Mathematics Department

Algebra 1

Developed By: Deanna Banks, Megan Casale, Jessica Mabel, Leann Martin, Christine Matias
Effective Date: Fall 2018

Scope and Sequence

Month	Algebra 1	Advanced Algebra 1	Accelerated Algebra 1
September	**Prerequisites - No Calculators** -Add/Sub/Mult/Divide Integers, fractions, and decimals -Absolute Value -Algebraic Expressions -Order of Operations - Properties - Intro to functions **COMMON ASSESSMENT: Prerequisite TEST** **Linear Equations - Calculators** - Solve linear equations using add/sub/mult/division - Solve a formula for one of its variables	**Prerequisites - No Calculators** -Add/Sub/Mult/Divide Integers, fractions, and decimals - Order of Operations **COMMON ASSESSMENT: Prerequisite TEST** **Linear Equations - No Calculators** - Solve linear equations using add/sub/mult/division - Solve a formula for one of its variables -Use ratios, rates, and proportions to solve real-life problems -Percents - Solve absolute value equations	***8th grade: condensed review of Ch.1 & Ch.2 in our textbook. We should be able to start at Ch.3** ***7th Grade: might not be able to skip chapters** **Prerequisites - No Calculators** -Add/Sub/Mult/Divide Integers, fractions, and decimals -Absolute Value -Algebraic Expressions -Order of Operations - Properties - Intro to functions **COMMON ASSESSMENT: Prerequisite TEST** **Linear Equations - No Calculators** - Solve linear equations using add/sub/mult/division - Solve a formula for one of its variables -Use ratios, rates, and proportions to solve real-life problems -Percents -Rewrite equations in function form
October	**Linear Equations - Calculators (Cont)** -Use ratios, rates, and proportions to solve real-life problems -Percents - Solve absolute value equations **Linear Inequalities - Calculators** - Solve and graph inequalities using addition/subtraction/multiplication/division -Solve compound inequalities - Solve absolute value inequalities	**Linear Inequalities - No Calculators** - Solve and graph inequalities using addition/subtraction/multiplication/division -Solve compound inequalities - Solve absolute value inequalities	**Functions** -Identify functions -Find the domain and range of relations and functions -Write an equation in function notation and evaluate a function for given input values -Graph functions -Find a given term of an arithmetic sequence **Linear Functions** -Identify linear functions and linear equations -Find x- and y-intercepts to graph lines and interpret their meanings in real-world situations -Find rates of change and slopes -Compare families of graphs

November	**Characteristics of Linear Functions - Calculators** -Identify linear functions and linear equations -Find x- and y-intercepts to graph lines and interpret their meanings in real-world situations -Find rates of change and slopes - Graph linear equations using a t-chart, x and y intercepts, slope-intercept form, standard form, point-slope form, - Graph horizontal and vertical lines	**Functions- No Calculators** -Identify functions -Find the domain and range of relations and functions -Write an equation in function notation and evaluate a function for given input values -Graph functions -Create and interpret scatter plots -Find a given term of an arithmetic sequence **Linear Functions- No Calculators** -Identify linear functions and linear equations -Find x- and y-intercepts to graph lines and interpret their meanings in real-world situations -Find rates of change and slopes	**Linear Functions- (Cont)** -Identify, write, and graph direct variation -Write and graph a linear equation in slope-intercept form -Graph a line and write a linear equation using point-slope form -Identify, graph, and write equations of parallel and perpendicular lines. -Describe how changing slope and y-intercept affect the graph of a linear function. -Create and interpret scatter plots
December	**Writing Linear Equations - Calculators** -Write linear equations in slope-intercept form, standard form, and point slope form given two points and a point and a slope -Identify, graph, and write equations of parallel and perpendicular lines.	**Linear Functions- No Calculators (Cont)** -Identify, write, and graph direct variation -Write and graph a linear equation in slope-intercept form -Graph a line and write a linear equation using point-slope form -Identify, graph, and write equations of parallel and perpendicular lines. -Describe how changing slope and y-intercept affect the graph of a linear function. **Systems of Equations and Inequalities- No Calculators** -Solve systems of equations by graphing, elimination, and substitution	**Linear Inequalities** - Solve and graph inequalities using addition/subtraction/multiplication/division -Solve compound inequalities - Solve absolute value equations - Solve absolute value inequalities -Graph linear inequalities in two variables.
January	**Systems of Equations and Inequalities- Calculators** -Solve systems of equations by graphing, elimination, and substitution	**Systems of Equations and Inequalities- No Calculators (Cont)** -Solve systems of equations by graphing, elimination, and substitution -Graph and solve linear inequalities in two variables -Graph and solve systems of linear inequalities in two variables **COMMON ASSESSMENT: Linear Function** **Exponents and Polynomials- No Calculators** -Evaluate and simplify expressions containing the laws of exponents. -Evaluate and simplify expressions containing rational exponents	**Systems of Equations and Inequalities** -Solve systems of equations by graphing, elimination, and substitution -Graph and solve linear inequalities in two variables -Identify linear systems as having one solution, no solution, or infinitely many solutions -Graph and solve systems of linear inequalities in two variables **COMMON ASSESSMENT: Linear Function** **Exponents & Exponential Functions** -Evaluate and simplify expressions containing the laws of exponents. -Evaluate and simplify expressions containing rational exponents
February	**Systems of Equations and Inequalities- Calculators (Cont)** -Graph and solve linear inequalities in two variables -Graph and solve systems of linear inequalities in two variables **COMMON ASSESSMENT: Linear Function**	**Exponents and Polynomials- No Calculators (Cont)** - Classify polynomials -Add/subtract/multiply polynomials **Factoring Polynomials- No Calculators** -Find the GCF of monomials -Factor polynomials by using the greatest common factor -Factor polynomials by grouping -Factor quadratic trinomials -Factor perfect-square trinomials and the	**Exponents & Exponential Functions (Cont.)** -Recognize and extend geometric sequences -Identify and graph exponential functions -Evaluate exponential functions -Solve problems involving exponential growth and decay -Compare linear and exponential models -Compare functions in different representations

