Eureka Math² Year at a Glance
Algebra I: Modeling with Functions

Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
Expressions, Equations, and Inequalities in One Variable	Equations and Inequalities in Two Variables	Functions and Their Representations	Quadratic Functions	Linear and Exponential Functions	Modeling with Functions

Module 1: Expressions, Equations, and Inequalities in One Variable

Topic A: Adding, Subtracting, and Multiplying Polynomial Expressions

Lesson 1: The Growing Pattern of Ducks
- Compare verbal and mathematical representations of a visual pattern.

A.SSE.A.2, MP8, A1.Mod1.AD1

Lesson 2: The Commutative, Associative, and Distributive Properties
- Rewrite algebraic expressions in equivalent forms.
- Show the equivalency of two algebraic expressions by using properties and operations.

A.SSE.A.2, MP7, A1.Mod1.AD1

Lesson 3: Polynomial Expressions
- Compare numbers in base 10 to numbers in base x.

A.APR.A.1, A.SSE.A.2, MP6, A1.Mod1.AD, A1.Mod1.AD2

Lesson 4: Adding and Subtracting Polynomial Expressions

Module 2: Equations and Inequalities in Two Variables

Topic A: Linear Equations and Inequalities in Two Variables

Lesson 1: Solution Sets of Linear Equations in Two Variables
- Explain advantages and disadvantages of representations of solution sets of two-variable equations.
- Write and graph equations in two variables to represent situations.

A.CED.A.2, A.CED.A.3, A.REI.D.10, MP2, A1.Mod2.AD1, A1.Mod2.AD2, A1.Mod2.AD3, A1.Mod2.AD7

Lesson 2: Graphing Linear Equations in Two Variables
- Graph linear equations by using a variety of methods and defend the chosen methods.

A.CED.A.2, A.REI.D.10, MP6, A1.Mod2.AD2, A1.Mod2.AD7

Lesson 3: Creating Linear Equations in Two Variables
- Write linear equations in two variables.

Module 3: Functions and Their Representations

Topic A: Functions and Their Graphs

Lesson 1: The Definition of a Function
- Use the definition of a function to identify examples of functions and their domains and ranges.
- Use function notation to express outputs for given inputs of a function.

F.IF.A.1, F.IF.A.2, MP6, A1.Mod3.AD3, A1.Mod3.AD4, A1.Mod3.AD6

Lesson 2: Representing, Naming, and Evaluating Functions
- Represent functions with equations and examine their domains.
- Interpret statements that use function notation in context.

F.IF.A.1, F.IF.A.2, MP6, A1.Mod3.AD3, A1.Mod3.AD4, A1.Mod3.AD6

Lesson 3: The Graph of a Function
- Graph functions by evaluating them for select inputs in their domains.
- Relate the domain of a function to its graph.

Module 4: Quadratic Functions

Topic A: Quadratic Functions and Their Graphs

Lesson 1: Falling Objects
- Represent the distance traveled by a falling object with graphs, tables, and equations.
- Explain why a linear function is not a good model for the distance traveled by a falling object.

F.IF.B.4, F.IF.B.6, MP2, A1.Mod4.AD14, A1.Mod4.AD16

Lesson 2: Projectile Motion
- Analyze the height over time of an object falling due to gravity by using tables, graphs, and equations.
- Interpret different representations of functions that model projectile motion.

F.IF.B.4, F.IF.B.5, MP7, A1.Mod4.AD14, A1.Mod4.AD15

Lesson 3: Analyzing Functions That Model Projectile Motion
- Interpret the coefficients of a quadratic equation that models the height of a projectile as a function of time.

Module 5: Linear and Exponential Functions

Topic A: Arithmetic and Geometric Sequences

Lesson 1: Exploring Patterns
- Represent sequences by using pictures, tables, equations, and graphs.
- Recognize sequences as functions with a domain in the nonnegative integers.

F.IF.A.2, F.IF.A.3, F.BF.A.1.a, MP3, A1.Mod5.AD5, A1.Mod5.AD6, A1.Mod5.AD9, A1.Mod5.AD11

Lesson 2: The Recursive Challenge
- Use a recursive process to generate a sequence.
- Write recursive formulas to model and solve problems.

F.IF.A.2, F.IF.A.3, F.BF.A.1.a, MP1, A1.Mod5.AD5, A1.Mod5.AD6, A1.Mod5.AD10, A1.Mod5.AD11

Lesson 3: Recursive Formulas for Sequences
- Write recursive formulas for sequences.

Module 6: Modeling with Functions

Topic A: Modeling Bivariate Quantitative Data

Lesson 1: Analyzing Paint Splatters
- Determine what type of model is appropriate for a set of bivariate quantitative data.
- Use residual plots to determine whether a linear model is appropriate for a set of bivariate quantitative data.

