Interpret the parameters in a linear or exponential function in terms of a context.
Unit 4- Solving Systems of Equations	Students will be able to find a system of equations algebraically and graphically. They will understand that the solution of two equations is the point where the two lines cross. Algebraically students will be able to determine this by using the process of elimination or substitution. Students will be able to determine if two lines have one solution, infinite solutions or no solution. Students will also be able to graph two linear equations to show where there is a solution.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 3 Project	**A-CED.A.3** : Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. **A-REI.C.5** : Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solution. **A-REI.C.6**: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables **A-REI.D.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line) **A-CED.A.1:** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-CED.A.2** : Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Unit 5- Systems of Inequalities (PBL1)	Students will be able to algebraically and graphically determine the solution of two linear inequalities. Students will be able to create a graph that shows the solution of the inequalities is the area where both inequalities cross.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Project	**A-CED.A.3** : Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. **A-REI.D.12** : Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **A-CED.A.1:** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **A-CED.A.2** : Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Unit 6- Piecewise/Absolute Value	Students will be able to algebraically determine values of a piecewise function. Students will be able to graph and interpret absolute value functions.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 4	**F.IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. **F.IF.C.7**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
Unit 7- Exponential Functions	Students will be able to identify an exponential function by observing that the quantities increase/decrease at a greater rate. Students will be able to determine the difference between an exponentially growing function and an exponentially decaying function. Students will be able to graph these functions using their graphing calculator.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 5 Project	**F-LE.A.1** Distinguish between situations that can be modeled with linear functions and with exponential functions. **F-LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). **F-LE.A.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. **F-LE.B.5** Interpret the parameters in a linear or exponential function in terms of a context. **8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. **A.SSE.B.3**. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} = 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. **F-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Unit 8-Polynomials	Students will be able to complete different operations with polynomials such as addition, subtraction, multiplication and division. Students will also discover various ways to factor polynomials.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 6	**A-APR.A.1** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials **A-SSE.A.2** Use the structure of an expression to identify ways to rewrite it. For example, see x4-y4 as (x2)2-(y2)2, thus recognizing it as a difference of squares that can be factored as (x2-y2)(x2+y2).
Unit 9- Quadratics	Students will be able to transform quadratic equations/expressions using factoring techniques and solve these equations/expressions. Students will be able to identify these solutions as zeros of the functions given Students will be able to solve quadratic equations given real life situations such as profit, loss, revenue, cost, aea, etc. Students will also be able to graph quadratic functions and identify features of the graph such as the max, min, vertex and line of symmetry .	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 7 Project	**A-SSE.1** Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P. **A-SSE.22** Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2). Write expressions in equivalent forms to solve problems **A-SSE.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Perform arithmetic operations on polynomials **A-APR.327** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **A-REI.429** Solve quadratic equations in one variable.

				a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p) 2 = q that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.30 Represent and solve equations and inequalities graphically **A-REI.1131** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★ Interpret functions that arise in applications in terms of the context **F-IF.432** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. **F-IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. **F-IF.633** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. Analyze functions using different representations **F-IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **F-IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. **F-BF.335** Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
Unit 10- Transformations	Students will be able to interpret different functions and how they transform based on their parent graph and constants added to that equation.	https://www.ixl.com/signin/rachelcarsonhs https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	IXL Assignments PAO Strategy Quiz 8	F.BF.B.3Identify the effect on the graph of replacing f(x) by f(x)+k, kf(x), f(kx), and f(x+k) for specific values of *k* (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
Unit 11- Statistics	Students will be able to create various statistical graphs such as box plots, histograms, dot plots and scatter plots. They will use	https://www.ixl.com/signin/rachelcarsonhs	IXL Assignments PAO Strategy	**S-ID.A.1** Represent data with plots on the real number line (dot plots, histograms, and box plots). **S-ID.A.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread

	these to both display data and interpret data. Students will also be able to use the graphing calculator in order to find various regression equations. They will interpret statistical data through deciphering various word problems and make predictions based on their data.	https://edpuzzle.com/ https://screencast-o-matic.com/screen-recorder	Project	(inter-quartile range, standard deviation) of two or more different data sets. **S-ID.A.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **S-ID.B.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. **S-ID.B.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. **S-ID.C.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **S-ID.C.8** Compute (using technology) and interpret the correlation coefficient of a linear fit. **S-ID.C.9** Distinguish between correlation and causation

These Units also follow the Standards for Mathematical Practices:

1) Make sense of problems and persevere in solving them
2) Reason abstractly and quantitatively
3) Construct viable arguments and critique the reasoning of others
4) Model with mathematics
5) Use appropriate tools strategically
6) Attend to precision
7) Look for and make use of structure
8) Look for and express regularity