1	Searching for Patterns	This chapter begins with opportunities for students to analyze and describe various patterns. Questions ask students to represent algebraic expressions in different forms and use algebra and graphs to determine whether they are equivalent. Lessons provide opportunities for students to identify linear, exponential, and quadratic functions using multiple representations. Lessons introduce students to the concept of building new functions on a coordinate plane by operating on separate functions.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
1.1	Patterns: They're Grrrrrrowing! Exploring and Analyzing Patters	•Identify multiple patterns within a sequence. •Use patterns to solve problems.	A.SSE.1.a A.SSE.1.b A.SSE.2 A.APR.1 F.IF.8.b F.BF.1.b	N/A	•				
1.2	Are They Saying the Same Thing? Using Patterns to Generate Algebraic Expressions	• Generate algebraic expressions using geometric patterns. • Represent algebraic expressions in different forms. • Determine whether expressions are equivalent. • Identify patterns as linear, exponential, or quadratic using a visual model, a table of values, or a graph.	A.SSE.1.a A.SSE.1.b A.SSE.2 A.APR.1 F.IF.8.b F.FB.1.b	N/A	•		•	•	•
1.3	Are All Functions Created Equal? Comparing Multiple Representations of Functions	• Identify equivalent forms of functions in various representations. • Model situations using tables, graphs, and equations. • Use functions to make predictions. • Determine whether two forms of a function are equivalent.	A.SSE.1.a A.SSE.1.b A.CED.1 A.CED.2 F.IF.4 F.BF.1.b	• Relation • Function • Function notation	•	•	•	•	
1.4	Water Under the Bridge Modeling with Functions	• Use multiple representations of functions to model and solve problems. • Use multiple representations of functions to analyze problems.	A.SSE.1.b A.SSE.2 A.APR.3 A.REI.11	N/A	•				

1.5	I've Created a Monster, *m*(x) Analyzing Graphs to Build New Functions	• Model operations on functions graphically. • Sketch the graph of the sum, difference, and product of two functions on a coordinate plane. • Predict and verify the graphical behavior of functions. • Build functions graphically. • Predict and verify the behavior of functions using a table of values. • Build functions using a table of values.	A.SSE.1.b A.CED.2 F.IF.5 F.IF.7.a F.IF.7.c	• Zero Product Property • Polynomial • Degree	•				

2	Quadratic Functions	This chapter begins with a matching and sorting activity to review the different forms of quadratic functions. Key characteristics of quadratic functions and graphs are identified. Lessons then provide opportunities for students to explore and identify transformations performed on a quadratic function f(x) to form a new function g(x) = Af(B(x-C))+D. This transformational function form is introduced in order to abstract the general principle that transformations on a graph always have the same effect regardless of the type of underlying function. In the later part of the chapter, lessons provide opportunities for students to explore and understand what conditions are necessary to write a unique quadratic function. The set of complex numbers is introduced and students will operate with the imaginary number i. Finally, students will solve quadratic functions over the set of complex numbers.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
2.1	Shape and Structure Forms of Quadratic Functions	• Match a quadratic function with its corresponding graph. • Identify key characteristics of quadratic functions based on the form of the function. • Analyze the different forms of quadratic functions. • Use key characteristics of specific forms of quadratic functions to write equations. • Write quadratic functions to represent problem situations.	A.SSE.1.a A.SSE.2 A.APR.1 F.IF.4 F.IF.9 F.BF.1.a	• Standard form of a quadratic function • Factored form of a quadratic function • Vertex form of a quadratic function • Concavity of a parabola	•	•	•		
2.2	Function Sense Translating Functions	• Analyze the basic form of a quadratic function. • Identify the reference points of the basic form of a quadratic function. • Understand the structure of the basic quadratic function. • Graph quadratic functions through transformations. • Identify the effect on a graph by replacing f(x) by f(x - C) + D. • Identify transformations given equations of quadratic functions. • Write quadratic functions given a graph.	F.IF.7.a F.BF.3	• Reference points • Transformation • Rigid motion • Argument of a function • Translation	•	•			
2.3	Up and Down Vertical Dilations of Quadratic Functions	• Graph quadratic functions through vertical dilations. • Identify the effect on a graph by replacing f(x) by Af(x). • Write quadratic functions given a graph.	F.IF.7.a F.BF.3	• Vertical dilation • Vertical stretching • Vertical compression • Reflection • Line of reflection	•	•	•		•