F.LE.A.1, S.ID.B.6.a, S.ID.B.6.b, S.ID.B.6.c, MP1, A1.Mod6.AD1, A1.Mod6.AD2

Lesson 2: Using Residual Plots to Select Models for Data
- Use residual plots to determine whether sets of bivariate quantitative data are best modeled by using a linear or nonlinear function.
- Use appropriate models to represent bivariate data sets and use the models to make predictions.

F.LE.A.1, S.ID.B.6.a, S.ID.B.6.b, S.ID.B.6.c, MP7, A1.Mod6.AD1, A1.Mod6.AD2

Lesson 3: Populations of US Cities

Module 1

- Add and subtract polynomial expressions.

A.APR.A.1, MP7, A1.Mod1.AD2, A1.Mod1.AD3

Lesson 5: Multiplying Polynomial Expressions
- Multiply polynomial expressions.

A.APR.A.1, MP3, A1.Mod1.AD2, A1.Mod1.AD4

Lesson 6: Polynomial Identities
- Multiply polynomial expressions to establish polynomial identities.

A.APR.A.1, MP3, A1.Mod1.AD4

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Topic B: Solving Equations and Inequalities in One Variable

Lesson 7: Printing Presses
- Investigate a problem that can be solved by reasoning quantitatively or algebraically.

A.CED.A.1, A.REI.B.3, MP1, A1.Mod1.AD6, A1.Mod1.AD7

Lesson 8: Solution Sets for Equations and Inequalities in One Variable
- Find values to assign to the variables in equations or inequalities that make the statements true.
- Describe a solution set in words, in set notation, and on a graph.

A.REI.B.3, MP6, A1.Mod1.AD6

Lesson 9: Solving Linear Equations in One Variable
- Explain each step in solving a linear equation.

Module 2

A.CED.A.2, MP7, A1.Mod2.AD1

Lesson 4: Solution Sets of Linear Inequalities in Two Variables
- Relate a half-plane to the graph of the solution set of a linear inequality in two variables.
- Graph linear inequalities in two variables.

A.REI.D.12, MP7, A1.Mod2.AD8

Lesson 5: Graphing Linear Inequalities in Two Variables
- Graph linear inequalities in two variables.

A.REI.D.12, MP6, A1.Mod2.AD8

Lesson 6: Applications of Linear Equations and Inequalities
- Create and graph equations and inequalities in two variables to represent the relationship between quantities.
- Represent constraints with equations and inequalities.

A.CED.A.2, A.CED.A.3, MP1, A1.Mod2.AD1, A1.Mod2.AD2, A1.Mod2.AD3

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Topic B: Systems of Linear Equations and Inequalities in Two Variables

Lesson 7: Low-Flow Showerhead
- Investigate a real-world problem that can be solved by using a system of linear equations.

A.REI.C.6, MP4, A1.Mod2.AD5

Lesson 8: Systems of Linear Equations in Two Variables

Module 3

F.IF.A.1, F.IF.B.5, MP1, A1.Mod3.AD4, A1.Mod3.AD5, A1.Mod3.AD9

Lesson 4: The Graph of the Equation $y = f(x)$
- Graph the equation $y = f(x)$ and compare it to the graph of f.

F.IF.A.1, F.IF.C.7.a, MP7, A1.Mod3.AD4, A1.Mod3.AD5, A1.Mod3.AD10

Lesson 5: Using Pseudocode to Compare Graphs of Functions and Graphs of Equations (Optional)
- Use pseudocode to make sense of the processes of graphing a function f and the equation $y = f(x)$.

F.IF.A.1, F.IF.C.7.a, MP1, A1.Mod3.AD5, A1.Mod3.AD10

Lesson 6: Representations of Functions
- Use equations, tables, and graphs to represent functions in context.
- Strategically choose function representations to model real-world contexts.

F.IF.A.1, F.IF.A.2, F.IF.C.7.a, MP2, A1.Mod3.AD4, A1.Mod3.AD5, A1.Mod3.AD6, A1.Mod3.AD10

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Topic B: Interpreting Functions

Lesson 7: Exploring Key Features of a Function and Its Graph
- Informally identify key features of a function and its graph.

F.IF.B.4, MP2, A1.Mod3.AD7, A1.Mod3.AD8

Module 4

- Identify features of the graph of a quadratic function and interpret them in context.

A.SEA.A.1.a, A.SEA.A.2, F.IF.B.4, F.IF.B.5, F.IF.B.6, MP2, A1.Mod4.AD3, A1.Mod4.AD14, A1.Mod4.AD15, A1.Mod4.AD16

Lesson 4: Graphs of Quadratic Functions
- Describe key features of the graph of a quadratic function by looking at a graph, a table, or an equation.
- Graph quadratic functions given an equation or some points on the graph, deciding whether the given information is enough to sketch the graph.

F.IF.C.7.a, MP5, A1.Mod4.AD8

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Topic B: Factoring

Lesson 5: Solving Equations That Contain Factored Expressions
- Apply the zero product property to solve equations that contain factored expressions.
- Solve quadratic equations containing expressions that can be factored by removing a common factor.

