

# Algebra III

## Complex Numbers and Conic Sections **CNC**

### Complex Numbers: Students apply properties to complex numbers.

- 1 Find the conjugate of a complex number; use conjugates to find quotients of complex numbers. **A3.CNC.1**

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### Conic Sections: Students relate the equations and graphs of conic sections.

- 2 Generate an equivalent form of an equation for a conic section by completing the square to identify key characteristics. **A3.CNC.2**
  - 1 Conic sections include: circles, ellipses, parabolas, and hyperbolas **A3.CNC.2.1**
- 3 Identify, graph, write, and analyze equations of each type of conic section using properties and technology when appropriate. **A3.CNC.3**
  - 1 Conic sections include: circles, ellipses, parabolas, and hyperbolas **A3.CNC.3.1**
  - 2 Properties include: symmetry, intercepts, foci, asymptotes, and eccentricity **A3.CNC.3.2**

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## Functions **FN**

### Compositions: Students compose and compare functions.

- 1 Combine functions by addition, subtraction, multiplication, division, and composition to model the relationship between two quantities in real-world and mathematical contexts. **A3.FN.1**

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### Inverses: Students find inverse functions.

- 2 Verify if two functions are inverses of each other using composition of functions. **A3.FN.2**
- 3 For a function with an inverse, explain how to read the ordered pairs of the inverse function when given a graph or table of values. **A3.FN.3**
- 4 Construct an invertible function from a non-invertible function by restricting the domain. **A3.FN.4**

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### Transformations: Students graph function transformations.

- 5 Graph and generalize the effect of transformations on quadratic, absolute value, square root, cube root, cubic, and step functions. **A3.FN.5**
  - 1 Transformations include: stretches, compressions, vertical shifts, and horizontal shifts **A3.FN.5.1**
- 6 Determine if a function is even, odd, or neither from a graph or an algebraic expression. **A3.FN.6**

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**Sequences: Students use sequences to model and analyze mathematical situations.**

- 7 Write and use arithmetic and geometric sequences recursively and explicitly to model situations, translating between the two forms. [A3.FN.7](#)
    - 1 Forms include: when given a graph, a description of the relationship, or two input-output pairs [A3.FN.7.1](#)
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**Matrices** [MAT](#)

**Operations: Students represent and perform operations with matrices.**

- 1 Use matrices to describe, list, and manipulate data in different situations. [A3.MAT.1](#)
  - 2 Multiply matrices by scalars to solve real-world and mathematical problems. [A3.MAT.2](#)
  - 3 Add and subtract matrices. [A3.MAT.3](#)
  - 4 Multiply matrices, understanding that matrix multiplication for square matrices is not commutative. [A3.MAT.4](#)
  - 5 Calculate the determinant of a square matrix to determine if it has an inverse. [A3.MAT.5](#)
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**Systems: Students use matrices to solve systems of equations.**

- 6 Solve systems of linear equations using augmented matrices. [A3.MAT.6](#)
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**Exponential and Logarithmic Functions** [ELF](#)

**Analyze & Interpret: Students analyze and interpret exponential and logarithmic functions.**

- 1 Analyze and interpret exponential and logarithmic functions, identifying key characteristics. [A3.ELF.1](#)
    - 1 Functions should be represented numerically, graphically, and algebraically. [A3.ELF.1.1](#)
    - 2 Key features include asymptotes, end behavior, intercepts, domain, and range. [A3.ELF.1.2](#)
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**Solve: Students solve problems with exponential and logarithmic functions.**

- 2 Understand and apply the inverse relationship between exponents and logarithms to solve problems. [A3.ELF.2](#)
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**Polynomial & Rational Functions** [PRF](#)

**Analyze, Interpret, & Graph: Students analyze, interpret, and graph polynomial and rational functions.**

- 1 Analyze and interpret polynomial functions, identifying key characteristics. [A3.PRF.1](#)
  - 1 Functions should be represented numerically, graphically, and algebraically. [A3.PRF.1.1](#)
  - 2 Key features include end behavior, intercepts, domain, range, relative and absolute maximum and minimum, and intervals over which the function is increasing or decreasing. [A3.PRF.1.2](#)
- 2 Analyze and interpret rational functions, identifying key characteristics. [A3.PRF.2](#)
  - 1 Functions should be represented numerically, graphically, and algebraically. [A3.PRF.2.1](#)
  - 2 Key features include asymptotes (vertical, horizontal, and slant), end behavior, point discontinuities, intercepts, domain, and range. [A3.PRF.2.2](#)
- 3 Graph rational functions showing zeros, asymptotes, and end behavior. [A3.PRF.3](#)