

Unit 1 Transformations of Functions

Students use equations to transform functions and to model situations in context. They also revisit key features of functions, including domain and range.

*This course is in development, so the goals and number of lessons per sub-unit may change slightly.

Pre-Unit Check (Optional)

Sub-Unit 1 Analyzing Functions

- 1.01 Splashing Into Fun(ctions) | Diving Deeper Into Function Stories
- 1.02 Flower Frames | Domain and Range
- 1.03 A Family Function | Function Families and Features
- 1.04 Alphabet Soup | Functions Defined by Other Functions

Sub-Unit 2 Translating and Reflecting Functions

- 1.05 Transformation Station | Transformations of Functions
- 1.06 Shifting Gears | Vertical and Horizontal Translations
- 1.07 Mirror, Mirror | Reflecting Functions
- 1.08 Symmetry Studio | Exploring Even and Odd Functions

Practice Day 1

Sub-Unit Quiz

Sub-Unit 3 Scaling Functions and Modeling

- 1.09 Ferris Functions | Scaling Functions Vertically
- 1.10 Coastin' Through Transformations | Scaling Functions Horizontally
- 1.11 B(ring) It On | All of the Transformations Together
- 1.12 Mental Models | Modeling Mental Health Data by Age Group

Practice Day 2

End-of-Unit Assessment

Unit 2 Polynomial Functions

Students extend their knowledge of linear and quadratic functions to polynomial functions of higher degree. They describe key features of polynomials from their graphs and equations, rewriting functions in different forms to support their thinking. They explore two new key features: end behavior and multiplicities of zeros. Students also sketch graphs, write equations, and solve for all real and non-real zeros of polynomials.

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Pre-Unit Check (Optional)

Sub-Unit 1 Key Features of Polynomials

- 2.01 Let's Build a Box | Building Functions to Represent Boxes
- 2.02 Factored-Form Frenzy | Rewriting Quadratic Functions in Factored Form
- 2.03 Etchbot 3000 | Completing the Square to Reveal Key Features
- 2.04 To Infinity and Beyond | Introducing End Behavior
- 2.05 On Our Best Behavior | End Behavior of Polynomials
- 2.06 Into the Polyverse | Operations with Polynomials
- 2.07 Oddly Even | Even and Odd Polynomials
- 2.08 As a Matter of Factor | Polynomial Functions in Factored Form
- 2.09 Picturing Polynomials | Sketching Polynomials From Factored Form

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 Solving for All Zeros

- 2.10 Keep It Real | Factoring Higher-Degree Polynomials
- 2.11 Factor Finding | Dividing With Diagrams
- 2.12 Divide and Factor! | Two Strategies for Polynomial Division
- 2.13 Further Factor Finding | Using the Remainder Theorem
- 2.14 Zero Hero | Determining Zeros of Polynomial Functions
- 2.15 From Waste to Watts, Part 1 | Modeling With Polynomial Functions
- 2.16 From Waste to Watts, Part 2 | More Modeling With Polynomial Functions

Practice Day 2

End-of-Unit Assessment

Unit 3 Rational Functions

Students graph rational functions and analyze them to determine some of their key features, including asymptotes and holes. Students also write and solve rational equations and model real-world situations using rational functions.

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Pre-Unit Check (Optional)

Sub-Unit 1 Graphing Rational Functions

- 3.01** Climbing Chaos | Exploring Rational Functions
- 3.02** Cool Your Jets | Determining Vertical Asymptotes
- 3.03** Looks Sketchy | Sketching With Horizontal Asymptotes
- 3.04** How Will It End? | End Behavior and Oblique Asymptotes
- 3.05** Holey Moley | Graphs With Holes

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 Solving Rational Functions

- 3.06** The Pursuit of Hoop-iness | Rational Equations in Context
- 3.07** So Extra(neous)! | Extraneous Solutions
- 3.08** Solving, More or Less | Solving Rational Equations
- 3.09** Wear It's At | Modeling With Rational Functions

Practice Day 2

End-of-Unit Assessment

Unit 4 Root Functions and Radical Equations

Students explore situations where reversing the inputs and outputs of a polynomial function leads to a root function, and determine inverse functions more generally. Students also graph and explore the key features of root functions, write and solve radical equations and inequalities, and model situations with root functions.