A.SSE.A.2, A.REI.B.4.b, MP7, A1.Mod4.AD3, A1.Mod4.AD11

Lesson 6: Solving Quadratic Equations by Factoring: Identities and Guess and Check
- Solve quadratic equations by factoring using identities or by using guess and check.

A.SSE.A.2, A.REI.B.4.b, MP7, A1.Mod4.AD3, A1.Mod4.AD11

Module 5

F.IF.A.2, F.IF.A.3, F.BF.A.1.a, MP7, A1.Mod5.AD5, A1.Mod5.AD6, A1.Mod5.AD10

Lesson 4: Explicit Formulas for Sequences
- Write an explicit formula for a sequence.

F.IF.A.2, F.IF.A.3, F.BF.A.1.a, MP8, A1.Mod5.AD5, A1.Mod5.AD6, A1.Mod5.AD9

Lesson 5: Arithmetic and Geometric Sequences
- Explain the structure of arithmetic and geometric sequences.
- Write recursive and explicit formulas for arithmetic and geometric sequences.

F.IF.A.3, F.BF.A.1.a, F.BF.A.2, MP3, A1.Mod5.AD6, A1.Mod5.AD9, A1.Mod5.AD10, A1.Mod5.AD12

Lesson 6: Representations of Arithmetic and Geometric Sequences
- Convert between recursive and explicit formulas for arithmetic and geometric sequences.
- Write formulas for arithmetic and geometric sequences from a graph or a real-world context.

F.IF.A.3, F.BF.A.1.a, F.BF.A.2, A1.Mod5.AD6, A1.Mod5.AD9, A1.Mod5.AD10, A1.Mod5.AD12, A1.Mod5.AD13

Lesson 7: Sierpinski Triangle (Optional)
- Explore exponential growth through patterns in the Sierpinski triangle.

Module 6

- Create and justify a mathematical model for a set of bivariate data.

F.LE.A.1, S.ID.B.6.a, S.ID.B.6.b, S.ID.B.6.c, MP1, MP3, A1.Mod6.AD1, A1.Mod6.AD2

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Topic B: Developing Models for Contexts

Lesson 4: The Deal
- Model a real-world problem by using a recursive process.

F.BF.A.1.a, F.BF.A.1.b, F.LE.A.2, MP2, A1.Mod6.AD4

Lesson 5: Solar System Models
- Create a scale model by choosing appropriate quantities and units.

F.BF.A.1.a, F.BF.A.1.b, F.LE.A.2, MP6, MP8, A1.Mod6.AD3

Lesson 6: Designing a Fundraiser
- Create and justify a mathematical model to solve a problem by using a system of linear inequalities.

F.BF.A.1.a, F.BF.A.1.b, F.LE.A.2, MP4, MP7, A1.Mod6.AD4

Lesson 7: World Record Doughnut
- Solve a problem that is well-modeled with a quadratic function.
- Reflect on the effectiveness of a model when finding a solution to a problem.