2.4	Side to Side Horizontal Dilations of Quadratic Functions	• Graph quadratic functions through horizontal dilations. • Identify the effect on a graph by replacing f(x) by f(Bx). • Write quadratic functions given a graph.	F.IF.7.a F.BF.3	• Horizontal dilation • Horizontal stretching • Horizontal compression	•	•	•	•	•
2.5	What's the Point? Deriving Quadratic Functions	• Determine how many points are necessary to create a unique quadratic equation. • Derive a quadratic equation given a variety of information using reference points. • Derive a quadratic equation given three points using a system of equations. • Derive a quadratic equation given three points using a graphing calculator to perform a quadratic regression.	A.CED.1 F.IF.4 F.BF.1.a	N/A	•	•	•		•
2.6	Now Its Getting Complex … But It's Really Not Difficult! Complex Number Operations	• Calculate powers of i. • Interpret the real numbers as part of the complex number system. • Add, subtract, and multiply complex numbers. • Add, subtract, and multiply complex polynomial expressions. • Understand that the product of complex conjugates is a real number. • Rewriting quotients of complex numbers.	N.CN.1 N.CN.2 N.CN.3(+) N.CN.8(+)	• The imaginary number i • Principal square root of a negative number • Set of imaginary numbers • Pure imaginary number • Set of complex numbers • Real part of a complex number • Imaginary part of a complex number • Complex conjugates • Monomial • Binomial • Trinomial		•	•		

2.7	You Can't Spell "Fundamental Theorem of Algebra" without F-U-N! Quadratics and Complex Numbers	• Determine the number and type of zeros of a quadratic function. • Solve quadratic equations with complex solutions. • Use the Fundamental Theorem of Algebra. • Choose an appropriate method to determine zeros of quadratic functions.	N.CN.7 N.CN.8(+) N.CN.9(+)	• Imaginary roots • Discriminant • Imaginary zeros • Fundamental Theorem of Algebra • Double root	•		•		•

3	Polynomial Functions	This chapter begins with two different problem situations to explore how cubic functions are built. Lessons provide opportunities for students to connect characteristics and behaviors of cubic functions to their factors. An emphasis is placed on verifying equivalence between different forms both algebraically and graphically. Students will explore polynomial functions to gain an understanding of end behavior, symmetry, and whether a function is even, odd, or neither. Questions then ask students to graph, write, and explain the effects of transformations on cubic functions, and then draw conclusions about how symmetry is preserved in transformed functions. In the later part of the chapter, lessons focus on building various polynomial functions by operating with the basic power functions on a coordinate plane and in a table of values. Questions then ask students to compare and contrast the various polynomials to understand all the possible shapes and key characteristics for linear, quadratic, cubic, quartic, and quintic functions. At the end of the chapter, lessons focus on students' understanding that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
3.1	Planting the Seeds Exploring Cubic Functions	• Represent cubic functions using words, tables, equations, and graphs. • Interpret the key characteristics of the graphs of cubic functions. • Analyze cubic functions in terms of their mathematical context and problem context. • Connect the characteristics and behaviors of cubic functions to its factors. • Compare cubic functions with linear and quadratic functions. • Build cubic functions from linear and quadratic functions.	A.SSE.1.a A.SSE.1.b A.APR.1 F.IF.7.c	• Relative maximum • Relative minimum • Cubic function • Multiplicity	•	•	•	•	•
3.2	Polynomial Power Power Functions	• Determine the general behavior of the graph of even and odd degree power functions. • Derive a general statement and explanation to describe the graph of a power function as the value of the power increases. • Use graphs and algebraic functions to determine symmetry of even and odd functions. • Determine whether a function is even or odd based on an algebraic function or graph. • Understand the structure of the basic cubic function. • Graph the basic cubic function using reference points and symmetry.	F.IF.4 F.IF.7.a F.IF.7.c	• Power function • End behavior • Symmetric about a line • Symmetric about a point • Even function • Odd function	•	•	•		•

3.3	Function Makeover Transformations and Symmetry of Polynomial Functions	• Dilate, reflect, and translate cubic and quartic functions. • Understand that not all polynomial functions can be formed through transformations. • Explore differences between even and odd functions, and even and odd degree functions. • Use power functions to build cubic, quartic, and quintic functions. • Explore the possible graphs of cubic, quartic, and quintic functions, and extend graphical properties to higher-degree functions.	A.APR.1 F.BF.3	• Polynomial function • Quartic function • Quintic function	•			•	•
3.4	Polynormial DNA Key Characteristics of Polynomial Functions	• Interpret polynomial key characteristics in the context of a problem situation. • Generalize the key characteristics of polynomials. • Sketch the graph of any polynomial given certain key characteristics.	A.APR.3 F.IF.4 F.IF.5 F.IF.7.c	• Absolute maximum • Absolute minimum • Extrema	•			•	
3.5	That Graph Looks a Little Sketchy Building Cubic and Quartic Functions	• Construct cubic functions graphically from three linear functions. • Construct cubic functions graphically from one quadratic and one linear function. • Connect graphical behavior of a cubic function to key characteristics of its factors. • Construct quartic polynomial functions. • Determine the number of real and imaginary roots for polynomial functions based on their factors.	A.APR.3 F.IF.7.c F.IF.9 F.BF.1.b	•Aabsolute maximum • Absolute minimum • Extrema	•	•	•		
3.6	Closing Time The Closure Property	• Compare functions that are closed under addition, subtraction, and multiplication to functions that are not closed under these operations. • Analyze the meaning for polynomials to be closed under an operation. • Compare integer and polynomial operations.	A.APR.1	• Closed under an operation	•	•			

