Algebra 2: Mrs. Monroe
Curriculum: Illustrative Mathematics

Unit #1: Functions/Graphs and Their Transformations

Overview: Students will explore the concept of functions and their representations in multiple forms (graphical, numerical, algebraic, and verbal). They will learn to identify key features of functions, determine domains and ranges, perform transformations and operations, find inverses, and analyze special types such as piecewise and step functions. Students will also interpret average rate of change and investigate how functions model real-world situations.

Topic/Theme Duration	FUNCTIONS/GRAPHS AND THEIR TRANSFORMATIONS SEPTEMBER – MID OCTOBER (4-6 WEEKS)
Focus Question/s	• How can relations be represented? • How do we determine whether a given relation is a function? • How do we identify the domain and range of a relation or function? • How do you use transformations to help graph absolute value functions and other functions? • How do we determine key features of a function? • How do we determine the inverse of a relation or function? • How do we find the average rate of change? • How do we perform graphical transformation of functions? • How do we graph and evaluate piecewise functions?
Standards	**F.IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities. **A.APR.A.1 -** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication. **A.CED.A.2 -** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **S.REI.D.11 -** Explain why the x-coordinates of the points where the graphs of the equation $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$. **F.IF.7** Graph functions and show key features of the graph by hand and using technology when appropriate. **F-IF-7.a**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph linear and quadratic functions and show intercepts, maxima, and minima. **A-CED-2**: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

	F-IF-5: Relate the 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 (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **AF-IF-4:** For a function that models a relationship between two quantities, and sketch graphs showing key features given a verbal description of the relationship. **F-IF-9:** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **F.BF.3:** Identify the effect of the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative) find the value of k given the graph.
Key Student Learning Objectives	**Students will be able to:** • Find the domain and range of a relation and a function graphically and algebraically. • Find key features of a function i.e. x- and y-intercepts, absolute and relative extrema, increasing, decreasing and constant intervals. • Determine if a function is one-to-one. • Use the vertical and horizontal line tests. • Use interval notation to find the domain and range of a function graphically and algebraically • Perform transformations on functions • Perform operations with functions • Find the inverse of a function algebraically and graphically • Find the average rate of change of various functions over different intervals. • Evaluate piecewise and step functions. • Graph piecewise and step functions. • Create piecewise functions from a graph. • Identify the vertical translations, horizontal translations, stretches or shrinks, and reflection of the 9 parent function and use this information to graph the function. • Write the parent function and the transformation rule given the graph or verbal interpretation.

Learning Targets	**Understanding Functions**
	- I can identify whether a relation represents a function. - I can use the vertical line test to determine if a graph represents a function. - I can determine if a function is one-to-one using the horizontal line test. **Domain and Range** - I can find the domain and range of a relation or function graphically and algebraically. - I can write the domain and range using interval **notation**. - I can relate the domain of a function to the context of a real-world situation**.** **Key Features of Functions** - I can identify x- and y-intercepts**,** maximums and minimums**,** and intervals where a function is increasing, decreasing, or constant**.** - I can describe how these features appear in graphs, tables, and equations. - Transformations of Functions - I can describe and perform transformations of parent functions, including translations, reflections, stretches, and shrinks. - I can identify and graph transformations of the nine parent functions. - I can explain how transformations affect a function's domain, range, and key features. **Operations and Compositions** - I can add, subtract, multiply, divide, and compose functions. - I can find and state the domain of the resulting function. - Inverse Functions - I can find the inverse of a function algebraically and graphically. - I can verify that two functions are inverses by using composition. **Average Rate of Change** - I can calculate the average rate of change of a function over a given interval. - I can interpret the meaning of the average rate of change in a real-world context. **Piecewise and Step Functions** - I can evaluate piecewise and step functions for given inputs.

	• I can graph piecewise and step functions accurately. • I can write a piecewise function to represent a given graph or situation.