F.BF.A.1.a, MP4, MP5, A1.Mod6.AD4

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Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
A.REI.A.1, A.REI.B.3, MP3, A1.Mod1.AD5, A1.Mod1.AD6 **Lesson 10:** Some Potential Dangers When Solving Equations (Optional) • Explore steps in solving an equation that are not guaranteed to preserve the solution set. **A.REI.A.1, A.REI.B.3, MP3, A1.Mod1.AD5, A1.Mod1.AD6** **Lesson 11:** Writing and Solving Equations in One Variable • Create equations in one variable and use them to solve problems. **A.CED.A.1, A.CED.A.3, A.REI.A.1, A.REI.B.3, MP7, A1.Mod1.AD5, A1.Mod1.AD6, A1.Mod1.AD7, A1.Mod1.AD9** **Lesson 12:** Rearranging Formulas • Rearrange formulas to highlight a quantity of interest. **A.CED.A.4, MP7, A1.Mod1.AD10** **Lesson 13:** Solving Linear Inequalities in One Variable • Solve inequalities and graph the solution sets on the number line. **A.CED.A.1, A.REI.B.3, MP7, A1.Mod1.AD6, A1.Mod1.AD7** —————————————— Topic C: Compound Statements Involving Equations and Inequalities in One Variable **Lesson 14:** Solution Sets of Compound Statements • Describe the solution set of two equations or inequalities joined by	• Solve systems of linear equations graphically and algebraically by using substitution. **A.REI.C.6, MP1, A1.Mod2.AD5, A1.Mod2.AD6** **Lesson 9:** A New Way to Solve Systems • Solve systems of linear equations by using the elimination method. **A.REI.C.5, A.REI.C.6, MP7, A1.Mod2.AD4, A1.Mod2.AD5** **Lesson 10:** The Elimination Method • Solve systems of linear equations algebraically by using the elimination method and by using a method of their choice. **A.REI.C.6, MP5, A1.Mod2.AD5** **Lesson 11:** Applications of Systems of Equations • Investigate contextual problems that can be solved by creating and solving systems of linear equations. **A.REI.C.6, MP2, A1.Mod2.AD5, A1.Mod2.AD6.** **Lesson 12:** Solution Sets of Systems of Linear Inequalities • Identify the intersection of two half-planes and, in certain cases, parts of the boundary lines as the graph of the solution set of a system of two linear inequalities in two variables. • Graph a system of linear inequalities in two variables. **A.REI.D.12, MP6, A1.Mod2.AD9** **Lesson 13:** Graphing Solution Sets of Systems of Linear Inequalities • Graph the solution set of systems of linear inequalities in two variables. **A.REI.D.12, MP7, A1.Mod2.AD9**	**Lesson 8:** Identifying Key Features of a Function and Its Graph • Identify and interpret key features of a function and its graph. **F.IF.B.4, MP7, A1.Mod3.AD7** **Lesson 9:** Representing Functions from Verbal Descriptions • Sketch the graphs of functions given verbal descriptions. **F.IF.B.4, MP2, A1.Mod3.AD7, A1.Mod3.AD8** **Lesson 10:** Using Graphs to Solve Equations • Solve equations of the form $f(x) = g(x)$ graphically by looking for the intersection points of the graphs of $y = f(x)$ and $y = g(x)$. **A.REI.D.11, MP7, A1.Mod3.AD1, A1.Mod3.AD2** **Lesson 11:** Comparing Functions • Compare properties of functions that are represented in different ways. **F.IF.B.4, F.IF.C.9, MP5, A1.Mod3.AD7, A1.Mod3.AD12** **Lesson 12:** Mars Curiosity Rover • Engage in the modeling cycle to represent a real-world context with a graph. **F.IF.B.4, MP4, A1.Mod3.AD7, A1.Mod3.AD8** —————————————— Topic C: Piecewise-Defined Linear Functions **Lesson 13:** Modeling Elevation as a Function of Time	**Lesson 7:** Solving Quadratic Equations by Factoring: Splitting the Linear Term • Solve quadratic equations by factoring by splitting the linear term. **A.SSE.A.2, A.REI.B.4.b, MP1, A1.Mod4.AD3, A1.Mod4.AD11** **Lesson 8:** A Summary of Solving Quadratic Equations by Factoring • Solve quadratic equations by strategically using a factoring method. **A.SSE.A.2, A.REI.B.4.b, MP7, A1.Mod4.AD3, A1.Mod4.AD11** **Lesson 9:** Creating and Solving Equations in One Variable • Write and solve quadratic equations in one variable for a given context. **A.SSE.A.2, A.CED.A.1, A.REI.B.4.b, MP1, A1.Mod4.AD3, A1.Mod4.AD6, A1.Mod4.AD11** **Lesson 10:** Zeros of Functions • Find zeros of quadratic functions by factoring. • Write an equation for a quadratic function given its zeros. **A.SSE.A.2, A.SSE.B.3.a, F.IF.C.8.a, MP7, A1.Mod4.AD3, A1.Mod4.AD4, A1.Mod4.AD18** **Lesson 11:** Graphing Quadratic Functions from Factored Form • Write equations for a function in factored form to model a given context. • Use the factored form of a quadratic function to sketch its graph. **A.SSE.A.2, A.SSE.B.3.a, A.CED.A.2, F.IF.B.4, F.IF.C.7.a, F.IF.C.8.a, MP2, A1.Mod4.AD3,**	**F.IF.A.2, F.BF.A.1.a, F.BF.A.2, MP8, A1.Mod5.AD5, A1.Mod5.AD9, A1.Mod5.AD10, A1.Mod5.AD12** —————————————— Topic B: Exponential Functions and Their Graphs **Lesson 8:** Exponential Functions • Explore situations that can be modeled with exponential functions. **A.SSE.A.1.b, F.BF.A.1.a, F.LE.A.2, MP2, A1.Mod5.AD2, A1.Mod5.AD11, A1.Mod5.AD17** **Lesson 9:** Unit Fraction Exponents • Evaluate numerical expressions in the form $b^{\frac{1}{n}}$ for positive real numbers b where n is 2 or 3. **N.RN.A.1, N.RN.A.2, MP7, A1.Mod5.AD1** **Lesson 10:** Rational Exponents • Extend exponent properties to rational exponents. • Evaluate numerical expressions in the form $b^{\frac{m}{n}}$ for positive real numbers b, integers m, and where n is 2 or 3. **N.RN.A.1, N.RN.A.2, MP7, A1.Mod5.AD1** **Lesson 11:** Graphing Exponential Functions • Graph exponential functions in the form $f(x) = b^x$ where $b > 0$ and $b \neq 1$. • Identify key features of the graphs of exponential functions in the form $f(x) = b^x$.	

Module 1

and or *or* and graph the solution set on a number line.
- Write a compound statement to describe a situation.

A.CED.A.3, MP2, A1.Mod1.AD8, A1.Mod1.AD9

Lesson 15: Solving and Graphing Compound Inequalities
- Find the solution sets of compound inequalities in one variable and graph the solution sets on the number line.