		difference of two squares	
March	**Exponents and Polynomials** -Rules of exponents -Classify polynomials -Add/subtract/multiply polynomials **Factoring Polynomials- Calculators** -Find the GCF of monomials -Factor polynomials by using the greatest common factor - Factor quadratic trinomials -Factor perfect-square trinomials and the difference of two squares	**Quadratic Functions and Equations- No Calculators** -Identify quadratic functions -Identify the axis of symmetry, zeros, domain and range, and maximum/minimum of quadratic functions -Graph a quadratic function in standard form and vertex form -Graph and transform quadratic functions -Solve quadratic equations by graphing, factoring, and square roots	**Polynomials & Factoring** - Classify polynomials -Add/subtract/multiply polynomials -Find the GCF of monomials -Factor polynomials by using the greatest common factor -Factor polynomials by grouping -Factor quadratic trinomials -Factor perfect-square trinomials and the difference of two squares
April	**Quadratic Functions and Equations- Calculators** -Identify quadratic functions -Identify the axis of symmetry, zeros, domain and range, and maximum/minimum of quadratic functions -Graph a quadratic function in standard form and vertex form -Graph and transform quadratic functions	**Quadratic Functions and Equations- No Calculators (Cont)** -Solve quadratic functions by completing the square and the quadratic formula -Determine the number of solutions by using the discriminant -Solve systems of equations in two variables in which one equations and the other is quadratic	**Quadratic Functions and Equations** -Identify quadratic functions -Identify the axis of symmetry, zeros, domain and range, and maximum/minimum of quadratic functions -Graph a quadratic function in standard form and vertex form -Graph and transform quadratic functions -Solve quadratic equations by graphing, factoring, and square roots -Solve quadratic functions by completing the square and the quadratic formula -Determine the number of solutions by using the discriminant -Solve systems of equations in two variables in which one equations and the other is quadratic -Compare linear, quadratic, and exponential models
May	**Solve Quadratic Equations** -Solve quadratic functions by completing the square, factoring, and the quadratic formula -Determine the number of solutions by using the discriminant **COMMON ASSESSMENT: Quadratic Functions** **Exponential Functions - Calculators** -Identify and graph exponential functions -Evaluate exponential functions -Solve problems involving exponential growth and decay	**Exponential Functions- Calculators** -Recognize and extend geometric sequences -Identify and graph exponential functions -Evaluate exponential functions -Solve problems involving exponential growth and decay -Compare linear, quadratic, and exponential models -Compare functions in different representations **Data Analysis and Probability- Calculators** -Organize data in tables and graphs -Create stem-and-leaf plots, frequency tables, histograms, and box-and-whisker plots -Describe the central tendency of a data set -Recognize misleading graphs and statistics	**PARCC** **COMMON ASSESSMENT: Quadratic Functions** **Data Analysis and Probability** -Organize data in tables and graphs -Create stem-and-leaf plots, frequency tables, histograms, and box-and-whisker plots -Describe the central tendency of a data set -Recognize misleading graphs and statistics
June	**Exponential Functions - Calculators (Cont)** -Compare linear, quadratic, and exponential models -Compare functions in different representations	**Data Analysis and Probability- Calculators Cont** -Determine the experimental and theoretical probability of an event -Find the probability of independent and dependent events	**Data Analysis and Probability-(Cont.)** -Determine the experimental and theoretical probability of an event -Find the probability of independent and dependent events

