

## Algebraic Reasoning Parent Guide

### Unit 1 Concepts:

Students will review real number operations and learn matrix operations, such as addition and subtraction.

### Learning Goals:

Students will learn to represent sets of numbers using interval and set builder notation. They will simplify algebraic expressions and isolate single variable equations. In addition to learning the matrix operations, they will also understand scalar multiplication.

**Why?** – This unit prepares students for future learning. Students will use these skills in upcoming units and be ready to use matrices to solve systems of linear equations.

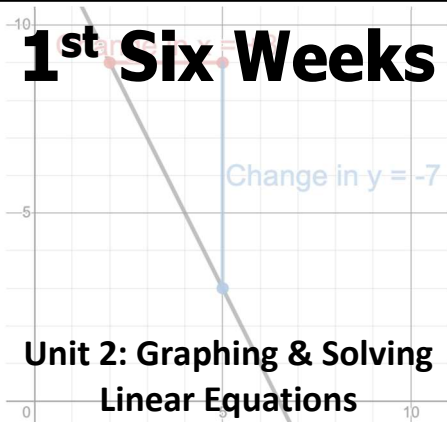
## 1<sup>st</sup> Six Weeks

$$A = \begin{bmatrix} 5 & 7 \\ -3 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 0 & -4 \\ 4 & 0 \end{bmatrix}$$

$$A+B = \begin{bmatrix} 5 & 3 \\ 1 & 2 \end{bmatrix}$$

### Unit 1: Real Numbers & Matrices

## 1<sup>st</sup> Six Weeks



### Unit 2: Graphing & Solving Linear Equations

### Unit 2 Concepts:

In unit 2, students will learn to recognize and analyze linear patterns in real world situations by reviewing strategies for solving linear equations and identifying domain and range.

### Learning Goals:

Students will write, analyze, and solve linear equations given points, slope and/or y-intercepts. They will use real world data to determine types of functions and model the functions algebraically using data.

**Why?** – This unit lays to foundation for graphing on an x, y plane and introduces methods for analyzing a functions or equations. With this knowledge students will be able to find the cost of any number of tickets given a fixed handling fee and the cost of 1 ticket.

### Unit 3 Concepts:

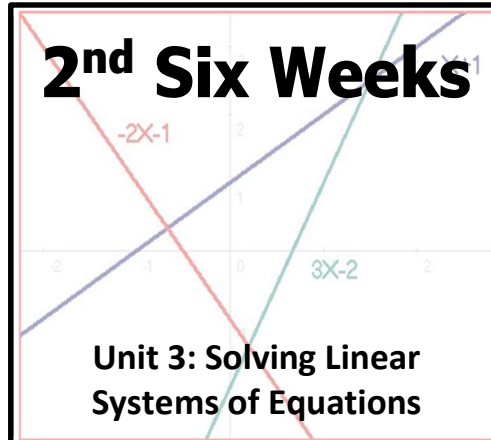
Students will learn to solve systems of linear equations with two or more variables using graphing calculators, technology, and matrices.

### Learning Goals:

The students will use substitution, elimination, matrices, and other technology to solve various systems of equations, some having up to three variables.

**Why?** – Being able to solve systems of equations teaches students how to find the break even point among different items. Students will learn to find when three people would pay the same price for various items, or when a company would go from losing money to profiting from the sale of a product.

## 2<sup>nd</sup> Six Weeks



### Unit 3: Solving Linear Systems of Equations

### Unit 4 Concepts:

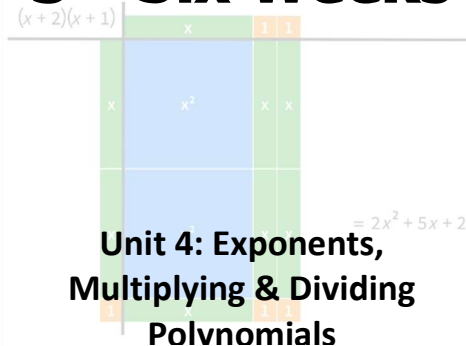
Students will learn to represent unknown quantities as polynomials. They will learn how to follow the rules of exponents and use them as they perform operations on polynomials such as multiplication and division.

### Learning Goals:

Students will add and subtract polynomials by combining like terms and use Laws of Exponents to multiply & divide polynomials. Additionally, they will determine the quotient of a polynomial when represented tabularly and symbolically.