Sequence of Key Learning Activities	• Introduction/Launch-
	    ➢ Which does not belong?
	    ➢ What do you notice? What do you wonder?
	• Mini- Lesson
	• Exploration
	• Check for Understanding
	• Summary-Exit Ticket
	
	Note: Mini-lesson or Exploration /Check for Understanding and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

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Unit 2: QUADRATIC AND POLYNOMIALS FUNCTIONS

Overview: Students will explore the structure, key features, and applications of quadratic and polynomial functions. They will analyze graphs, solve equations by multiple methods, and interpret solutions—including complex numbers. The unit builds algebraic fluency in factoring, completing the square, and using the quadratic formula, and extends to modeling and solving higher-degree polynomial equations using technology, factoring, and theorems.

Topic/Theme Duration	QUADRATIC AND POLYNOMIALS FUNCTIONS **End of October-Beginning of December(6-7 WEEKS)**
Focus Question/s	- What are some important features of polynomial expressions and their graphs? - What happens when polynomials are added, subtracted, or multiplied? - How do we factor polynomials of the form $x^2 + bx + c$ and $x^2 - c$ using factoring techniques? - How do we factor polynomials of the form $ax^2 + bx + c$ using factoring techniques? - How do we solve quadratic equations by Factoring? - How do we solve quadratic equation using square roots? - How do we solve quadratic equation by completing the square? - How do we use the Quadratic Formula to Solve Quadratic Equations? - How is it possible to manipulate algebraic expressions with non real Values? - How do we perform operations with complex numbers? - How do we divide complex numbers? - How do we solve quadratic systems algebraically and graphically? - How do we find and use the sum and product of the roots of a quadratic equations? - How do we use factoring by grouping to factor polynomial expression with 4 terms? - How do we find the roots of polynomials equations of higher degree? - What are some characteristics of the graphs of polynomial functions? - What is the multiplicity of a zero and how does it affect the zero? - How do we use the degree of a polynomial, its leading coefficient and multiplicity of its zeros to sketch and identify a polynomial? - How do we determine if a function is Even or Odd? - How do we find zeros of a polynomial function using long division? - How do we find zeros of a polynomial function using synthetic division?

	• How can we use a remainder inform us about a polynomial functions?
Standards	**A.SSE** Interpret the structure of expressions. **A.APR.1** Add, subtract, and multiply polynomials and recognize that the result of the operation is also a polynomial. This forms a system analogous to the integers. **A.SSE.A.1.a:** Interpret parts of an expression, such as terms, factors, and coefficients. **F.IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities. **A.APR.A.1 -** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication. **A.CED.A.2 -** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **S.REI.D.11 -** Explain why the *x*-coordinates of the points where the graphs of the equation $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$. **A.SSE.A.1 -** Interpret expressions that represent a quantity in terms of its context. **F.IF.7** Graph functions and show key features of the graph by hand and using technology when appropriate. **A.APR.B:** Understand the relationship between zeros and factors of polynomials. **F-IF-7.a**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph linear and quadratic functions and show intercepts, maxima, and minima. **A-REI-11**: Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$; 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. **F.IF.7.c:** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. **A-REI-4.b**: Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm b$ for real numbers *a* and *b*. **F-IF-8.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.

	N-CN-7: Solve quadratic equations with real coefficients that have complex solutions
	N-CN-1: Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ and a and b real
	N-CN-2: Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers
	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.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically
	A-CED-2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	F-IF-5: Relate the 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 (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
	A.APR-3: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
	F-IF-4: For a function that models a relationship between two quantities, and sketch graphs showing key features given a verbal description of the relationship.
	F-IF-9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
	A-SSE-2: Use the structure of an expression to identify ways to rewrite it.
	F.BF.3: Identify the effect of the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative) find the value of k given the graph.
Key Student Learning Objectives	**Students will be able to:** • The standard form of a quadratic equation is $ax^2 + bx + c = 0$ • The zeros of a quadratic function are where the function intersects the x-axis • The vertex of a quadratic function is the highest or lowest y-value the function reaches • The standard form of a quadratic equation is calculator ready • The vertex of a quadratic function is the highest or lowest y-value the function reaches • A graphing calculator can be used to calculate all points of a quadratic function by using the table or looking at the graph • A sketch of the graph or graphing calculator can be used to solve a quadratic equation