Unit 1

Linear Equations

Summary and Rationale

Students will learn to rewrite an equation in order to make the statement about its variable as simple as possible. Through the use of the properties of real numbers and equality, inverse operations, and other algebraic properties, students will learn to transform an equation into equivalent and more simple equations in order to isolate the variable and determine a solution(s). Students will use this process to solve one-step, two-step, and multi-step linear equations, equations with variables on both sides, absolute value equations, as well as proportions.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Algebra	
A-CED-1	Create equations and inequalities in one variable and use them to solve problems.
A-CED-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-1	Explain each step in solving a simple equations as following from the equality of numbers asserted in the previous step, starting from the assumption that the original equations has a solution. Construct a viable argument to justify a solution method.
A-REI-3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Number and Quantity	
N-Q-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

Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Quantities are used to form expressions, equations, and inequalities. An expression refers to a quantity, but does not make a statement about it. An equation (or an inequality) is a statement about the quantities it mentions. Using variables in place of numbers in equations (or inequalities) allows the statement of relationships among numbers that are unknown or unspecified. A single quantity may be represented by many different expressions. The facts about a quantity may be represented by many different equations (or inequalities.) Equations are used to represent the relationship between two quantities that have the same value.	Can equations that appear to be different be equivalent? How can you solve equations? What kinds of relationships can proportions represent?

Equations can describe, explain, and predict various aspects of the real world.

Equivalent equations have the same solution(s). An algebraic equation can be represented using the symbols in an infinite number of ways, where each representation has the same solution(s).

Properties of real numbers and equality, along with the use of inverse operations, can transform an equation into one or a series of equivalent simpler equations. The properties of real numbers and equality can be used repeatedly to isolate the variable. This process is used to find solutions to one-variable equations. The process is also used to isolate a particular variable in a formula that contains two or more variables.

Absolute value equations can be solved by first isolating the absolute value expression (if necessary), then writing a pair of linear equations, and then solving each equation separately, which will yield two solutions.

Ratio and rates can be used to compare quantities and make conversions in order to solve problems.

A proportion is an equation that states two ratios are equal. Proportionality involves a relationship in which the ratio of two quantities remains constant as the corresponding values of the quantities change. In a proportional relationship, there are an infinite number of ratios equal to this constant ratio. If two ratios are equal, and a quantity in one of the ratios is unknown, the unknown quantity can be found by writing and solving a proportion.

Percents represent another application of proportions. The percent proportion can be used to solve for any one of the missing components and to solve percent increase and percent decrease problems. Percent problems can also be solved using the percent equation.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Expressions · Equations · Inequalities	· Solve linear equations using addition, subtraction, multiplication, and division. (One Step) · Use two or more steps to solve a linear equation. · Solve equations that have variables on both sides. · Solve a formula for one of its variables. · Use ratios and rates to solve real-life problems. · Solve percent problems. · Solve absolute-value equations. · Solve proportions.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills.
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 2

Linear Inequalities

Summary and Rationale

Unit 2 connects and extends the ideas introduced in Unit 1 to solving one-variable inequalities. Students will learn to rewrite an inequality to make the statement about its variable as simple as possible. Through the use of the properties of real numbers and inequality, inverse operations, and other algebraic properties, students will learn to transform an inequality into equivalent, simpler inequalities in order to isolate the variable and determine a solution(s). Students will use this process to solve one-step, two-step, and multi-step, compound, and absolute value inequalities. Useful information about one- variable inequalities, including solutions, can be found by analyzing their number line graphs. The types of solutions vary predictably, based on the type of inequality.

Recommended Pacing	
For recommended pacing refer to the scope and sequence for each course.	
Standards	
Number and Quantity	
N-Q-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.
Algebra	
A-CED-1	Create equations and inequalities in one variable and use them to solve problems.
A-REI-3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problemsolving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Quantities are used to form expressions, equations, and inequalities. An expression refers to a quantity, but does not make a statement about it. An equation (or an inequality) is a statement about the quantities it mentions. Using variables in place of numbers in equations (or inequalities) allows the statement of relationships among numbers that are unknown or unspecified. A single quantity may be represented by many different expressions. The facts about a quantity may be represented by many different equations (or inequalities.) Inequalities are used to state that two quantities that *DO NOT* have the same value. Inequalities can describe, explain, and predict various aspects of the real world. An inequality is a mathematical sentence that uses an inequality symbol to compare the values of two expressions. Inequalities can be represented with symbols. Their solutions can be represented on a number line. Properties of real numbers and inequality, along with the use of inverse operations, can transform an inequality into one or a series of equivalent simpler inequalities. The properties of real numbers and inequality can be used repeatedly to isolate the variable. This process is used to find solutions to one-variable inequalities (including multi-step and compound inequalities.) Many properties of equality hold true for inequalities. One major difference is as follows: When multiplying or dividing both sides of an	How can you represent relationships between quantities that are not equal? Can inequalities that appear to be different be equivalent? How can you solve inequalities?

inequality by a negative number, it is necessary to reverse the inequality sign. The solutions of a compound inequality are either the overlap or combination of the solution sets of distinct inequalities. The graph of a compound inequality with the word *and* contains the overlap of the graphs of the two inequalities. The graph of a compound inequality with the word *or* contains each graph of the two inequalities. Absolute value inequalities can be solved by first isolating the absolute value expression (if necessary), then writing the appropriate compound inequality that satisfies the condition, and then solving accordingly, which will yield a solution set to be graphed.	