A.CED.A.1, A.CED.A.3, A.REI.B.3, MP1, A1.Mod1.AD6, A1.Mod1.AD7, A1.Mod1.AD8, A1.Mod1.AD9

Lesson 16: Solving Absolute Value Equations
- Write absolute value equations in one variable as compound statements and solve.

A.REI.B.3, MP7, A1.Mod1.AD6.

Lesson 17: Solving Absolute Value Inequalities
- Write absolute value inequalities in one variable as compound statements joined by *and* or *or*.
- Solve absolute value inequalities and graph the solution set on a number line.

A.REI.B.3, MP8, A1.Mod1.AD6

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Topic D: Univariate Data

Lesson 18: Distributions and Their Shapes
- Informally describe a data distribution displayed in a dot plot.

S.ID.A.1, S.ID.A.2, S.ID.A.3, MP4, A1.Mod1.AD11, A1.Mod1.AD12, A1.Mod1.AD13

Module 2

Lesson 14: Applications of Systems of Linear Inequalities
- Use systems of inequalities to solve contextual problems.
- Interpret solutions within a context.

A.REI.D.12, MP2, A1.Mod2.AD9

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Topic C: Numerical Data on Two Variables

Lesson 15: Relationships between Quantitative Variables
- Represent data on two quantitative variables in a scatter plot.
- Describe the direction, shape, and strength of associations between variables displayed in scatter plots.

S.ID.B.6, A1.Mod2.AD12

Lesson 16: Using Lines to Model Bivariate Quantitative Data
- Informally fit a line to bivariate data and write an equation of the line.
- Make predictions by using equations of lines fit to the data.
- Interpret the slope and y-intercept of the lines fit to the data in context.

S.ID.B.6.a, S.ID.C.7, MP3, A1.Mod2.AD13, A1.Mod2.AD16

Lesson 17: Modeling Relationships with a Line
- Use technology to determine a line of best fit from a given set of data and use the line of best fit to make predictions.

S.ID.B.6.a, S.ID.B.6.c, S.ID.B.7, MP6, A1.Mod2.AD12, A1.Mod2.AD15, A1.Mod2.AD16

Lesson 18: Calculating and Analyzing Residuals

Module 3

- Create a graph and an equation of a piecewise linear function to model a situation.

F.IF.B.4, F.IF.B.5, F.IF.C.7.b, MP4, A1.Mod3.AD8, A1.Mod3.AD9, A1.Mod3.AD11

Lesson 14: Piecewise Linear Functions
- Graph piecewise linear functions.
- Write equations of piecewise linear functions from a graph.

F.IF.C.7.b, MP7, A1.Mod3.AD11

Lesson 15: The Absolute Value Function
- Rewrite equations of functions of the form $f(x) = a|bx - c| + d$ as piecewise linear functions and graph them.

A.REI.D.11, F.IF.C.7.b, MP7, A1.Mod3.AD2, A1.Mod3.AD11

Lesson 16: Step Functions
- Identify and graph step functions.

F.IF.A.2, F.IF.B.5, F.IF.C.7.b, MP6, A1.Mod3.AD6, A1.Mod3.AD9, A1.Mod3.AD11

Lesson 17: Piecewise Linear Functions in Context
- Model real-world situations with piecewise linear functions.

F.IF.C.7.b, F.BF.A.1.a, MP2, A1.Mod3.AD11, A1.Mod3.AD13

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Topic D: Transformations of Functions

Lesson 18: Exploring Transformations of the Graphs of Functions

Module 4

A1.Mod4.AD4, A1.Mod4.AD8, A1.Mod4.AD14, A1.Mod4.AD18

Lesson 12: Using Symmetry to Graph Quadratic Functions from Standard Form
- Use symmetry to graph quadratic functions that cannot be factored over the integers.

A.SSE.A.2, A.CED.A.2, F.IF.B.4, F.IF.B.6, F.IF.C.7.a, F.IF.C.9, MP7, A1.Mod4.AD3, A1.Mod4.AD8, A1.Mod4.AD14, A1.Mod4.AD16, A1.Mod4.AD19

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Topic C: Completing the Square

Lesson 13: Using Square Roots to Solve Quadratic Equations
- Solve quadratic equations in the form $(x - p)^2 = q$.
- Explain why the sum of a rational number and an irrational number is an irrational number.

A.CED.A.4, A.REI.B.4.b, HSN-RN.B.3, MP7, A1.Mod4.AD1, A1.Mod4.AD9, A1.Mod4.AD11

Lesson 14: Solving Quadratic Equations by Completing the Square
- Solve quadratic equations by rewriting them in the form $(x - p)^2 = q$.