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Pre-Unit Check (Optional)

Sub-Unit 1 Radicals and Inverse Functions

- 4.01 Painted Cubes, Part 1 | Building Functions to Make Predictions
- 4.02 Painted Cubes, Part 2 | Using Functions to Answer Questions
- 4.03 Flip the Robot | Writing Equations of Inverse Functions
- 4.04 Inverse Universe | Graphing Inverse Functions

Sub-Unit 2 Root Functions

- 4.05 Radical Lab | Exploring Graphs of Root Functions
- 4.06 Marbleslides: Radicals | Transforming Root Functions
- 4.07 Radical Graphical | Graphing Root Functions

Practice Day 1

Sub-Unit Quiz

Sub-Unit 3 Radical Equations and Inequalities

- 4.08 Pendulums and Planets | Introducing Radical Equations
- 4.09 Roots and Chutes | Solving Radical Equations
- 4.10 Powers to Root For | Rational Exponents and Radical Equations
- 4.11 Brake Point | Modeling With Root Functions, Radical Equations, and Inequalities

Practice Day 2

End-of-Unit Assessment

Unit 5 Exponential Functions

Students extend what they learned about exponential functions in previous courses. They write and interpret exponential functions in context, including situations that compound continuously. They explore how to use logarithms to solve exponential equations. They also describe connections between the graphs, tables, key features, and equations of exponential functions and their logarithmic inverses.

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Pre-Unit Check (Optional)

Sub-Unit 1 Exponential Functions

- 5.01 Exponents and Extraterrestrials | Exponential Functions in Context
- 5.02 Coffee Shop Chaos | Interpreting Key Features of Exponential Functions
- 5.03 Sketchy Business | Understanding Transformations of Exponential Functions
- 5.04 Interest-ing Investments | Making Sense of and Calculating Interest
- 5.05 Exploring e | Writing Functions for Continuous Compounding
- 5.06 Sounds Like a (Retirement) Plan | Reasoning With Recurring Rates
- 5.07 Detroit's Population, Part 1 | Modeling Data and Goodness of Fit
- 5.08 Detroit's Population, Part 2 | Modeling Exponential Data

Practice Day 1

Sub-Unit 2 Logarithmic Expressions and Equations

- 5.09 Puzzle Party | Introducing Logarithms
- 5.10 Log Pond | Finding Logarithms
- 5.11 Clash of the Logs | Which is the Greater Logarithm?
- 5.12 Proof Perfect | Writing Equivalent Logarithmic Expressions
- 5.13 Super Solver | Solving Strategies
- 5.14 A Case for a Different Base (Optional) | Solving Exponential Equations With Any Base

Practice Day 2

Sub-Unit Quiz

Sub-Unit 3 Logarithmic Functions

- 5.15 Engineering the Impossible | Introducing Logarithmic Functions
- 5.16 Into the Inverse | Writing the Inverses of Exponential Functions
- 5.17 Sketch It Out | Graphs of Logarithmic Functions
- 5.18 Library Location | Creating Logarithmic and Exponential Models

Practice Day 3

End-of-Unit Assessment

Unit 6 Trigonometric Functions

Students extend what they've learned about right triangle trigonometry to define trigonometric functions. In this unit, students explore the unit circle and graph trigonometric functions.