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· One-variable linear equations · Multi-step inequalities · Compound inequalities	· Solve and graph one-step inequalities in one variable using addition, subtraction, multiplication, and division. · Solve and graph multi-step inequalities in one variable. · Solve and graph compound inequalities. · Solve absolute-value inequalities in one variable.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 3

Functions

Summary and Rationale

Unit 3 introduces the topic of functions, with a specific focus on linear functions and their graphs. Throughout Units 4 and 5, students will have the opportunity to see that useful information about one- variable equations, including solutions, can be found by analyzing the graphs of their related two-variable functions.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Number and Quantity	
N-Q-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
Functions	
F-IF-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 f(x) denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation y = f(x).
F-IF-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-3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n−1) for n ≥ 1.
F-IF-4	For a function that models a relationships 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.

F-IF-5	Relate domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
Interpreting Categorical and Quantitative Data	
S-ID-6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Given a two-variable equation, the value of one quantity can be found if the value of the other is known. A table can be used to display the relationship between the quantities, which would also represent a set of solutions of the equation. The set of all solutions of the equation forms its graph on a coordinate plane. The graph will show solutions that are in the table, will visually	How can you represent quantities and relationships on a graph? How can you represent and describe functions? Can functions model real-world situations?

represent the relationship between the two variable quantities that are changing, and can also show solutions to the equation that are not in the table.

A function is a relationship between variables in which each value of the input variable (value in the domain) is associated with a unique value of the output variable (value in the range.) In order to determine if an equation or a set of ordered pairs represents a function, the solutions of the equation or the ordered pairs can be organized in a table or plotted on a graph. If the table of values shows that each value in one set is paired with exactly one value in the other set, the relation is a function. The vertical line test uses the graph to determine whether a relation is a function.

A linear function is a function whose graph is a line. A nonlinear function is a function whose graph is not part of a line. Both linear and nonlinear functions can be represented in a variety of ways, such as words, tables, two-variable equations or rules, sets of ordered pairs, and graphs. Each representation is particularly useful in certain situations.

Many real world mathematical problems can be modeled and represented algebraically and graphically by functions. A function that models a real world situation can be represented using an equation or graph that can be used to make estimates or predictions about future occurrences. A real-world graph of a function should only show points that make sense in the given situation.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Functions · Graphs	· Plot points in a coordinate plane. · Graph linear equations on a coordinate by using a table of solution values. · Represent relations using sets of ordered pairs, tables, mappings, and graphs. · Determine whether an equation or relation is a function using a table of solution values or a graph. · Identify the domain and range of a function. · Find the value of a function for a given element of the domain. · Use function notation.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 4

Linear Functions

Summary and Rationale

Unit 4 connects and extends the ideas introduced in Unit 3 by allowing students to take a closer look at the characteristics and properties of linear functions, and their equations and graphs. Students will learn how the slope of a line affects its graph, different graphing methods, and how to write and obtain important information from linear equations in different forms.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Algebra	
A-CED-2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A-CED-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.
A-REI-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).
Functions	
F-IF-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 f(x) denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation y = f(x).
F-IF-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-4	For a function that models a relationships 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.

F-IF-5	Relate domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
F-IF-6	Calculate and interpret the average rate of change of a function over a specified interval. Estimate the rate of change from a graph.
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. 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. Write exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showering period, midline, and amplitude
F-IF-8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the functions. 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. Use the properties of exponents to interpret expressions for exponential functions.
F-IF-9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
F-LE-1	Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
Number and Quantity	
N-Q-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.

Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problemsolving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
Integration of Technology	

Instructional Focus

Enduring Understandings:	**Essential Questions:**
A function is a relationship between variables in which each value of the input variable (value in the domain) is associated with a unique value of the output variable (value in the range.) Functions can be represented in a variety of ways, such as words, tables, two-variable equations or rules, sets of ordered pairs, and graphs. Each representation is particularly useful in certain situations. Some important families of functions are developed through transformations of the simplest form of the function. Two ratios are proportional if they have the same ratio in each instance where they are measured. With linear functions, the slope of the line is the ratio of the vertical change to the horizontal change. The slope of a line can be positive, negative, zero, or undefined. The ratio of slope	What does the slope of a line indicate about the line? What information does the equation of a line give you? How can you make predictions based on a scatter plot?

remains the same when measured between any two points on a line, so it is proportional.