4	Polynomial Expressions and Equations	This chapter presents opportunities for students to analyze, factor, solve, and expand polynomial functions. The chapter begins with an analysis of key characteristics of polynomial functions and graphs. Lessons then provide opportunities for students to divide polynomials using two methods and to expand on this knowledge in order to determine whether a divisor is a factor of the dividend. In addition, students will solve polynomial equations over the set of complex numbers using the Rational Root Theorem. In the later part of the chapter, lessons provide opportunities for students to utilize polynomial identities to rewrite numeric expressions and identify patterns. Students will also explore Pascal's Triangle and the Binomial Theorem as methods to expand powers of binomials.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
4.1	Don't Take This Out of Context Analyzing Polynomial Functions	• Analyze the key characteristics of polynomial functions in a problem situation. • Determine the average rate of change of a polynomial function. • Solve equations and inequalities graphically.	A.SSE.1.a A.CED.3 A.REI.11 F.IF.4 F.IF.6	•Average rate of change	•	•	•		
4.2	The Great Polynomial Divide Polynomial Division	• Describe similarities between polynomials and integers. • Determine factors of a polynomial using one or more roots of the polynomial. • Determine factors through polynomial long division. • Compare polynomial long division to integer long division.	A.SSE.1.a A.SSE.3.a A.APR.1	•Polynomial long division •Synthetic division		•	•		•
4.3	The Factors of Life The Factor Theorem and Remainder Theorem	• Use the Remainder Theorem to evaluate polynomial equations and functions. • Use the Factor Theorem to determine if a polynomial is a factor of another polynomial. • Use the Factor Theorem to calculate factors of polynomial equations and functions.	A.APR.2	• Remainder Theorem • Factor Theorem		•	•	•	
4.4	Break It Down Factoring Higher Order Polynomials	•Factor higher order polynomials using a variety of factoring methods.	N.CN.8 A.SSE.2 A.APR.3 F.IF.8.a	N/A		•	•	•	

4.5	Getting to the Root of It All Rational Root Theorem	• Use the Rational Root Theorem to determine possible roots of a polynomial. • Use the Rational Root Theorem to factor high order polynomials. • Solve higher order polynomials.	A.APR.2 F.IF.8.a	•Rational Root Theorem			•		
4.6	Identity Theft Exploring Polynomial Identities	• Use polynomial identities to rewrite numeric expressions. • Use polynomial identities to generate Pythagorean triples. • Identify patterns in numbers generated from polynomial identities. • Prove statements involving polynomials.	A.APR.4	• Euclid's Formula		•	•		
4.7	The Curious Case of Pascal's Triangle Pascal's Triangle and the Binomial Theorem	• Identify patterns in Pascal's Triangle. • Use Pascal's Triangle to expand powers of binomials. • Use the Binomial Theorem to expand powers of binomials. • Extend the Binomial Theorem to expand binomials of the form $(ax + by)^n$.	A.APR.5	• Binomial Theorem		•	•		

5	Polynomial Functions	This chapter provides opportunities for students to solve polynomial inequalities algebraically and graphically. Lessons present various problem situations and ask students to use a graphing calculator to determine the polynomial regression function that best models the data. Students then use their regression functions to answer questions. Piecewise functions are introduced for situations where a single polynomial function is not the most appropriate model for a set of data. At the end of the chapter, the lesson provides opportunities for students to compare properties of two functions each represented in a different way. Questions present functions that are represented using a graph, table of values, equation, or description of its key characteristics.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
5.1	Unequal Equals Solving Polynomial Inequalities	•Determine all roots of polynomial equations. •Determine solutions to polynomial inequalities algebraically and graphically.	A.CED.1 A.CED.3	N/A	•	•	•		•
5.2	America's Next Top Polynomial Model Modeling with Polynomials	• Determine the appropriate regression equation to model a problem situation. • Predict outcomes using a regression equation. • Sketch polynomial functions that appropriately model a problem situation.	A.CED.3 F.IF.4 F.IF.5 F.BF.1 S.ID.6.a	•Regression equation •Coefficient of determination	•				•
5.3	Connecting Pieces Piecewise Functions	• Write a piecewise function to model data. • Graph a piecewise function. • Determine intervals for a piecewise function to best model data.	A.CED.1 A.CED.3 F.IF.7.b S.ID.6.a	•Piecewise function	•	•		•	•
5.4	Modeling Gig Modeling Polynomial Data	• Model a problem situation with a polynomial function. • Solve problems using a regression equation.	A.CED.2 A.CED.3 A.REI.11 F.LE.3 S.ID.6.a	N/A	•		•		•
5.5	The Choice Is Yours Comparing Polynomials in Different Representations	• Compare polynomials using different representations. • Analyze key characteristics of polynomials.	F.IF.9	N/A		•	•		

