



**Class:** Algebra II

**Teacher:** Jordan Weissberg

**Dates:** June 21–July 30, 2021 (6 weeks)

**Time:** 9:30 a.m.–12:30 p.m. (87 hours total)

**Textbook Used:** [McDougal Littell Algebra 2](#), ISBN: 978-0618595419

**Objectives:**

### Unit 1

- Describe functions using domain and range, one-to-one, increasing and decreasing, continuous, maximum and minimum values, and symmetry.
- Represent piecewise functions involving linear, absolute value, and step functions numerically, algebraically, and graphically.
- Describe the properties of a piecewise function involving linear, absolute value, and step functions.
- Interpret and solve problems involving piecewise functions including linear, absolute value, and step functions.
- Perform operations on functions, including determining the composition of two functions.
- Determine the inverse of a function.
- Determine whether two functions are inverses analytically and graphically.
- Describe the effect of transformations of the graph of  $f(x)$  including  $a \cdot f(x)$ ,  $f(x - h)$ , and  $f(x) + k$ .

### Unit 2

- Solve systems of two or more linear equations using a variety of methods.
- Represent a system of two or more linear equations in matrix form.
- Perform operations on matrices.
- Determine whether a square matrix has a multiplicative inverse.

### Unit 3

- Write a polynomial function given its real zeros or a graph with real zeros.
- Describe and compare the characteristics of polynomial functions, given numerical, graphical, and algebraic representations, including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, zeros and their multiplicity, and turning points.
- Apply finite differences to find the degree of polynomial functions.
- Solve polynomial equations using graphs, the factor theorem, rational root theorem, and the quadratic formula.
- Solve polynomial inequalities using the graph of the related polynomial function.

- Solve polynomial inequalities of degree 2 graphically.
- Make predictions using quadratic mathematical models given a set of data.
- Choose appropriate models based on an analysis of the pattern of change in data.
- Apply the Fundamental Theorem of Algebra.
- Represent complex numbers numerically and graphically.
- Identify numbers as real or complex; distinguish among rational, irrational, imaginary, and complex numbers.
- Perform operations on complex numbers.

#### **Unit 4**

- Represent arithmetic and geometric sequences explicitly and recursively.
- Determine the sum and  $n$ th term of an arithmetic or geometric series.

#### **Unit 5**

- Write a radical function or expression as an equivalent power function or expression.
- Represent radical functions numerically, algebraically, and graphically.
- Describe the properties of radical functions.
- Describe the effect of transformations on the graphs of radical functions,
- Solve radical equations graphically or algebraically, and check for extraneous roots.
- Interpret and solve problems involving radical functions.
- Write equivalent expressions involving radicals and exponents, including negative exponents.
- Evaluate expressions involving radicals and exponents.

#### **Unit 6**

- Represent exponential functions, including base  $e$ , numerically, algebraically, and graphically.
- Represent logarithmic functions, including base  $e$ , numerically, algebraically, and graphically.
- Describe the properties of exponential functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
- Describe the properties of logarithmic functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
- Describe the inverse relationship between exponential and logarithmic functions numerically, graphically, and algebraically.
- Describe the effect of transformations on graphs of exponential functions.
- Solve exponential equations using graphs, the laws of exponents, or the inverse relationship with logarithms.

- Solve logarithmic equations using graphs and the inverse relationship with exponents.
- Interpret and solve problems involving exponential functions.
- Write equivalent forms for exponential and logarithmic expressions and equations.
- Evaluate logarithmic expressions.
- Make predictions using quadratic, exponential, or logarithmic mathematical models given a set of data.
- Choose appropriate models, quadratic, exponential, or logarithmic, based on an analysis of the patterns of change in data.

### Unit 7

- Write a rational function or expression in the form  $\frac{1}{x^n}$  as an equivalent power function or expression.
- Graph rational functions with numerators and/or denominators that are linear polynomials and describe their properties.
- Write a rational function or expression in equivalent form.
- Describe the properties of rational functions with numerators and/or denominators that are linear polynomials, including domain, range, continuity, end behavior, horizontal asymptotes, and vertical asymptotes.
- Solve rational equations with linear denominators graphically, numerically, and algebraically.
- Interpret and solve problems involving rational equations, including inverse and combined variation.

### Unit 8

- Write the equation and describe the characteristics of a circle, ellipse, and hyperbola centered at the origin and parabola with vertex at the origin given its graph.
- Represent circles, ellipses, and hyperbolas centered at the origin and parabolas with vertex at the origin algebraically and graphically.
- Describe the properties of circles, ellipses, and hyperbolas centered at the origin and parabolas with vertex at the origin.
- Describe circles, ellipses, parabolas, and hyperbolas as a locus of points.

### Assessment:

- Daily quizzes.
- Quarterly progress checks.
- Although homework is not assigned, students will be expected to complete in class assignments and turn them in for 10% of their grade at the end of each quarter. Any uncompleted classwork will need to be completed at home.