If the ratio of two variables is constant, then the variables have a special linear relationship, called a direct variation. The equation of a direct variation is $y = kx$. Its graph is a line that passes through the origin and has a slope of k.

A linear equation can be represented using three equation forms: slope-intercept form, point-slope form, and standard form. All forms are useful in writing the equations of linear functions given a graph or certain characteristics and also provide effective and efficient graphing methods.

The particular form of a linear equation often suggests a particular graphing method. The standard form makes it easy to find x and y intercepts and draw graphs quickly using two points. The slope-intercept form makes it possible to graph the line easily starting with one point and obtaining several others by moving according to the slope.

The relationship between two lines can be determined by comparing their slopes and y-intercepts obtained from graphs or equations.

Scatter plots provide a way to graph ordered pairs to determine whether two sets of real world numerical data are related. If two sets of data are related, it may be possible to use the graph of an estimated line to model the data and use it to make estimates or predictions about values.

Absolute value equations can be graphed using a table of values or more quickly by shifting the graph of $y = |x|$.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Linear equations · Functions · Graphing · Slope	· Determine the slope of a line given a graph or by using the slope formula given two points. · Identify and write the equation of a direct variation. · Find the x and y intercepts of a linear equation and use them to draw the graph · Use slope and a point to graph a line. · Graph horizontal and vertical lines. · Use slope-intercept form, point-slope form, and standard form to write an equation of a line. · Write an equation of a line given two points on the line. · Write and use a linear equation to solve a real-life problem. · Write the equations of perpendicular and parallel lines · Graph equations of lines in slope-intercept form, point-slope form, and standard form. · Graph ordered pairs of real life data sets in a scatter plot to determine whether a relationship exists between the two data sets. · Write and use a linear equation or function to solve a real-life problem. · Graph absolute value functions.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 5

Systems of Equations and Inequalities

Summary and Rationale

Unit 5 connects and extends the concepts from Units 1 and 2 about finding solutions to equations and inequalities to solving systems of equations and inequalities. Students will learn to solve systems of equations and inequalities by graphing and through algebraic methods such as substitution and elimination. Students will have the opportunity to see that useful information about equations and inequalities (including solutions) can be found by analyzing their graphs. Furthermore, the numbers and types of solutions vary predictably, based on the types of equations and graphs in the system.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

(Sub Standard Heading)	
A-CED-2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A-CED-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.
A-REI-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 solutions.
A-REI-6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A-REI-7	Solve a simple system consisting of a linear equations and a quadratic equation in two variables algebraically and graphically.
A-REI-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 variable as the intersections of the corresponding half-planes.

Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.

W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Solving an equation (or inequality) is the process of rewriting the equation (or inequality) to make what it says about its variable(s) as simple as possible. Properties of numbers, equality, and inequality can be used to transform an equation (or inequality) into equivalent, simpler equations (or inequalities) in order to find solutions. The solution of a system of equations is the set of ordered pairs that satisfy both equations in the system. When solving a system of linear equations, there are possible types of solutions: one solution (the point of intersection of the two lines), no solution (The lines do not intersect.), or an infinite number of solutions (The equations in the system represent the exact same line.) Systems of equations can be solved in more than one way. Three methods are graphing, substitution, and elimination. The best method to use depends on the forms of the given equations and how precise the solution should be. The graphing method involves graphing each equation and finding the intersection point, if one exists. When a system has at least one equation that can be solved for a variable, the system can be efficiently solved using substitution. Some equations of a system are written in a way that makes eliminating a variable the best method to use. A linear inequality in two variables has an infinite number of solutions. Solutions to a linear	How can you solve a system of equations or inequalities? Can systems of equations model real-world situations? When and how do you know when the use of one method is more efficient than another for a particular problem?

inequality in two variables can be represented in a coordinate plane as the set of all points on one side of a boundary line. Solutions of a system of linear inequalities can be graphed in the coordinate plane. The graph of the solution of a system of linear inequalities is the region where the graphs of the individual inequalities overlap. Real world problems can be modeled and solved using linear inequalities and systems of linear equations and inequalities.	

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know: · Linear systems of equations · Inequalities · Graphing	Students will be able to: · Solve a linear system by graphing, substitution, and elimination methods. · Identify the number of solutions of a linear system. · Determine if the lines in a system are parallel, perpendicular, or neither. · Use linear systems to solve real-life problems. · Solve and graph a two-variable linear inequality. · Graph a system of linear inequalities.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 6

Exponents

Summary and Rationale

Unit 6 expands on students' understandings and skills related to exponential expressions. The unit also introduces concepts related to the square root operation. Students will extend the use of exponents to include zero, negative, and rational exponents and will use the Properties of Exponents and Radicals to simplify and perform operations on expressions containing exponents and radicals.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Number and Quantity	
N-RN-1	Explain how the definition of the meaning of rational exponents follows from extending properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
N-RN-2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN-3	Explain why the sum or product of two rational numbers is rational; that the sum of the rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
Algebra	
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. f. Interpret complication expressions by viewing one or more of their parts as a single entity.
A-SSE-2	Use the structure of an expression to identify ways to rewrite it.
A-REI-2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
A-APR-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.
Interdisciplinary Connections	

Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
A single quantity may be represented by many different expressions. The facts about a quantity may be expressed by many different equations (or inequalities). Powers are used to shorten the representation of repeated multiplication. The Multiplication Properties of Exponents must be used when simplifying and performing operations on numerical or algebraic expressions containing powers The idea of exponents can be extended to include zero and negative exponents. A nonzero number to the zero power is equal to 1. a^{-n} is the reciprocal of a^{n}. The Properties of Exponents make it easier to simplify products or quotients of powers with the same base or powers raised to a power or products raised to a power. To multiply powers with the same base, add the exponents. To raise a power to a power, multiply the exponents. To raise a product to a power, raise each factor to the power and multiply. To divide powers with the same base, subtract the exponents. To raise a quotient to a power, raise the numerator and the denominator to the power and simplify.	How can you simplify expressions involving exponents? How do you know when an expression with exponents is completely simplified? How do you simplify a radical (or square root) expression?

The opposite of squaring a number is taking the square root of a number. Square roots are written with a radical symbol √. The number or expression inside the radical symbol is called the radicand.

Positive real numbers have two square roots. Zero has only one square root: zero. Negative numbers do not have real square roots because the square of every real number is either positive or zero.

The square of an integer is a perfect square. Therefore the square root of a perfect square is in integer. The square root of a nonnegative number that is not a perfect square is an irrational number. The exact value of an irrational number can be represented using a radical. The decimal representation of an irrational number is an approximation that can either be estimated or determined by a calculator.

An algebraic expression that contains a radical is called a radical expression. The simplest form of a radical expression is an expression that has no perfect square factors other than 1 in the radicand, no fractions in the radicand, and no radicals in the denominator of a fraction. Properties of Real Numbers and Radicals (or Square Roots) can be used to simplify expressions that contain radicals, as well as to multiply and divide radicals.

Rationalizing the denominator of a radical expression removes the radical from the denominator of the expression. The denominators of some radical expressions can be rationalized by multiplying by conjugates.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Exponents · Radicals · Square roots · Radical expression · Distributive property	· Use properties of exponents to evaluate and simplify expressions. · Evaluate a square root. · Simplify square roots and radical expressions. · Simplify radical expressions involving addition, subtraction, and multiplication.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 7

Polynomials

Summary and Rationale

In this unit, students will have more opportunities to see that two algebraic expressions that appear to be different can be equivalent as they apply the properties of real numbers to the addition, subtraction, and multiplication of polynomial expressions, and as they factor polynomials. They will use the Properties of Real Numbers and Exponents, particularly the Commutative and Associative Properties and the Distributive Property to manipulate polynomial expressions, and multiply and factor polynomials.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

(Sub Standard Heading)

A-SSE-1	Interpret expressions that represent a quantity in terms of its context. g. Interpret parts of an expression, such as terms, factors, and coefficients. h. Interpret complication expressions by viewing one or more of their parts as a single entity.

A-SSE-2	Use the structure of an expression to identify ways to rewrite it.

Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
A single quantity may be represented by many different expressions. The facts about a quantity may be expressed by many different equations (or inequalities). A monomial is a number, a variable, or the product of a number and one or more variables with whole number exponents. The degree of a monomial is the sum of the exponents of the variables in the monomial. Monomials can be used to form larger expressions called polynomials. A polynomial is a monomial or a sum of monomials. A polynomial of two terms is a binomial. A polynomial of three terms is a trinomial. A polynomial is usually written in standard form, which means that the terms are arranged in decreasing order, from largest exponent to smallest exponent. The degree of a polynomial in one variable is the largest exponent of that variable. Polynomials can be added and subtracted. To add or subtract polynomials, add or subtract like terms. The Properties of Real Numbers can be used to multiply a monomial by a polynomial or to simplify the product of binomials. To multiply polynomials, use The Distributive Property or FOIL pattern.	How are the properties of real numbers related to polynomials? How do you add, subtract, and multiply polynomials? How do you factor polynomials?

Simplify by using the Multiplication Properties of Exponents and then combining like terms.

Special product patterns occur when multiplying polynomials, particularly when multiplying two binomials. These patterns include the Sum and Difference Patterns and the Square of a Binomial Pattern.
One important fact is that with exception to the Sum and Difference Patterns, when you multiply two binomials, the result is a trinomial.