	- The axis of symmetry the line of symmetry half way in between both zeros. - All quadratic function have two zeros; they can be standard zeros, repeated zeros, or imaginary zeros. - The reverse of distributive property is factoring - Quadratic functions that are perfect squares can be factored in one of two ways; factoring a perfect square trinomial or factoring the difference of two squares. - The concept of factoring applies the same way to factoring a trinomial expression; it is two factors called binomials that multiply to get the starting trinomial - X-method can be used to factor most trinomials. If the trinomial is a perfect square the additional methods for factoring can be also be applied - Completing the square can be used to change a quadratic function from standard form into vertex form in order to find different key features of the function - The square root of any number will always be a positive and negative value; both of these values will determine the roots of a given function - One way to factor quadratic functions that do not have whole number factors is by completing the square - Completing the square is a process that allows you to factor a completed trinomial square by factoring it as a square of a binomial and then finding the square root. - A quadratic function can have real or imaginary solutions - The discriminant of a quadratic function can be used to determine what type of solutions the function has - One way to factor quadratic functions that do not have whole number factors is by using the quadratic formula - The quadratic formula can be used to solve any quadratic function - A quadratic function can have real or imaginary solutions - When multiplying complex numbers with imaginary parts you must also use the distributive property - When adding or subtracting complex numbers (similarly to variables) you can only combine real parts with real parts and imaginary parts with imaginary parts - You can simplify complex numbers by using the relation $i^2 = -1$ - Equation that can be solved using the Properties of Equality is obtained by substitution method.

	- Identify a polynomial. - Classify a polynomial by degree and number of terms. - Find a polynomial function that models real-world data and use it to make predictions. - Write a polynomial in standard form. - Write a polynomial in factored form. - Find the zeros of a polynomial function. - Write a polynomial function form its zeros. - Find the multiplicity of a zero. - Divide a polynomial by a binomial using long division. - Determine if a binomial is a factor of a trinomial. - Divide a polynomial by a binomial using synthetic division. - Evaluate a polynomial using synthetic division and the Remainder Theorem. - Solve a polynomial equation by graphing. - Solve polynomial equations by factoring and using the Zero Product Property. - Factor a sum or difference of cubes. - Use the Rational Root Theorem to find a list of all the possible rational roots of a polynomial function - Find irrational and imaginary roots using conjugates or complex conjugates. - Write a polynomial equation from its roots. - For a given polynomial equation, find the number of complex roots and the possible number of real roots. - Find all of the complex zeros of a polynomial function.
Learning Targets	**A. Understanding Quadratic Functions** - I can identify the standard form of a quadratic equation and describe how each coefficient affects the graph. - I can explain that the zeros of a quadratic function are the points where the graph intersects the x-axis. - I can find and interpret the vertex of a quadratic function as the highest or lowest point of the graph. - I can identify the axis of symmetry as the vertical line that passes through the vertex and splits the parabola in half. - I can use a graphing calculator or sketch to identify the vertex, zeros, and other key points of a quadratic function. - I can use a graph or table to solve quadratic equations. - I can describe the types of zeros a quadratic can have: two real, one repeated, or two imaginary.

B. Factoring and the Structure of Quadratic Expressions
- I can explain that factoring is the reverse of distribution.
- I can factor perfect square trinomials and differences of squares.
- I can use the X-method or other factoring strategies to factor trinomials.
- I can apply factoring to solve quadratic equations using the Zero Product Property.

C. Completing the Square & Vertex Form
- I can complete the square to rewrite a quadratic equation in vertex form.
- I can use completing the square to find the vertex or determine key features of the function.
- I can explain why taking the square root of a number yields positive and negative values, and how these represent two possible solutions.
- I can use completing the square to solve quadratics that cannot be factored easily.

