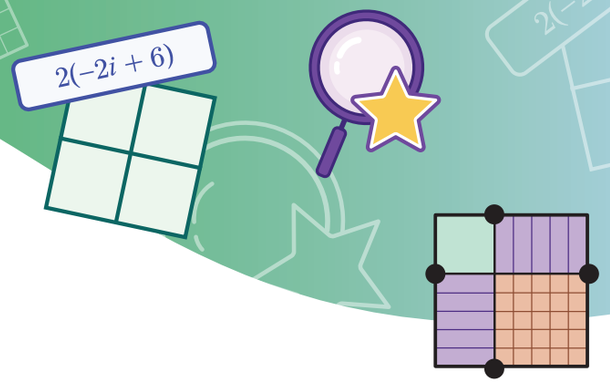
Unit 2 Quadratic Functions and Complex Numbers



Students extend what they learned in Algebra 1 to rewrite quadratic functions in different forms, determine their key features, and solve quadratic equations. Students discover the imaginary unit i and write equivalent expressions involving adding, subtracting, and multiplying complex numbers.

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

Unit 4 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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Unit 5 Root Functions and Radical Equations

Students generalize undoing the operations in a quadratic or cubic function to write square root and cube root functions. They explore the properties of root functions and of inverse functions more generally. Then they graph square and cube root functions by hand and using technology. They also write and solve radical equations and inequalities in context, then explore a real-world situation that can be modeled by radical equations.

Standards: HSA.CED.A.1, HSA.CED.A.2, HSA.CED.A.3, HSA.CED.A.4, HSA.REI.A.1, HSA.REI.A.2, HSA.REI.D.11, HSF.BF.A.1, HSF.BF.A.1.A, HSF.BF.B.3, HSF.BF.B.4, HSF.BF.B.4.A, HSF.BF.B.4.C(+), HSF.IF.B.5, HSF.IF.C.7.B, HSN.RN.A.1, HSN.RN.A.2, HSN.Q.A.2

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Unit 6 Exponential and Logarithmic Functions

Students extend what they learned about exponential functions in Algebra 1. 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.

Standards: HSA.REI.D.11, HSA.SSE.A.1, HSA.SSE.A.1.A, HSA.SSE.A.1.B, HSA.SSE.B.4, HSF.BF.A.1, HSF.BF.B.3, HSF.BF.B.4.A, HSF.BF.B.5, HSF.IF.B.4, HSF.IF.B.6, HSF.IF.C.7.E, HSF.LE.A.2, HSF.LE.A.4, HSF.LE.B.5

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Pre-Unit Check (Optional)

Sub-Unit 1 Exponential Functions (6 lessons)

- Write and interpret exponential functions in context.
- Sketch graphs of exponential functions and transformations of them.
- Describe how adjusting a compounding interval, including one that's compounding continuously, affects the equation.

Practice Day 1 (Optional)

Sub-Unit 2 Logarithmic Expressions and Equations (6 lessons)

- Evaluate logarithmic expressions.
- Prove and use logarithmic properties to rewrite expressions.
- Solve one-variable equations involving exponents and logarithms.

Practice Day 2

Sub-Unit Quiz

Sub-Unit 3 Logarithmic Functions (4 lessons)

- Use exponential and logarithmic functions to analyze and model real-world situations.
- Explain why exponential and logarithmic functions are inverses within the context of multiple representations
- Sketch graphs of logarithmic functions.

Practice Day 3

End-of-Unit Assessment

Unit 7 Trigonometric Functions

Students explore how circular motion can give rise to periodic functions. They build on their understanding of trigonometric ratios to discover relationships between angles and coordinates on the unit circle, then use these insights to prove and apply the Pythagorean identity. Then they define trigonometric functions, using angles measured in radians as inputs, exploring the graphs and key features of these functions. Finally, students learn about transformations of these functions, using them to model periodic situations in the real world.

Standards: HSF.BF.B.3, HSF.IF.B.4, HSF.IF.C, HSF.IF.C.7, HSF.IF.C.7.E, HSF.TF.A, HSF.TF.A.1, HSF.TF.A.2, HSF.TF.B, HSF.TF.B.5, F.TF.C.8, N.Q.A.1

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Pre-Unit Check (Optional)

Sub-Unit 1 The Unit Circle (7 lessons)

- Explore real-world situations that are periodic.
- Determine the coordinates of points on the unit circle.
- Prove the Pythagorean identity and use it to solve problems.

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 Graphing Sine, Cosine and Tangent (5 lessons)

- Define sine, cosine, and tangent as functions of an angle measured in radians.
- Extend the domain of trigonometric functions.
- Graph trigonometric functions.

Practice Day 2

Sub-Unit Quiz

Sub-Unit 3 Transforming Sine, Cosine, and Tangent (6 lessons)

- Graph transformations of trigonometric functions.
- Determine the key features of trigonometric functions.
- Model real-world situations using trigonometric functions.

Practice Day 3

End-of-Unit Assessment

Unit 8 Statistical Inferences

Students learn about the statistical process to make sense of the purposes of and differences among sample surveys, experiments, and observational studies. They explore the normal distribution and use it to simulate everyday situations and make inferences about populations.

Standards: HSS.IC.A.1, HSS.IC.A.2, HSS.IC.B.3, HSS.IC.B.4, HSS.IC.B.5, HSS.IC.B.6, HSS.ID.A.1, HSS.ID.A.2, HSS.ID.A.4

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Pre-Unit Check (Optional)

Sub-Unit 1 The Statistical Process (5 lessons)

- Distinguish between sample surveys, experiments, and observational studies.
- Explain how sampling methods impact the results of a study.
- Describe why simulated data can vary from actual experimental data.

Practice Day 1

Sub-Unit Quiz

Sub-Unit 2 The Normal Distribution (8 lessons)

- Model situations with normal distributions when the data are approximately symmetric and bell-shaped.
- Describe the relationship between areas in a histogram and proportions of data.
- Calculate areas under the normal curve.
- Explore the effect of random sampling on the features of sampling distributions.

Practice Day 2

Sub-Unit Quiz

Sub-Unit 3 Analyzing Experimental Data (5 lessons)

- Use simulations to compare distributions from two different experimental groups.
- Redistribute data from an experiment into groups in order to determine whether the original difference in means is significant.
- Calculate the area under a normal curve using z-scores and a table of values.
- Conduct an experiment and analyze the results.

Practice Day 3

End-of-Unit Assessment