Some trinomials and some polynomials of a degree greater than two can be factored to equivalent forms which are the product of two binomials. Factoring a polynomial reverses the multiplication process. To factor a polynomial means to use the Properties of Real Numbers to rewrite it as a product of factors. Completely factoring a polynomials can involve one or more of the following methods and strategies: factoring out the GCF (greatest common factor), factoring by grouping (commonly used when factoring polynomials with four terms), the "unfoil" or "sum/product" method (commonly used for factoring trinomials), and special product or sum and difference of cube patterns (used for special binomials).

If a polynomial has four or more terms, it may be possible to group the terms and factor binomials from the groups. This method is called "Factor by Grouping."

The signs and factors of the coefficients of a trinomial can be used indicate how the trinomial can be factored. To factor a trinomial means to "undistributed" or "unfoil" so that it is written as a product of two binomials (factored form). The sum/product method is the most efficient method when factoring the simplest trinomials of the form: $ax^2 + bx + c$ and $a = 1$. When a does not equal one, the sum/product method can still be used in combination with the factoring by grouping method.

Some polynomials, such as trinomials that are the squares of binomials, or binomials that are the differences of two squares, can be factored by reversing the rules for multiplying binomials that contain special product patterns.

The following is a step-by-step factoring strategy that can be used for factoring all polynomials:

1) Factor out the greatest common factor, if one exists. (GCF).

2) Does it contain four terms? Try factor by grouping method.

3) Trinomial? (three terms) Does a = 1? If so, "Unfoil" using sum/product method.

If a ≠ 1, Use sum/product method with factor by grouping method. (Break up the middle term so that there are four terms.)

4) Binomial? Look for Difference of Squares, Sum or Difference of Cubes

Reminder: A sum of squares cannot be factored. (prime)

5) Repeat steps until all factors are prime.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Monomials · Polynomials · Trinomials · Distributive property · FOIL pattern	· Identify polynomials by their number of terms. · State the degree of a monomial and of a polynomial. · Add, subtract, and multiply polynomials. · Factor trinomials. · Factor binomials that contain differences of squares, sum of cubes, difference of cubes. · Factor using the distributive property. · Factor using grouping techniques

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified

-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 8

Quadratic Functions

Summary and Rationale

In Unit 8 students will solve quadratic equations using a variety of methods. Students will learn the characteristics of quadratic functions as they graph them on a coordinate plane and use the graph to determine exact solutions or types of solutions. They will also use quadratic functions to model and represent real- world situations.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Algebra	
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
A-CED-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.
A-SSE-3	Choose and produce and equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. d. Factor a quadratic expression to reveal the zeros of the function it defines. e. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. F. Use the properties of exponents to transform expression for exponential functions.
A-REI-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-4	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equations in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equations. Recognize when the quadratic formula gives complex solutions and write them as a + bi and a – bi for real numbers a and b.
A-REI-7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = – 3x and the circle x^2 + y^2 = 3.
A-REI-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-REI-11	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.
Functions	
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. 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. Write exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showering period, midline, and amplitude.
F-BF-3	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
Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
All equations, (or functions) of degree one or higher are defined as polynomial equations. Linear equations are degree one, so most yield at most one real solution. Quadratics equations are degree two equations therefore yield at most two real solutions. Unlike linear functions, the family of quadratic functions models certain situations where the rate of change is not constant. Quadratic equations contain an x^2 term. Since the opposite of squaring a number is taking the square root, this is the simplest method for solving a quadratic equation. However, not all quadratic equations can be solved by taking the square root of both sides. Quadratic functions are graphed by a symmetric u-shaped graph called a parabola. The equation of a parabola written in standard form is $y = ax^2 + bx + c$. The equation can be used to find the coordinates of the vertex. The value of b translates the position of the axis of symmetry and the vertex of the parabola. A table of values can be used to find points to the left and right of the vertex to form its u-shape. Graphing a quadratic function provides another method for solving quadratic equations. The x-intercepts of the function are the solutions to the related quadratic equation. A parabola will cross the x-axis at most two times. Two other methods for solving quadratic equations are The Zero-Product Property (used with factoring methods) and The Quadratic Formula. Any quadratic equation can be solved using The Quadratic Formula.	What are the characteristics of quadratic functions? (or equations)? How can you solve a quadratic equation? How can you use quadratic equations and functions to model real-world situations? How can you solve a radical equation?

When solving quadratic equations, one particular method for solving may be more appropriate or necessary over another. The best method to use depends on the forms of the given equations, the types of solutions that exist, and how precise the solutions should be. The value of the discriminant, $b^2 - 4ac$, of a quadratic equation can be used to determine the number and type of solutions and can also help predict the best solving method.

A quadratic inequality in two variables has an infinite number of solutions. The graph of a quadratic inequality consists of the graph of all ordered pairs *(x, y)* (or points) that are solutions of the inequality.

Since taking the square root of a number is the inverse of squaring a number and vice versa, some radical equations can be solved by isolating the radical expression (or square root term), and then squaring both sides of the equation. However, squaring both sides of an equation can yield a solution that does *not* satisfy the original equation. Such a solution is called an extraneous solution. When an equation is solved by squaring both sides, all solutions must be checked in the original equation.