6	Sequences and Series	This chapter begins with a review of arithmetic and geometric sequences and their explicit and recursive formulas. Lessons provide opportunities for students to explore finite and infinite arithmetic series, and then finite and infinite geometric series are used to derive formulas to compute each type of series. Students will explore and analyze the common ratios of several infinite geometric series to understand under what conditions the series is either divergent or convergent. In the later part of the chapter, lessons provide opportunities for students to apply their understanding of geometric series to solve problems.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
6.1	Sequence-Not Just Another Glittery Accessory Arithmetic and Geometric Sequences	• Recognize patterns as sequences. • Determine the next term in a sequence. • Write explicit and recursive formulas for arithmetic and geometric sequences. • Use formulas to determine unknown terms of a sequence.	F.BF.2	• Arithmetic sequence • Geometric sequence • Finite sequence • Infinite sequence	•		•	•	
6.2	This is Series(ous) Business Finite Arithmetic Sequences	• Compute a finite series. • Use sigma notation to represent a sum of a finite series. • Use Gauss's method to calculate a sum of a finite arithmetic series. • Write a function to represent the sum of a finite arithmetic series. • Use finite arithmetic series to solve real world problems.	A.SSE.1.a A.CED.1 F.BF.2	• Tessellation • Series • Finite series • Infinite series • Arithmetic series	•				
6.3	I Am Having a Series Craving (For Some Math)! Geometric Series	• Generalize patterns to derive the formula for the sum of a finite geometric series. • Compute a finite geometric series.	A.SSE.1.a A.SSE.4 F.BF.2	• Geometric series		•	•		

6.4	These Series Just Go On … And On … And On … Infinite Geometric Series	• Write a formula for an infinite geometric series. • Compute an infinite geometric series. • Draw diagrams to model infinite geometric series. • Determine whether series are convergent or divergent. • Use a formula to compute a convergent infinite geometric series.	A.SSE.4	• Convergent series • Divergent series	•		•	•	
6.5	The Power of Interest (It's a Curious Thing) Geometric Series Applications	• Apply your understanding of series to problem situations. • Write the formula for a geometric series representing a problem situation.	A.SSE.4	N/A	•	•	•	•	•
6.6	A Series of Fortunate Events Applications of Arithmetic and Geometric Series	• Apply your understanding of series to problem situations. • Determine whether a situation is best modeled by a geometric or arithmetic series.	A.SSE.4	N/A	•				•

7	Rational Functions	This chapter presents opportunities for students to analyze, graph, and transform rational functions. The chapter begins with an analysis of key characteristics of rational functions and graphs. Lessons then expand on this knowledge for transformations of rational functions. Students will determine whether graphs of rational functions have vertical asymptotes, removable discontinuities, both, or neither, and then sketch graphs of rational functions detailing all holes and asymptotes. Finally, students will explore problem situations modeled by rational functions and answer questions related to each scenario.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	Lesson Title	Key Math Objective	CCSS	Key Terms					
7.1	A Rational Existence Introduction to Rational Functions	• Graph rational functions. • Compare rational functions in multiple representations. • Compare the basic rational function to various basic polynomial functions. • Analyze the key characteristics of rational functions.	F.IF.7.d (+)	• Rational function • Vertical asymptote	•		•		•
7.2	A Rational Shift in Behavior Translating Rational Functions	• Analyze rational functions with a constant added to the denominator. • Compare rational functions in different forms. • Identify vertical asymptotes of rational functions.	F.IF.7.d (+) F.IF.8.a F.BF.3	N/A	•		•		
7.3	A Rational Approach Exploring Rational Functions Graphically	• Graph rational functions. • Determine graphical behavior of rational functions from the form of the equation. • Translate rational functions.	F.IF.7.d (+) F.IF.8.a F.BF.3	N/A	•	•	•	•	•
7.4	There's a Hole In My Function, Dear Liza Graphical Discontinuities	• Sketch rational functions with removable discontinuities. • Rewrite rational expressions. • Compare removable discontinuities to vertical asymptotes. • Identify domain restrictions of rational functions.	A.APR.6 A.APR.7 (+) F.IF.7.d (+) F.IF.8.a	•Removable discontinuity	•	•	•	•	
7.5	The Breaking Point Using Rational Functions to Solve Problems	• Model situations with rational functions. • Use rational expressions to solve real-world problems.	A.SSE.2 A.CED.1 A.REI.2 F.IF.5	N/A			•		