D. The Quadratic Formula & Discriminant
- I can use the quadratic formula to solve any quadratic equation.
- I can use the discriminant to determine whether a quadratic function has real or imaginary solutions.
- I can interpret the number and type of solutions based on the discriminant's value.

E. Complex Numbers
- I can simplify complex numbers using the fact that $i^2 = -1$.
- I can add, subtract, and multiply complex numbers correctly.
- I can explain that complex numbers have both real and imaginary parts, which can only be combined with like terms.
- I can solve quadratic equations that have imaginary solutions.

F. Identifying and Classifying Polynomials
- I can identify and classify polynomials by degree and number of terms.
- I can write a polynomial in standard and factored form.
- I can determine whether a binomial is a factor of a polynomial using substitution or division.

G. Polynomial Operations and Division
- I can divide a polynomial by a binomial using long division or synthetic division.
- I can evaluate a polynomial using synthetic division and apply the Remainder Theorem.

	• I can use polynomial long division to simplify or solve polynomial expressions. **H. Zeros and Factors of Polynomial Functions** • I can find the zeros of a polynomial function. • I can write a polynomial function given its zeros. • I can determine the multiplicity of a zero and explain how it affects the graph. • I can factor sums or differences of cubes. • I can apply the Zero Product Property to solve polynomial equations. • I can use the graph of a polynomial to identify zeros and behavior near them. **I. Rational, Irrational, and Complex Roots** • I can use the Rational Root Theorem to list all possible rational zeros. • I can find irrational and imaginary roots using conjugate pairs. • I can use the Quadratic Formula or factoring to find all real and complex zeros. • I can determine the number and type of roots (real and complex) for a given polynomial. • I can find all complex zeros of a polynomial function. **J. Modeling and Real-World Applications** • I can find a polynomial function that models real-world data and use it to make predictions. • I can interpret key features (intercepts, turning points, end behavior) in the context of a situation. • I can use technology (graphing calculator or Desmos) to explore and verify solutions and models.
Sequence of Key Learning Activities	• Introduction/Launch- ➢ Which does not belong? ➢ What do you notice? What do you wonder? • Mini- Lesson • Exploration • Check for Understanding • Summary-Exit Ticket **Note**: Mini-lesson or Exploration /Check for Understanding and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

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Assessments	Check Students Readiness-Diagnostic Mid Unit Assessments End of Unit Assessment Homework Assignments Exit Tickets In-class Assignments and Check-ins

Unit #3: Exponential and Logarithmic Functions

Overview: This unit focuses on exponential growth and decay models and their inverse, logarithmic functions. Students will explore how exponential and logarithmic relationships appear in real-world contexts, such as population growth and compound interest. They will apply the properties of exponents and logarithms to solve equations and interpret models.

Topic/Theme Duration	**EXPONENTIAL AND LOGARITHMIC FUNCTIONS** **Mid December – Mid January (4-5 WEEKS)**
Focus Question/s	- How can we recognize and describe situations that follow exponential growth or decay patterns? - How do transformations affect the graphs of exponential and logarithmic functions? - What is the relationship between an exponential function and its logarithmic inverse? - How can we use the properties of logarithms to simplify expressions or solve equations? - In what ways do exponential and logarithmic models help us understand real-world phenomena such as population, finance, and radioactive decay? - How can technology support our understanding of exponential and logarithmic relationships?
<u>**Standards:**</u>	**F.IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities. **A.CED.A.2 -** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **F.IF.7** Graph functions and show key features of the graph by hand and using technology when appropriate. **F-IF-7.a**: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph linear and quadratic functions and show intercepts, maxima, and minima. **F.IF.7.e:** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

A-CED-2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

F-IF-5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

F.IF.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

F.BF.1.b: Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*

A.SSE.1.b: Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*

F-IF-9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

F.BF.1.b: Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*

F.BF.3: Identify the effect of the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x+k) for specific values of k (both positive and negative) find the value of k given the graph.

F.BF.4.a: Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, f(x) =2 x3 for x > 0 or f(x) = (x+1)/(x–1) for x ≠ 1.*

F.LE.4: For exponential models, express as a logarithm the solution to *ab*ct = *d* where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology.