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)

Students will know:	Students will be able to:
· Quadratics · Polynomial equations · Graphing	· Graph quadratic functions. · Solve quadratic equations by graphing. · Solve quadratic equations by factoring. · Solve quadratic equations by using The Quadratic Formula.

	· Graph quadratic inequalities. · Solve radical equations.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 9

Exponential Functions

Summary and Rationale

In Unit 9 students will extend the study of functions to exponential functions, which is important family of functions because they model many real-life situations. Students will analyze the characteristics and properties of these functions, their equations, and graphs. Students will explore graphs that contain asymptotes as they draw and recognize patterns within the behavior of exponential functions. Previously learned Properties of Exponents will be used to simplify expressions and solve equations.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Functions

F-IF-3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n−1) for n ≥ 1.
F-IF-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-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.
F-IF-9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
F-LE-1	Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
F-LE-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-BF-2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms
Algebra	
A-CED-2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
A function is a relationship in which one set of values defines another. All functions can be used to model many important phenomena. Determining an output value of a function, given an input value, requires evaluating the algebraic expression that is being used to represent the function. Functions can be represented using an equation, or through a graph of the ordered pairs on a coordinate plane that satisfy the equation. The graph of a function is a useful way of visualizing the relationship of the function, as well as its complete domain and range. A relationship between two variables or two sets of data is an exponential function if the two variables increase (grow) or decrease (decay) by the same *percent* over equal periods of time.	What values of b does $y = b^x$ represent exponential growth? Decay? How do you determine the asymptotes of an exponential graph? How do you determine the domain and range exponential functions? How is solving exponential equations similar to solving other equations? How is it different?

Evidence of Learning (Assessments)
Tests Quizzes Homework Class participation

Objectives (SLO)	
Students will know: · Exponents · Graphs	Students will be able to: · Graph exponential functions, including those that model growth and decay. · Use exponential functions to model and solve real-life problems.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources

Unit 10

Data Analysis and Probability

Summary and Rationale

This unit focuses on students' ability to analyze data, and interpret and choose data displays. Students will compare measures of central tendency (mean, median, and mode) and find the range of data sets. Box-and-whisker plots will be analyzed, and two-way tables used to recognize associations in data. Students will draw on statistics to represent real world situations and communicate results, using technology when needed.

Recommended Pacing

For recommended pacing refer to the scope and sequence for each course.

Standards

Statistics	
S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
S.ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S.ID.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.IC.6	Evaluate reports based on data.
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S.CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

Interdisciplinary Connections	
Standard	
RL.10	Read and comprehend complex literary and informational texts independently and proficiently.
W.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9.1	All students will demonstrate the creative, critical thinking, collaboration, and problem solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Data can be analyzed both numerically and visually in order to convey meaning.	How can collecting and analyzing data help one make decisions and predictions?

Evidence of Learning (Assessments)

Tests
Quizzes
Homework
Class participation

Objectives (SLO)	
Students will know: ·Measures of Central Tendency (mean, median, mode) Measures of Variation (range, standard deviation) Frequency table Histogram Quartiles Box and Whisker Plots Independent and Dependent Variables Two-Way Tables	Students will be able to: ·I will calculate and compare measure of center (mean, median, mode) of data sets. · I will create and interpret box-and-whisker plots in the context of a problem. · I will analyze data displays such as frequency tables, histograms, and box-and-whisker plots and describe the shape of the distribution. · I will be able to choose and construct an appropriate data display based on given data.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-Parcc.pearson.com & parcconline.org (PARCC Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Desmos graphing calculator
-Kuta Software

Modifications

Special Education: Modifications are determined by each student's Individual Education Plan. Examples include:
-Use concrete examples of concepts before teaching the abstract
-Reduce the number of concepts presented at one time
-Give additional presentations by varying the methods using repetition, simpler explanations, more examples and modeling
-Use of aids (calculator, computer, tape recorder, etc.)
-Frequently check on progress of independent work
-Provide study guides and copy of notes
-Provide repetition and practice

ELL: Modifications are determined by each student. Examples include:
- Provide students with notes, examples, tests, and quizzes in their primary language
- Monitor the student's comprehension of language used during instruction
- Give written directions to supplement verbal directions
- Frequently check on progress of independent work

504: Modifications are determined by each student's 504 plan. Examples include:
-Teacher will review, restate and repeat directions, as needed
-Frequently check on progress of independent work

21ST CENTURY LIFE AND CAREER STANDARDS

- ❑ Apply appropriate academic and technical skills..
- ❑ Communicate clearly and effectively and with reason.
- ❑ Demonstrate creativity and innovation.
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ Use technology to enhance productivity.

LINKS TO CAREERS: https://www.math.uci.edu/math-majors/math-career-resources