8	Solving Rational Expressions	This chapter provides opportunities for students to connect their knowledge of operations with rational numbers to operations with rational expressions. Lessons provide opportunities for students to analyze and compare the process to add, subtract, multiply, and divide rational numbers to the same operations with rational expressions. Students conclude rational expressions are similar to rational numbers and are closed under all the operations. In the later part of the chapter, lessons provide opportunities for students to write and solve rational equations and list restrictions. Student work is presented throughout the chapter to demonstrate efficient ways to operate with rational expressions and efficient ways to solve rational equations based on the structure of the original equation.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
8.1	There Must Be a Rational Explanation Adding and Subtracting Rational Expressions	• Add and subtract rational expressions. • Factor to determine a least common dominator.	A.SSE.2 A.APR.6 A.APR.7(+)	N/A		•	•		
8.2	Different Client, Same Deal Multiplying and Dividing Rational Expressions	• Multiply rational expressions. • Divide rational expressions.	A.SSE.2 A.APR.6 A.APR.7(+)	N/A		•	•		
8.3	Things Are Not Always as They Appear Solving Rational Equations	• Solve rational equations in one variable.	A.SSE.2 A.REI.2 A.REI.11	•Rational equation •Extraneous solution	•		•		•
8.4	Get to Work, Mix It Up, Go the Distrance, and Lower the Cost! Using Rational Equations to Solve Real-World Problems	• Use rational equations to model and solve work problems. • Use rational equations to model and solve mixture problems. • Use rational equations to model and solve distance problems. • Use rational equations to model and solve cost problems.	A.CED.1 A.REI.2	N/A	•				

9	Radical Functions	This chapter presents opportunities for students to explore radical functions, simplify radical expressions, and solve radical equations. The chapter begins with an introduction to radical functions as inverses of power functions. Students will graph radical functions, write their equations, and determine their key characteristics. Lessons then expand on this knowledge for transformations of radical functions. In the later part of the chapter, lessons provide opportunities for students to rewrite radicals using rational exponents and extract roots from radical expressions. Students will also multiply, divide, add, and subtract radical expressions. Finally, students will analyze solution strategies for radical equations, and solve real-world problem situations using radical equations.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
9.1	With Great Power ... Inverses of Power Functions	• Graph the inverses of power functions. • Use the Vertical Line Test to determine whether an inverse relation is a function. • Use graphs to determine whether a function is invertible. • Use the Horizontal Line Test to determine whether a function is invertible. • Graph inverses of higher-degree power functions. • Generalize about inverses of even- and odd-degree power functions.	F.IF.4 F.IF.5 F.IF.7b F.IF.9 F.BF.4a	• Inverse of a function • Invertible function • Horizontal Line Test	•		•	•	
9.2	The Root of the Matter Radical Functions	• Restrict the domain of f(x) 5 x 2 to graph the square root function. • Determine equations for the inverses of power functions. • Identify characteristics of square root and cube root functions, such as domain and range. • Use composition of functions to determine whether two functions are inverses of each other. • Solve real-world problems using the square root and cube root functions.	F.IF.4 F.IF.5 F.IF.7.b F.IF.9 F.BF.1.c (+) F.BF.4.a	• Square root function • Cube root function • Radical function • Composition of functions	•	•	•	•	
9.3	Making Waves Transformations of Radical Functions	• Graph transformations of radical functions. • Analyze transformations of radical functions using transformational function form. • Describe transformations of radical functions using algebraic, graphical, and verbal representations. • Generalize about the effects of transformations on power functions and their inverses.	F.IF.4 F.IF.5 F.IF.7b F.IF.9 F.BF.3	N/A	•		•		
9.4	Keepin' It Real Extracting Roots and Rewriting Radicals	• Extract roots from radicals. • Rewrite radicals as powers that have rational exponents. • Rewrite powers that have rational exponents as radicals.	N.RN.1 N.RN.2	N/A	•	•	•		

9.5	Time to Operate! Multiplying, Dividing, Adding, and Subtracting Radicals	• Rewrite radicals by extracting roots. • Multiply, divide, add, and subtract radicals.	N.RN.1 N.RN.2	N/A		•	•	•	
9.6	Look to the Horizon Solving Radical Equations	• Use algebra to solve radical equations. • Write the solution steps of a radical equation using radical notation. • Write the solution steps of a radical equation using exponential notation. • Identify extraneous roots when solving radical equations.	A.REI.2	N/A		•	•		

10	Graphs of Exponential and Logarithmic Functions	This chapter presents opportunities for students to analyze, graph, and transform exponential and logarithmic functions. The chapter begins with an exploration of exponential functions. Students will analyze key characteristics of exponential functions and graphs. Lessons then expand on this knowledge for transformations of exponential functions. In the later part of the chapter, lessons focus on logarithmic functions. Student will determine key characteristics of logarithmic functions and graphs. Students will also transform logarithmic functions and make generalizations about the effect of a transformation on an inverse function.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
10.1	Small Investment, Big Reward Exponential Functions	• Construct an exponential function from a geometric sequence. • Classify functions as exponential growth or decay. • Compare tables, graphs, and equations of exponential functions.	F.IF.4 F.IF.8b F.LE.5	• Half-life	•	•	•		•
10.2	We Have Liftoff! Properties of Exponential Graphs	• Identify the domain and range of exponential functions. • Investigate graphs of exponential functions through intercepts, asymptotes, intervals of increase and decrease, and end behavior. • Explore the irrational number e.	F.IF.4 F.IF.7e F.IF.9	• natural base e	•	•	•		•
10.3	I Like to Move It Transformations of Exponential Functions	• Dilate, reflect, and translate exponential functions using reference points and transformational function form. • Investigate graphs of exponential functions through intercepts, asymptotes, intervals of increase and decrease, and end behavior. • Describe how transformations of exponential functions affect their key characteristics.	F.BF.3	N/A	•		•		