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.

Key Student Learning Objectives	**Students will be able to:** • Recognize and write exponential growth and decay functions from graphs, tables, and contexts. • Compare exponential, linear, and quadratic models. • Evaluate and transform exponential functions using translations, reflections, and stretches. • Convert between exponential and logarithmic forms. • Evaluate logarithmic expressions using the properties of logs. • Apply the product, quotient, and power properties of logarithms to simplify expressions. • Solve exponential and logarithmic equations algebraically and graphically. • Use logarithmic and exponential models to represent and solve real-world problems (e.g., population, interest, half-life). • Interpret parameters and relate them to rates of growth or decay. • Use technology (graphing calculator or Desmos) to explore exponential and logarithmic relationships.
Learning Targets	**Understanding Exponential Functions** • I can identify exponential functions from equations, graphs, and tables. • I can distinguish exponential growth from exponential decay. • I can write exponential equations to model real-world situations. • I can interpret the parameters a (initial value) and b (growth/decay factor). • I can graph exponential functions and describe their domain, range, and asymptote. • I can perform vertical and horizontal shifts, reflections, and stretches on exponential functions. **Exploring Logarithmic Functions** • I can define a logarithm as the inverse of an exponential function. • I can convert between exponential and logarithmic forms. • I can identify the domain, range, and vertical asymptote of a logarithmic function.

	• I can evaluate logarithmic expressions using properties of exponents. • I can graph logarithmic functions and relate them to their corresponding exponentials. **Properties of Logarithms** • I can use the product, quotient, and power properties of logarithms to simplify expressions. • I can expand and condense logarithmic expressions. • I can use change-of-base formula to evaluate logs on a calculator. **Solving Equations** • I can solve exponential equations by rewriting bases or using logarithms. • I can solve logarithmic equations by rewriting in exponential form or applying properties of logs. • I can verify solutions graphically or using technology. **Real-World Applications** • I can model and solve problems involving compound interest, continuous growth/decay, and half-life. • I can interpret exponential and logarithmic models in context. • I can use logarithms to determine time or rate in exponential models.

Sequence of Key Learning Activities	• Introduction/Launch-
	    ➢ Which does not belong?
	    ➢ What do you notice? What do you wonder?
	• Mini- Lesson
	• Exploration
	• Check for Understanding
	• Summary-Exit Ticket
	
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Unit #4: Rational Functions

Overview: In this unit, students will explore polynomial and quadratic functions through multiple representations — equations, graphs, and tables. They'll factor, find zeros, analyze vertex form, and apply various solving methods, including completing the square and the quadratic formula. The connection between algebraic structure and graph shape is emphasized.

Topic/Theme Duration	**RATIONAL FUNCTIONS** **FEBRUARY (2-3 WEEKS)**
Focus Question/s	• How do restrictions on the domain affect a rational expression or function? • What do vertical, horizontal, and slant asymptotes tell us about a graph's behavior? • How can we use algebraic manipulation to simplify or combine rational expressions? • How are rational equations used to solve real-world problems?
<u>Standards:</u>	**A.APR.D.6:** Rewrite simple rational expressions in different forms; identify restrictions on the domain. **A.APR.D.7:** Add, subtract, multiply, and divide rational expressions **F.IF.C.7d:** Graph rational functions, identifying zeros and asymptotes. **F.IF.B.4:** Interpret key features of graphs and tables.
Key Student Learning Objectives	**Students will be able to:** • Simplify, multiply, divide, add, and subtract rational expressions. • Identify domain restrictions from rational expressions. • Determine asymptotes, intercepts, and holes of rational functions. • Graph rational functions and describe transformations. • Solve rational equations and apply them to real-world problems.
Learning Targets	• I can simplify rational expressions and state restrictions on the domain. • I can add, subtract, multiply, and divide rational expressions. • I can identify and interpret vertical, horizontal, and slant asymptotes of a rational function. • I can find intercepts and holes of a rational function. • I can graph rational functions and describe how the equation affects the graph.