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Pre-Unit Check (Optional)

Sub-Unit 1 The Unit Circle

- 6.01 Sand Dollar Search Party | Right Triangle Trigonometry in the Coordinate Plane
- 6.02 Exactly On Point | Special Right Triangles in Circles
- 6.03 Penguin Trolley | Radians and Coordinates on the Unit Circle
- 6.04 The Unit Circle | Going Deeper With the Unit Circle
- 6.05 Going On a Tangent | Tangent and the Unit Circle
- 6.06 Pythagorean Dream | Proving and Applying the Pythagorean Identity
- 6.07 The Cosmic Claw | Co-terminal Angles in the Unit Circle

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 Graphing Trigonometric Functions

- 6.08 Dizzy Bug | Graphing Circular Motion
- 6.09 Cosine of the Times | Graphing the Cosine Function
- 6.10 Tan Lines | Exploring Key Features of Tangent Graphs
- 6.11 Reciprocal Round-Up (Optional) | Reciprocal Trigonometric Functions
- 6.12 Let's Talk Transformations | Key Features of Sine and Cosine Functions

Sub-Unit 3 Transforming Trigonometric Functions

- 6.13 Graph With the Wind | Amplitude and Midline
- 6.14 It's Just a Phase Shift | Phase Shift
- 6.15 Spin You Round | Period of Trigonometric Functions
- 6.16 Squigglebot | Features of Trigonometric Graphs
- 6.17 Wheely Cool Functions | Circular Motion
- 6.18 Over the Moon | Modeling With Calendars

Practice Day 2

End-of-Unit Assessment

Unit 7 Modeling with Mathematics

Students make sense of relationships between two-dimensional figures and three-dimensional solids by rotating figures around an axis. Students also apply formulas to model and solve design problems to meet a set of constraints.

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Pre-Unit Check (Optional)

Sub-Unit 1 Modeling With Trigonometry

- 7.01 Slides, Swings, and Modeling Things | Modeling With Trigonometry
- 7.02 Encore, Encore! Part 1 | Creating a Model
- 7.03 Encore, Encore! Part 2 | Improving a Model

Practice Day 1

Sub-Unit 2 Modeling With Geometric Figures

- 7.04 Put a Spin On It | Solids of Rotation
- 7.05 Welcome to Planeview | Cross Sections of 3-D Solids
- 7.06 Spinning to Make a 3-D Figure | Rotating to Make 3-D Figures
- 7.07 Sweet Spot, Part 2 | Calculating the Volume of Solids
- 7.08 Berry Special Container, Part 1 | Modeling With Solid Geometry
- 7.09 Berry Special Container, Part 2 | Modeling With Solid Geometry
- 7.10 A Berry Big Container | Modeling With Solid Geometry

Practice Day 2

End-of-Unit Assessment

Unit 8 Statistical Inference

Students explore the process of statistics as they learn to ask questions, collect and analyze data, and interpret results. They model one-variable data using normal curves to support them in calculating percentages, estimating population parameters, developing a margin of error, and determining if the results of an experiment are significant.

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Pre-Unit Check (Optional)

Sub-Unit 1 The Statistical Process

- 8.01** Cactus Claims, Part 1 | Introduction to the Statistical Process
- 8.02** Water Works | Collecting Data
- 8.03** Water You Surveying? | Taking a Sample
- 8.04** Park Picks | Sampling Methods
- 8.05** Cavities in the Claims | Critiquing a Study's Design

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 The Normal Distribution

- 8.06** Relatively Normal | Normal Distributions and Relative Frequency Histograms
- 8.07** Cars on the Curve | Areas Under the Normal Curve
- 8.08** Weathering the Curve | Using a Normal Curve to Calculate Area
- 8.09** Coin-cidental Results? | Using Statistics to Test Theories
- 8.10** Algebuddies | Estimating Population Proportions
- 8.11** Novel Estimates | Introduction to the Margin of Error
- 8.12** The Dread of No Spread | Using Simulations to Estimate a Margin of Error
- 8.13** Polls Pulse | Reducing Margin of Error

Practice Day 2

Sub-Unit Quiz

Sub-Unit 3 Exploring Experiments

- 8.14** Get It Under Control | Designing Experiments
- 8.15** Egg-streme Values | Introducing Randomization Distributions
- 8.16** Now That's Significant | Interpreting Differences in Means
- 8.17** Healthy Skepticism | Analyzing Studies Based on Data
- 8.18** Cactus Claims, Part 2 | Conduct Your Own Experiment

Practice Day 3

End-of-Unit Assessment