10.4	I Feel the Earth Move Logarithmic Functions	• Graph the inverses of exponential functions with bases of 2, 10, and e. • Recognize the inverse of an exponential function as a logarithm. • Identify the domain and range of logarithmic functions. • Investigate graphs of logarithmic functions through intercepts, asymptotes, intervals of increase and decrease, and end behavior.	F.IF.4 F.IF.5 F.IF.7e F.BF.4a	• Logarithm • Logarithmic function • Common logarithm • Natural logarithm	•	•		•	•
10.5	More Than Meets the Eye Transformations of Logarithmic Functions	• Dilate, reflect, and translate logarithmic functions using reference points. • Investigate graphs of logarithmic functions through intercepts, asymptotes, intervals of increase and decrease, and end behavior.	F.BF.3	N/A	•				

11	Exponential and Logarithmic Expressions and Equations	In this chapter, students use their understanding of exponential and logarithmic functions to solve exponential and logarithmic equations. Students begin by building understanding and fluency with exponential and logarithmic expressions, including estimating the values of logarithms on a number line and then use this understanding to derive the properties of logarithms. Students explore alternative methods for solving logarithmic equations and solve exponential and logarithmic equations in context.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
11.1	All The Pieces of the Puzzle Exponential and Logarithmic Forms	• Convert exponential equations into logarithmic equations. • Convert logarithmic equations into exponential equations. • Solve exponential and simple logarithmic equations. • Estimate the values of logarithms on a number line. • Evaluate logarithmic expressions.	F.BF.5(+)	• Logarithmic equation	•	•	•	•	
11.2	Mad Props Properties of Logarithms	• Derive the properties of logarithms. • Expand logarithmic expressions using the properties of logarithms. • Rewrite multiple logarithmic expressions as a single logarithmic expression.	F.BF.5(+)	• Zero Property of Logarithms • Logarithms with Same Base and Argument • Product Rule of Logarithms • Quotient Rule of Logarithms • Power Rule of Logarithms	•				
11.3	What's Your Strategy? Solving Exponential Equations	• Solve exponential equations using the Change of Base Formula. • Solve exponential equations by taking the log of both sides. • Analyze different solution strategies to solve exponential equations.	F.BF.5(+) F.LE.4	• Change of Base Formula			•		•

11.4	Logging On Solving Logarithmic Equations	• Solve for the base, argument, and exponent of logarithmic equations. • Solve logarithmic equations using logarithmic properties. • Solve logarithmic equations arising from real-world situations. • Complete a decision tree to determine efficient methods for solving exponential and logarithmic equations.	F.BF.5(+) F.LE.4	N/A	•		•	•	
11.5	So When Will I Use This? Applications of Exponential and Logarithmic Equations	• Use exponential models to analyze problem situations. • Use logarithmic models to analyze problem situations.	F.BF.5(+) F.LE.4	N/A			•		

12	Mathematical Modeling	In this chapter, students explore various real-world and purely mathematical situations that are modeled with functions. Function composition is developed, and students apply function composition to solve contextual problems. Students also use functions to draw graphics, to model optimal solutions and self-similarity, and to study situations modeled by logistic growth, such as the spread of infectious diseases. Students end the chapter by choosing appropriate functions to model a variety of problem situations.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
12.1	It's Not New, It's Recycled Composition of Functions	• Perform the composition of two functions graphically and algebraically. • Use the composition of functions to determine whether two functions are inverses of each other. • Add, subtract, multiply, and divide with functions. • Determine the restricted domain of a composite function.	F.IF.5 F.BF.1c F.BF.4b	• Identity function	•		•		
12.2	Paint by Numbers Art and Transformations	• Use transformations of functions and other relations to create artwork. • Write equations for transformed functions and other relations given an image.	F.IF.7.a F.IF.7.b F.IF.7.c F.IF.7.d F.IF.7.e	N/A	•				
12.3	Make the Most of It Optimization	• Determine constraints from a problem situation. • Analyze a function to calculate maximum or minimum values.	A.CED.3 A.REI.12 F.IF.1b F.IF.4	N/A	•				•

12.4	A Graph is Worth a Thousand Words Interpreting Graphs	• Interpret the contextual meaning of a graph and analyze it in terms of a problem situation • Write a logistic growth function to model a data set. • Use technology to generate random numbers in order to conduct an experiment modeling logistic growth.	F.IF.2 F.IF.4 F.IF.7d	• Logistic functions • Carrying capacity	•				•
12.5	This Is the Title of This Lesson Fractals	• Build expressions and equations to model the characteristics of self-similar objects. • Write sequences to model situations and use them to identify patterns. • Analyze the counterintuitive	F.IF.3 F.BF.1a F.BF.2	• Fractal • Self-similar • Iterative process	•				
12.6	Grab Bag Choosing Functions to Model Situations	• Use technology to determine regression equations that model data. • Choose functions to model problem situations. • Graph and analyze function characteristics in terms of problem situations.	A.CED.3 F.BF.1b F.BF.3 F.LE.2 F.LE.5	N/A			•		•