	- I can solve rational equations and check for extraneous solutions. - I can apply rational models to real-world problems like rates, proportions, and motion.

Sequence of Key Learning Activities	- Introduction/Launch-
	    ➤ Which does not belong?
	    ➤ What do you notice? What do you wonder?
	- Mini- Lesson
	- Exploration
	- Check for Understanding
	- Summary-Exit Ticket
	
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Unit #5: Trigonometric Functions

Overview: Students will study trigonometric ratios and functions through the unit circle, right triangles, and graphs of sine, cosine, and tangent. They will explore periodic behavior and how it models cycles in real-world situations such as sound waves and seasonal patterns.

Topic/Theme Duration	TRIGONOMETRIC FUNCTIONS MARCH – BEGINNING APRIL (4 WEEKS)
Focus Question/s	• What does the unit circle reveal about the values of trigonometric functions? • How do amplitude, period, and phase shift describe real-world cycles? • How can trigonometric functions model patterns in nature and science? • How do trigonometric identities help simplify expressions and solve equations?
Standards:	**F.TF.A.1:** Understand radian measure of an angle as arc length on a unit circle. **F.TF.A.3:** Use special triangles to determine values of sine, cosine, and tangent. **F.TF.B.5:** Graph trigonometric functions, identifying amplitude, period, phase shift, and midline. **F.TF.C.8:** Use trigonometric identities to simplify expressions and solve equations.
Key Student Learning Objectives	• Convert between degree and radian measure. • Define sine, cosine, and tangent using the unit circle. • Evaluate trigonometric functions for key angles. • Graph trigonometric functions and identify transformations. • Apply amplitude, period, phase shift, and midline to describe graphs. • Solve basic trigonometric equations. • Use trigonometric models to represent periodic behavior.
Learning Targets	• I can convert between degrees and radians • I can define and evaluate sine, cosine, and tangent using the unit circle. • I can graph sine, cosine, and tangent functions and identify their key features. • I can determine amplitude, period, phase shift, and midline of a trig graph.

	- I can apply transformations to trigonometric functions. - I can solve simple trigonometric equations. - I can model real-world periodic phenomena (e.g., sound, tides, seasons).

Sequence of Key Learning Activities	- Introduction/Launch-
	    ➢ Which does not belong?
	    ➢ What do you notice? What do you wonder?
	- Mini- Lesson
	- Exploration
	- Check for Understanding
	- Summary-Exit Ticket
	
	Note: Mini-lesson or Exploration /Check for Understanding
	
	    and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

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Assessments	Check Students Readiness-Diagnostic Mid Unit Assessments End of Unit Assessment Homework Assignments Exit Tickets In-class Assignments and Check-ins

Unit #6: SEQUENCES AND SERIES

Overview: Students will investigate patterns represented by arithmetic and geometric sequences and series. They will write recursive and explicit formulas, find sums, and use sigma notation. This unit highlights how patterns can model real-life situations like savings plans, depreciation, and population trends.

Topic/Theme Duration	**SEQUENCES AND SERIES** **APRIL (3 WEEKS)**
Focus Question/s	• How are arithmetic and geometric sequences similar and different? • How can sequences be represented as functions? • What do recursive and explicit rules reveal about patterns in data? • How can series be used to represent and solve real-world problems?
<u>**Standards:**</u>	**F.BF.A.1a:** Write a function (recursive or explicit) that describes a sequence. **F.IF.A.3:** Recognize sequences as functions whose domain is the set of integers. **F.LE.A.2:** Construct arithmetic and geometric sequences given terms. **A.SSE.B.3c:** Use the formula for the sum of a finite geometric series.
Key Student Learning Objectives	• Distinguish between arithmetic and geometric sequences. • Write explicit and recursive formulas for sequences. • Find terms in arithmetic and geometric sequences. • Use summation notation and calculate partial sums. • Apply sequences and series to model patterns or financial problems.
Learning Targets	• I can identify whether a sequence is arithmetic or geometric**.** • I can write recursive and explicit formulas for arithmetic and geometric sequences. • I can find missing terms in arithmetic and geometric sequences. • I can use summation notation (Σ) to represent a series.