A.SSE.A.2, A.REI.B.4.a, A.REI.B.4.b, MP6, A1.Mod4.AD3, A1.Mod4.AD10, A1.Mod4.AD11

Lesson 15: Deriving the Quadratic Formula

Module 5

A.SSE.A.2, A.SSE.B.3.c, F.IF.C.7.e, F.IF.C.8.b, MP6, A1.Mod5.AD3, A1.Mod5.AD8

Lesson 12: Using Transformations to Graph Exponential Functions (Bases Greater Than 1)
- Apply transformations of graphs of exponential functions in the form $f(x) = b^x$ where $b > 1$.
- Identify key features of the graphs of exponential functions.

A.SSE.A.2, A.SSE.B.3.c, F.BF.B.3, F.IF.C.7.e, F.IF.C.8.b, MP6, A1.Mod5.AD3, A1.Mod5.AD8, A1.Mod5.AD14

Lesson 13: Using Transformations to Graph Exponential Functions (Bases Between 0 and 1)
- Graph transformations of the graphs of $f(x) = b^x$ where $0 < b < 1$.
- Identify key features of exponential functions and their graphs.

A.REI.D.11, F.BF.B.3, F.IF.C.7.e, MP3, A1.Mod5.AD4, A1.Mod5.AD8, A1.Mod5.AD14

Lesson 14: Writing Equations for Exponential Functions from Tables or Graphs
- Write equations for exponential functions represented by tables and graphs.

F.BF.B.3, F.LE.A.2, MP6, A1.Mod5.AD14, A1.Mod5.AD17

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Topic C: Exponential Growth and Decay

Lesson 15: Calculating Interest

Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
Lesson 19: Describing the Center of a Distribution • Find the mean and median of data shown in a dot plot and estimate the mean and median of a data distribution represented by a histogram. • Identify whether the mean and/or the median appropriately describes a typical value for a given data set. **S.ID.A.1, S.ID.A.2, S.ID.A.3, MP1, A1.Mod1.AD11, A1.Mod1.AD12, A1.Mod1.AD13** **Lesson 20:** Using Center to Compare Data Distributions • Determine the median from data distributions displayed in box plots. • Use the median to compare data distributions displayed in box plots. **S.ID.A.1, S.ID.A.2, S.ID.A.3, MP3, A1.Mod1.AD11, A1.Mod1.AD12, A1.Mod1.AD13** **Lesson 21:** Describing Variability in a Univariate Distribution with Standard Deviation • Calculate standard deviation to represent a typical variation from the mean of a data distribution. • Use standard deviation to compare two data distributions. **S.ID.A.2, S.ID.A.3, MP5, A1.Mod1.AD12, A1.Mod1.AD13** **Lesson 22:** Estimating Variability in Data Distributions • Estimate and compare variation in data distributions represented by histograms. • Use the interquartile range to compare the variation in data distributions represented by box plots and dot plots.	• Calculate residuals for a set of data. • Interpret residuals in context. **S.ID.B.6.b, S.ID.B.6.c, MP2, A1.Mod2.AD14, A1.Mod2.AD15** **Lesson 19:** Analyzing Residuals • Create residual plots for sets of bivariate quantitative data. • Observe and interpret patterns in residual plots of data. **S.ID.B.6.b, MP4, A1.Mod2.AD14** **Lesson 20:** Interpreting Correlation • Use technology to determine the value of the correlation coefficient for a given bivariate data set. • Interpret the value of the correlation coefficient as a measure of strength and direction of a linear association and distinguish between correlation and causation. **S.ID.B.6.c, S.ID.C.8, S.ID.C.9, MP2, A1.Mod2.AD15, A1.Mod2.AD17, A1.Mod2.AD18** **Lesson 21:** Analyzing Bivariate Quantitative Data • Analyze bivariate quantitative data sets. **S.ID.B.6, S.ID.C.7, S.ID.C.8, S.ID.C.9, MP1, A1.Mod2.AD12, A1.Mod2.AD16, A1.Mod2.AD17, A1.Mod2.AD18** ———————————— **Topic D: Categorical Data on Two Variables** **Lesson 22:** Summarizing Bivariate Categorical Data with Two-Way Tables • Represent bivariate categorical data by using two-way frequency tables and relative frequency tables.	• Explore transformations of the graphs of functions. **F.BF.B.3, MP3, A1.Mod3.AD14, A1.Mod3.AD15** **Lesson 19:** Building New Functions—Translations • Recognize that the graph of $y = f(x) + k$ is a vertical translation of the graph of $y = f(x)$. • Recognize that the graph of $y = f(x - k)$ is a horizontal translation of the graph of $y = f(x)$. **F.BF.B.3, F.IF.C.7.b, MP8, A1.Mod3.AD11, A1.Mod3.AD14, A1.Mod3.AD15** **Lesson 20:** Building New Functions—Reflections • Recognize that the graph of $y = -f(x)$ is a reflection of the graph of $y = f(x)$ across the x-axis. • Recognize that the graph of $y = f(-x)$ is a reflection of the graph of $y = f(x)$ across the y-axis. **F.BF.B.3, MP8, A1.Mod3.AD14, A1.Mod3.AD15** **Lesson 21:** Building New Functions—Vertical Scaling • Recognize that the graph of $y = kf(x)$, where $|k| > 0$, is a vertical scaling of the graph of $y = f(x)$. • Distinguish between graphs that have been vertically stretched and graphs that have been vertically compressed. **F.BF.B.3, MP7, A1.Mod3.AD14, A1.Mod3.AD15** **Lesson 22:** Building New Functions—Horizontal Scaling • Explain that the graph of $y = f\left(\frac{1}{k}x\right)$ where $|k| > 0$ is a horizontal scaling of the graph of $y = f(x)$.	• Complete the square to solve any quadratic equation. • Complete the square to derive the quadratic formula. **A.SSE.A.2, A.REI.B.4.a, A.REI.B.4.b, MP3, A1.Mod4.AD3, A1.Mod4.AD10, A1.Mod4.AD11** **Lesson 16:** Solving Quadratic Equations • Solve quadratic equations by using the quadratic formula. • Solve quadratic equations by strategically choosing a method. **A.REI.B.4.b, MP1, A1.Mod4.AD11** **Lesson 17:** Rewriting Square Roots • Rewrite square roots in simplest radical form. • Explain why the product of a nonzero rational number and an irrational number is an irrational number. **HSN-RN.B.3, MP3, A1.Mod4.AD1** **Lesson 18:** The Quadratic Formula and Zeros of a Function • Use the discriminant to determine the number and nature of the zeros of a quadratic function. • Use the quadratic formula to identify key features of the graph of a quadratic function. **A.REI.B.4.b, MP7, A1.Mod4.AD11** **Lesson 19:** Transforming the Graphs of Quadratic Functions • Graph quadratic functions as transformations of the graph of $f(x) = x^2$. • Write an equation for a quadratic function in the form $f(x) = a(x - h)^2 + k$ given the graph. • Identify key features of the graph of a quadratic function written in vertex form.	• Calculate and compare simple and compound interest. • Determine that simple interest can be modeled with a linear function and compound interest can be modeled with an exponential function. **F.BF.A.1.a, F.LE.A.1, MP2, A1.Mod5.AD11, A1.Mod5.AD15** **Lesson 16:** Exponential Growth • Write equations for functions that represent exponential growth and use them to solve problems. • Recognize and represent exponential growth in equations, graphs, and tables. **A.SSE.A.1.b, F.LE.A.2, MP7, A1.Mod5.AD2, A1.Mod5.AD17** **Lesson 17:** Exponential Decay • Write equations for functions that model exponential decay and use them to solve problems. • Recognize and represent exponential decay in equations, graphs, and tables. **A.SSE.A.1.b, F.LE.A.2, MP2, A1.Mod5.AD2, A1.Mod5.AD17** **Lesson 18:** Modeling Populations • Write equations for functions that model exponential growth or decay. • Interpret equations for exponential functions. **A.SSE.A.1.b, A.SSE.A.2, A.SSE.B.3.c, F.IF.C.8.b, F.LE.A.1, F.LE.B.5, MP6, A1.Mod5.AD2, A1.Mod5.AD3, A1.Mod5.AD15, A1.Mod5.AD19** **Lesson 19:** Analyzing Exponential Growth	