13	Trigonometric Functions	This chapter begins with a problem situation involving a Ferris wheel in which students explore how periodic functions are built. Lessons provide opportunities for students to analyze the graphs of periodic functions for characteristics such as the maximum, minimum, period, amplitude, and midline. Students will explore the unit circle to understand radian measure and convert between angle measures in degrees and radians. Using new understanding of the unit circle, radian measure, and periodic functions, students will investigate the sine and cosine functions as well as their characteristics and graphs. In the later part of the chapter, students recall the transformational function form g(x) = Af(B(x - C)) + D to graph and analyze transformations of the sine and cosine functions and build a graph of the tangent function using a context. Students will analyze the characteristics of the tangent graph, and apply their knowledge of transformations to sketch graphs of transformed tangent functions.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
13.1	A Sense of Deja Vu Periodic Functions	• Model a situation with a periodic function. • Analyze the period and amplitude of a periodic function. •Determine the period, amplitude, and midline of a periodic function.	F.IF.7e	• Periodic function • Period • Standard position • Initial ray • Terminal ray • Amplitude • Midline	•				•
13.2	Two Pi Radii Radian Measure	• Determine the radian measure of angles. • Convert between angle measures in degrees and angle measures in radians. • Estimate the degree measure of central angle measures given in radians. • Identify reference angles in radians.	F.TF.1 F.TF.2	• Theta (θ) • Unit circle • Radians	•		•		•

13.3	Triangulation The Sine and Cosine Functions	• Define the sine and cosine functions. • Calculate values for the sine and cosine of reference angles. • Define the sine and cosine of an angle as a coordinate of a point on the unit circle. • Graph and compare the sine and cosine functions.	F.TF.3(+) F.TF.5	• Sine function • Cosine function • Trigonometric function • Periodicity identity	•		•	•	
13.4	Pump Up the Amplitude Transformations of Sine and Cosine Functions	• Transform the graphs of the sine and cosine functions. • Determine the amplitude, frequency, and phase shift of transformed functions. • Graph transformed sine and cosine functions using a descriptions of the period, phase shift, and amplitude.	F.TF.3(+) F.TF.5	• Frequency • Phase shift	•	•		•	
13.5	Farmer's Tan The Tangent Function	• Build the graph of the tangent function using the ratio sin θ / cos θ. • Analyze characteristics of the tangent function, including period and asymptotes. • Calculate values of the tangent function for common angles. • Identify transformations of the tangent function.	F.TF.3(+) F.TF.5	• Tangent function	•	•	•		

14	Trigonometric Equations	In this chapter, students are introduced to solving trigonometric equations. They use their knowledge of the unit circle, radian measures, and the graphical behaviors of trigonometric functions to solve sine, cosine, and tangent equations. Students then apply all that they have learned to model various situations with trigonometric functions, including circular motion. Finally, students explore the damping function and modeling with trigonometric transformations.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
14.1	Chasing Theta Solving Trigonometric Equations	• Write and solve trigonometric equations. • Use periodicity identities to identify multiple solutions to trigonometric equations. • Solve trigonometric equations using inverse trigonometric functions. • Solve second-degree trigonometric equations. • Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$. • Use the Pythagorean identity to determine other trigonometric values.	F.TF.1 F.TF.2 F.TF.8	• Trigonometric equation • Inverse sine ($\sin^{-1}$) • Inverse cosine ($\cos^{-1}$) • Inverse tangent ($\tan^{-1}$) • Pythagorean identity	•	•	•		•
14.2	Rabbits and Seasonal Affective Disorder Modeling with Periodic Functions	• Model real-world situations with periodic functions. •Interpret key characteristics of periodic functions in terms of problem situations.	F.TF.5	N/A	•				•
14.3	Behind the Wheel Modeling Motion with a Trigonometric Function	• Interpret characteristics of a graph of a trigonometric function in terms of a problem situation. • Construct a trigonometric function to model a problem situation.	F.TF.5	N/A	•				
14.4	Springs Eternal The Damping Function	• Choose a trigonometric function to model a periodic phenomenon. • Determine the graphical attributes (amplitude, midline, frequency) of a periodic function from a description of a situation. • Build a function that is a combination of a trigonometric function and an exponential function.	F.TF.5	• Damping function	•		•		