	• I can calculate the sum of a finite or infinite geometric series • I can **apply sequence and series formulas** to real-world contexts such as finance or patterns.

Sequence of Key Learning Activities	• Introduction/Launch-
	    ➤ Which does not belong?
	    ➤ What do you notice? What do you wonder?
	• Mini- Lesson
	• Exploration
	• Check for Understanding
	• Summary-Exit Ticket
	
	<u>Note</u>: Mini-lesson or Exploration /Check for Understanding and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

Key Texts to be Used	https://bim.easyaccessmaterials.com/ Digital Sources (Illustrative Math, Jmap.org, Desmo, Deltamath.com)
Assessments	Check Students Readiness-Diagnostic Mid Unit Assessments End of Unit Assessment Homework Assignments Exit Tickets In-class Assignments and Check-ins Parent Function/Transformation Project

Unit #6: STATISTICS

Overview: This unit focuses on data analysis and probability. Students will summarize, represent, and interpret data using measures of central tendency and dispersion. They will use probability distributions and simulations to make predictions and inferences. Students connect statistical reasoning to real-world data sets.

Topic/Theme Duration	STATISTICS **MID MAY TO END OF MAY (2 WEEKS)**
Focus Question/s	• How can data be organized and displayed to reveal patterns and relationships? • How do measures of center and spread describe a data set? • How do we use models to make predictions from data? • How can we decide whether relationships in data are meaningful or due to chance?
<u>**Standards:**</u>	**S.ID.A.1–4:** Represent and interpret data with histograms, box plots, and scatter plots. **S.ID.B.6:** Fit a function to data; use residuals to assess model fit. **S.IC.A.1–2:** Understand and evaluate random processes underlying statistical experiments. **S.IC.B.3–6:** Make inferences and justify conclusions using sample data.
Key Student Learning Objectives	• Represent data graphically using various displays. • Calculate and interpret measures of central tendency and spread (mean, median, mode, IQR, standard deviation). • Analyze bivariate data and create lines of best fit. • Interpret correlation coefficients and residual plots. • Use data to make predictions and justify conclusions. • Distinguish between correlation and causation.

Learning Targets	• I can represent data using histograms, box plots, and scatter plots. • I can calculate mean, median, mode, range, IQR, and standard deviation. • I can interpret measures of spread and outliers in context. • I can create and analyze lines of best fit for bivariate data. • I can interpret correlation coefficients to describe relationships. • I can use data to make predictions and draw conclusions. • I can differentiate between correlation and causation.

Sequence of Key Learning Activities	• Introduction/Launch-
	   ➢ Which does not belong?
	   ➢ What do you notice? What do you wonder?
	• Mini- Lesson
	• Exploration
	• Check for Understanding
	• Summary-Exit Ticket
	
	Note: Mini-lesson or Exploration /Check for Understanding and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

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Assessments	Check Students Readiness-Diagnostic Mid Unit Assessments End of Unit Assessment Homework Assignments Exit Tickets In-class Assignments and Check-ins Parent Function/Transformation Project

Key Student Learning Objectives	
Learning Targets	

Sequence of Key Learning Activities	• Introduction/Launch-
	    ➢ Which does not belong?
	    ➢ What do you notice? What do you wonder?
	• Mini- Lesson
	• Exploration
	• Check for Understanding
	• Summary-Exit Ticket
	
	Note: Mini-lesson or Exploration /Check for Understanding
	and activities are adjusted according to the skill levels of the students. Manipulatives are available and used. Graphing calculators used based on lesson. Flexible Grouping tasks. Activities are varied and geared to different learning styles.

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Assessments	Check Students Readiness-Diagnostic Mid Unit Assessments End of Unit Assessment Homework Assignments Exit Tickets In-class Assignments and Check-ins Parent Function/Transformation Project