Module 1	Module 2	Module 3	Module 4	Module 5	Module
S.ID.A.2, S.ID.A.3, MP2, A1.Mod1.AD12, A1.Mod1.AD13 **Lesson 23:** Comparing Distributions of Univariate Data • Compare two or more data sets by using shape, center, and variability. • Interpret differences in data distributions in context. **S.ID.A.2, S.ID.A.3, MP1, A1.Mod1.AD12, A1.Mod1.AD13** ■	• Interpret marginal and joint frequencies in context. **S.ID.B.5, MP2, A1.Mod2.AD10, A1.Mod2.AD11** **Lesson 23:** Bivariate Categorical Data and Conditional Relative Frequency Tables • Identify trends in bivariate categorical data from two-way relative frequency tables. • Construct conditional relative frequency tables and interpret them. **S.ID.B.5, MP6, A1.Mod2.AD10, A1.Mod2.AD11** **Lesson 24:** Conditional Relative Frequencies and Association • Construct and interpret row and column conditional relative frequency tables in context to determine whether an association exists between categorical variables. • Distinguish between association and a cause-and-effect relationship. **S.ID.B.5, MP4, A1.Mod2.AD10, A1.Mod2.AD11** ■	• Apply horizontal scalings to graphs and identify horizontal scalings from graphs. **F.BF.B.3, MP6, A1.Mod3.AD14, A1.Mod3.AD15** **Lesson 23:** A Summary of Transforming the Graph of a Function • Transform the graph of a function by using translations, reflections, and/or scalings. • Apply understanding of transformations to write an equation for a function given its graph. **F.BF.B.3, F.IF.C.7b, MP7, A1.Mod3.AD11, A1.Mod3.AD14, A1.Mod3.AD15** ■	**F.IF.C.7.a, MP7, A1.Mod4.AD8** **Lesson 20:** Art with Transformations (Optional) • Use transformations of graphs of functions to create a picture. **F-BF.B.3, MP1, A1.Mod4.AD20** **Lesson 21:** Completing the Square to Graph Quadratic Functions • Complete the square to rewrite a quadratic function in vertex form. • Identify key features of the graph of a quadratic function written in vertex form. **A-SSE.B.3.b, F-IF.B.4, F-IF.C.9, MP6, A1.Mod4.AD5, A1.Mod4.AD14, A1.Mod4.AD19** ――――――――――――― **Topic D: Modeling with Quadratic Functions** **Lesson 22:** A Summary of Graphing Quadratic Functions • Graph quadratic functions written in a variety of forms and identify key features of the functions and their graphs. • Determine which forms of quadratic functions can be used to identify specific key features. **A.SSE.B.3.a, A.SSE.B.3.b, F.IF.C.8.a, MP5, A1.Mod4.AD4, A1.Mod4.AD5, A1.Mod4.AD18** **Lesson 23:** Creating Equations of Quadratic Functions to Model Contexts • Write quadratic functions in vertex form or factored form to model a context. • Interpret key features of quadratic functions and their graphs in context.	• Calculate average rates of change for exponential functions over given intervals. • Recognize that average rates of change for exponential functions are not constant over different intervals of equal length. **F.IF.B.6, F.LE.A.1.a, F.LE.B.5, MP2, A1.Mod5.AD7, A1.Mod5.AD16, A1.Mod5.AD19** **Lesson 20:** Comparing Growth of Functions • Show that linear functions change by equal differences over equal intervals and that exponential functions of the form $y = a \cdot b^x$ change by equal factors over equal intervals. • Explain by using tables and graphs that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically. **A.REI.D.11, F.IF.B.6, F.LE.A.3, MP8, A1.Mod5.AD4, A1.Mod5.AD7, A1.Mod5.AD18** ――――――――――――― **Topic D: Comparing Linear and Exponential Models** **Lesson 21:** World Population Prediction • Write and revise equations of functions that model a population. • Compare predictions from population models to reason about what type of function best models the world population. **F.LE.A.1, F.LE.A.2, MP4, MP5, A1.Mod5.AD15, A1.Mod5.AD17** **Lesson 22:** A Closer Look at Populations	

Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
			A.CED.A.2, F.IF.B.4, F.IF.B.5, F.IF.C.7.a, F.BF.A.1.a, S.ID.B.6.a, MP1, A1.Mod4.AD7, A1.Mod4.AD8, A1.Mod4.AD14, A1.Mod4.AD15, A1.Mod4.AD21 **Lesson 24:** Another Look at Systems of Equations • Solve systems of equations consisting of one linear equation and one quadratic equation both graphically and algebraically. • Solve quadratic equations of the form $f(x) = g(x)$ graphically by looking for the intersection points of the graphs of $y = f(x)$ and $y = g(x)$. **A.REI.C.7, A.REI.D.11, F.IF.C.7.a, MP7, A1.Mod4.AD8, A1.Mod4.AD12, A1.Mod4.AD13** **Lesson 25:** Maximizing Area • Analyze a situation that can be modeled with a quadratic function numerically, graphically, and algebraically. **A.CED.A.2, F.IF.B.4, F.BF.A.1.a, N.Q.A.2, MP4, A1.Mod4.AD2, A1.Mod4.AD7, A1.Mod4.AD14** **Lesson 26:** Modeling Data with Quadratic Functions • Model data sets with quadratic functions. **A.CED.A.2, F.BF.A.1.a, S.ID.B.6.a, MP7, A1.Mod4.AD7, A1.Mod4.AD21** **Lesson 27:** Search and Rescue Helicopter • Model a verbal description of a situation with a quadratic function.	• Use technology to model a population of a region over time with a linear or exponential function. • Explain why a linear function, an exponential function, or neither best model the population of a region over time. **F.LE.A.1, F.LE.A.2, MP4, A1.Mod5.AD15, A1.Mod5.AD17** **Lesson 23:** Modeling the Temperature of Objects Cooling Over Time • Model situations by using transformations of the graphs of exponential functions. **A.SSE.A.1.b, F.BF.B.3, F.LE.A.2, F.LE.B.5, MP2, MP5, A1.Mod5.AD2, A1.Mod5.AD14, A1.Mod5.AD17, A1.Mod5.AD19** **Lesson 24:** Modeling an Invasive Species Population • Apply knowledge of exponential functions to create a mathematical model for a real-world situation. • Test the validity of the model. **F.IF.B.6, F.LE.A.1, F.LE.A.2, F.LE.B.5, MP4, A1.Mod5.AD7, A1.Mod5.AD15, A1.Mod5.AD17, A1.Mod5.AD19** ■	

			A.CED.A.2, F.BF.A.1.a, S.ID.B.6.a, MP4, A1.Mod4.AD7, A1.Mod4.AD21 ■		