15	Interpret Data in Normal Distributions	The first lesson of this chapter leverages student knowledge of relative frequency histograms to introduce normal distributions. Students explore the characteristics of normal distributions. In the second lesson, students build their knowledge of normal distributions using the Empirical Rule for Normal Distributions. Students use the Empirical Rule for Normal Distributions to determine the percent of data between given intervals that are bounded by integer multiples of the standard deviation from the mean. In the third lesson, students use a z-score table and a graphing calculator to determine the percent of data in given intervals that are bounded by non-integer multiples of the standard deviation from the mean. In the last lesso, students use their knowledge of probability and normal distributions to analyze scenarios and make decisions.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
15.1	Recharge It! Normal Distributions	• Differentiate between discrete data and continuous data. • Draw distributions for continuous data. • Recognize the difference between normal distributions and non-normal distributions. • Recognize and interpret properties of a normal curve and a normal distribution. • Describe the effect of changing the mean and standard deviation on a normal curve.	S.ID.1 S.ID.2 S.ID.4	• Discrete data • Continuous data • Sample • Population • Normal curve • Normal distribution • Mean <Greek letter mu> • Standard deviation <Greek letter sigma>	•				
15.2	#I'mOnline The Empirical Rule for Normal Distributions	• Recognize the connection between normal curves, relative frequency histograms, and the Empirical Rule for Normal Distributions. • Use the Empirical Rule for Normal Distributions to determine the percent of data in a given interval.	S.ID.1 S.ID.4	• Standard normal distribution • Empirical Rule for Normal Distributions	•				

15.3	Below the Line, Above the Line, and In Between the Lines Z-Scores and Percentiles	• Use a z-score table to calculate the percent of data below any given data value, above any given data value, and between any two given data values in a normal distribution. • Use a graphing calculator to calculate the percent of data below any given data value, above any given data, and between any two given data values in a normal distribution. • Use a z-score table to determine the data value that represents a given percentile. • Use a graphing calculator to determine the data value that represents a given percentile.	S.ID.4	• z-score • Percentile	•	•	•		•
15.4	You Make the Call Normal Distributions and Probability	• Interpret a normal curve in terms of probability. • Use normal distributions to determine probabilities. • Use normal distributions and probabilities to make decisions.	S.MD.6(+) S.MD.7(+)	N/A	•				

16	Making Inferences and Justifying Conclusions	The first two lessons focus on methods of collecting data to analyze a question or characteristic of interest, specific sampling methods, and the significance of randomization. Then, students use data from samples to estimate population means and proportions, and determine whether results are statistically significant. In the last lesson, students have the opportunity to complete a culminating project based on concepts from the chapter.			Modules	Worked Examples	Peer Analysis	Talk the Talk	Technology
Chapter	**Lesson Title**	**Key Math Objective**	**CCSS**	**Key Terms**					
16.1	For Real? Sample Surveys, Observational Studies, and Experiments	• Identify characteristics of sample surveys, observational studies, and experiments. • Differentiate between sample surveys, observational studies, and experiments. • Identify possible confounds in the design of experiments.	S.IC.1 S.IC.3	• Characteristic of interest • Sample survey • Random sample • Biased sample • Observational study • Experiment • Treatment • Experimental unit • Confounding			•	•	
16.2	Circle Up Sampling Methods and Randomization	• Use a variety of sampling methods to collect data. • Identify factors of sampling methods that could contribute to gathering biased data. • Explore, identify, and interpret the role of randomization in sampling. • Use data from samples to estimate population mean.	S.IC.1 S.IC.3	• Convenience sample • Subjective sample • Volunteer sample • Simple random sample • Stratified random sample • Cluster sample • Cluster • Systematic sample • Parameter • Statistic		•	•		•

16.3	Sleep Tight Using Confidence Intervals to Estimate Unknown Population Means	• Interpret the margin of error for estimating a population proportion. • Interpret the margin of error for estimating a population mean. • Recognize the difference between a sample and a sampling distribution. • Recognize that data from samples are used to estimate population proportions and population means. • Use confidence intervals to determine the margin of error of a population proportion estimate. • Use confidence intervals to determine the margin of error of a population mean estimate.	S.IC.1 S.IC.4 S.IC.6	• Population proportion • Sample proportion • Sampling distribution • Confidence interval	•	•	•	•	
16.4	How Much Different? Using Statistical Significance to Make Inferences About Populations	• Use sample proportions to determine whether differences in population proportions are statistically significant. • Use sample means to determine whether differences in population means are statistically significant.	S.IC.1 S.IC.2 S.IC.4 S.IC.5 S.IC.6	• Statistically significant	•		•		
16.5	DIY Designing a Study and Analyzing the Results	• Analyze the validity of conclusions based on statistical analysis of data. • Design a sample survey, observational study, or experiment to answer a question. • Conduct a sample survey, observational study, or experiment to collect data. • Summarize the data of your sample survey, observational study, or experiment. • Analyze the data of your sample survey, observational study, or experiment. • Summarize the results and justify conclusions of your sample survey, observational study, or experiment.	S.IC.1 S.IC.2 S.IC.3 S.IC.4 S.IC.5 S.IC.6	N/A					