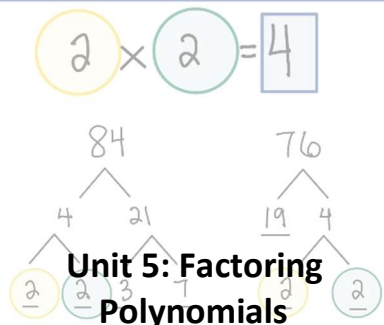
**Why?** – This unit prepares students for Algebra 2 by improving their ability to move from concrete to abstract thinking. Polynomial manipulation is a foundational skill needed to go further in math.

## 3<sup>rd</sup> Six Weeks



### Unit 4: Exponents, Multiplying & Dividing Polynomials

## 4<sup>th</sup> Six Weeks



### Unit 5: Factoring Polynomials

### Unit 5 Concepts:

In unit 5, students will factor polynomials by several methods including greatest common factor, and grouping.

### Learning Goals:

Students will learn that factoring is the inverse of multiplying polynomials. They will learn the process for factoring by using the GCF, grouping, special products, box method, magic X, and others. They will learn to determine which method is best for a problem. Likewise, they will apply these skills to geometric problems to find missing side lengths given area.

**Why?** – This unit improves student logic and ability to choose best the most appropriate solution steps. Although these basic skills were learned in Algebra 1, we will take it a step further by adding more variables.

### Unit 6 Concepts:

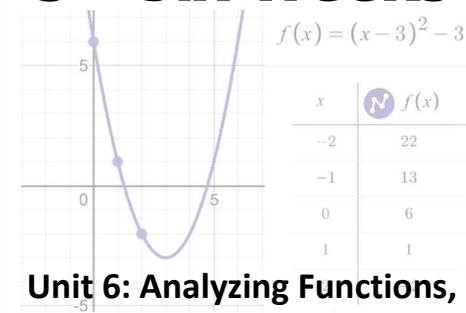
Students will learn to recognize different representations of functions. Given one representation, students will be able to create another representation, such as looking at a graph and being able to formulate an equation or table. They will also compare and contrast different types of equations.

### Learning Goals:

In this unit students will be introduced to new functions such as piecewise, square root, cubic, absolute value, and cubed root functions. They will analyze transformations of the parent functions for each of these.

**Why?** – This unit gives students a sneak peek into Algebra 2 and provides them the basis to be successful in that course. Looking at these different functions helps students connect the concepts of all functions together.

## 5<sup>th</sup> Six Weeks



### Unit 6: Analyzing Functions, Graphs & Tables

### Unit 7 Concepts:

Students will add more function types to their study. They will solve problems based on real world models of quadratic and exponential functions. Students will continue their analysis of functions.

### Learning Goals:

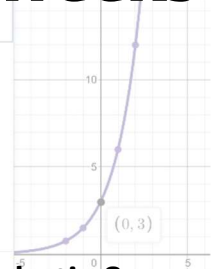
Students will solve quadratic equations by finding the zeros using multiple methods. They will look at exponential and logarithmic functions and identify how transformations of the parent function change their algebraic equations. Students will use finite differences or common ratios in the calculator to calculate regression equations that model each situation. Finally, they will compare and contrast key aspects of the functions like domain and range, intercepts, growth or decay, and y-intercepts.

**Why?** – These new functions will teach students to analyze concepts like a virus outbreak, or population growth.

## 5th Six Weeks

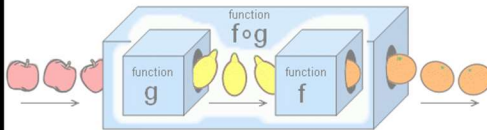
$$f(x) = 3 \cdot 2^x$$

x	f(x)
-2	0.75
-1	1.5
0	3
1	6
2	12



### Unit 7: Quadratic & Exponential Functions

## 6th Six Weeks



### Unit 8: Function Operations, & Inverse Functions

### Unit 8 Concepts:

In this final unit, students will study composite and inverse functions.

### Learning Goals:

Composite functions are created when two different functions are added, subtracted, multiplied, or divided. Students will learn to find the inverse function and determine if the inverse itself is a function. Students will be able to identify if a function is the inverse of another by looking at the table, graph, or equation.

**Why?** – These concepts of composite functions and inverse functions can apply to finding sale price with tax in one step, or how to find the original price by inverse.

**Questions?** Please contact your Algebraic Reasoning math teacher. **Additional Support:** We recommend Khan Academy and Tutor.com and remember campus tutoring is also available.