Algebra 1 Pre-AP Middle School
Overview
2019-2020

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. Included, is an overview of the Mathematics Instructional Model and Pacing, TEKS, Unit Overview, Big Ideas, Essential Questions, and Concepts for each unit.

Definitions:

Overview – The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Process Standards – The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Big Ideas and Essential Questions - Big ideas create connections in learning. They anchor all the smaller isolated, facts together in a unit. Essential questions (questions that allow students to go deep in thinking) should answer the big ideas. Students should not be able to answer Essential Questions in one sentence or less. Big ideas should be the underlying concepts, themes, or issues that bring meaning to content.

Concept – A subtopic of the main topic of the unit

Instructional Model – The structures, guidelines or model in which students engage in a particular content that ensures understanding of that content.

Parent Supports:

The following resources provide parents with ideas to support students in mathematical understanding

- Advice for Parents: Helping Children with Math
- How Math Should be Taught
- The Most Important Mathematical Habit of Mind
- Math: Why Doesn’t Yours Look Like Mine?
### Instructional Model:

The instructional model for mathematics is the Concrete-Representational-Abstract Model (CRA). The CRA model allows students to access mathematics content first through a concrete approach (“doing” stage) then representational (“seeing” stage) and finally abstract (“symbolic” stage). The CRA model allows students to conceptually develop concepts so they have a deeper understanding of the mathematics and are able to apply and transfer their understanding across concepts and contents. The CRA model is implemented in grades K-12 in FBISD.

### Adopted Resources:

Middle School: [https://www.fortbendisd.com/Page/93918](https://www.fortbendisd.com/Page/93918)

### Supplemental Resource and Tool Designation

The TI Nspire CX calculator is a standardized technology integration tool used for Mathematics and Science in FBISD

### Mathematical Process Standards:

The student uses mathematical process to acquire and demonstrate mathematical understanding. The student is expected to:

- **A.1A** Apply mathematics to problems arising in everyday life, society, and the workplace
- **A.1B** Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution
- **A.1C** Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems
- **A.1D** Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate
- **A.1E** Create and use representations to organize, record, and communicate mathematical ideas
- **A.1F** Analyze mathematical relationships to connect and communicate mathematical ideas
- **A.1G** Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication
## Grading Period 1

### Week of Inspirational Maths

**Estimated Date Range:** Aug. 14 – Aug. 20

**Unit Overview:** This unit is a set of 5 lessons to begin the school year. Lessons focus on growth mindset and how we learn mathematics.

<table>
<thead>
<tr>
<th>Themes for the Week</th>
<th>TEKS Link to Math TEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The themes for the week promote important mathematical ideas such as:</td>
<td>A.1A, A.1B, A.1C, A.1D, A.1E, A.1F, A.1G</td>
</tr>
<tr>
<td>- learning from mistakes</td>
<td></td>
</tr>
<tr>
<td>- doing mathematics visually</td>
<td></td>
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<tr>
<td>- productive struggle</td>
<td></td>
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<tr>
<td>- working together</td>
<td></td>
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<tr>
<td>- communicating about mathematics</td>
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</tbody>
</table>

### Unit 1: Exploring Functions

**Estimated Date Range:** Aug. 21 – Sept. 16

**Unit Overview:** In this unit, students will begin their study of the functions that are the focus of Algebra 1: Linear, Quadratic, and Exponential Functions. The major focus of this unit is that students build an understanding of the key features and the connection between multiple representations. Students will build an understanding that certain key features transcend across all the functions and some key features are specific to certain functions.

**Big Ideas:**
- Key features can be analyzed from any graphical representation of a function, and key features transcend across different types of functions.
- The domain and range represents all possible inputs and outputs of a relation and can be found using multiple representations.
- The graph of a function provides critical information (key attributes) about the function in order to interpret situations.
- The graph of a relation can be analyzed to determine if the relation is a function.
- The parameters in an equation representing a function are also values on the graph of the function.

**Essential Questions**
- How can key attributes be determined and interpreted from the graph of a linear, quadratic or exponential function?
- How can you determine the domain and range of a linear, quadratic, or exponential function?
- What can we look for to help us to determine if a relation represent a function?
- What type of information can be determined when analyzing a graph?
- What type of connections can be made between the equation representing and function and its graph?

<table>
<thead>
<tr>
<th>Concepts within Unit #1</th>
<th>TEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept #1: Determining and Evaluating Functions</td>
<td>8.5G, A.12A, A.12B</td>
</tr>
</tbody>
</table>
Unit 2: Solving Linear Functions, Equations and Inequalities

Estimated Date Range: Sept. 9 – Sept. 24

Unit Overview: In this unit, students will be introduced to arithmetic sequences. Students will write arithmetic sequences from multiple representations. Students will also apply their prior knowledge of solving linear equations to solve linear equations, inequalities and literal equations.

Big Ideas:
- Using formulas for arithmetic sequences provides a way to analyze patterns and common differences in tables and sequences of numbers in order to write an equation of a linear function.
- A solution to a linear equation or inequality represents value(s) that make statement(s) true in mathematical and real world situations.
- The process to solve a linear equation must preserve equivalence. Equivalence can be preserved using inverse operations, graphing and modeling.

Essential Questions
- How can analyzing arithmetic sequences assist in writing equations of linear functions?
- What do the solutions to linear equations and inequalities represent?
- What is the relationship between equivalence and solving a linear equation?

Concepts within Unit #2

<table>
<thead>
<tr>
<th>Concept #1: Functions as Arithmetic Sequences</th>
<th>TEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept #2: Solving Equations and Inequalities</td>
<td>A.12B, A.12C, A.12D</td>
</tr>
</tbody>
</table>

Unit 3: Graphing and Writing Linear Functions, Equations and Inequalities

Estimated Date Range: Sept. 25 – Oct. 10 and Oct. 15 – Nov. 8

Unit Overview: In this unit, students will expand their knowledge of linear functions from prior grade levels. Students will begin with determining rate of change and slope from multiple representations and from multiple forms of linear equations. Students will graph and write linear equations in multiple forms, including transformations. Students will analyze key features of linear functions from multiple representations in real world and mathematical situations. Students have prior experience with slope-intercept form. Students will also determine the linear regression model from data. The last part of the unit will have students writing and graphing linear inequalities.

Note: this unit is split between the 1st and 2nd grading period.

Big Ideas:
- The rate of change, or slope, of a linear function describes the changing relationship between the independent and dependent quantities of the function.
- The graph of a function provides critical information (key attributes) about the function in order to interpret situations.
- Linear Functions can be represented in multiple representations - verbally, graphically, algebraically (in equation form), and tabularly. There are several equation forms of a linear function.
- Transformations change the graph of a function in readily predictable ways so that features of the graph and changes in features of the graph can be analyzed.
- A regression model can be used to make predictions from a set of data.
- The solution set to linear inequalities in two variables can be represented graphically.

Essential Questions
- What does the rate of change or slope tell us about a linear function?
- What type of information can be determined when analyzing a graph?
- How can linear functions be represented?
- What effects do transformations have on linear functions?
- How do you make predictions using a set of data?
- How do you determine solutions to linear inequalities in two variables?

<table>
<thead>
<tr>
<th>Concepts within Unit #3 (Grading Period 1)</th>
<th>TEKS</th>
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</thead>
<tbody>
<tr>
<td>Concept #1: Rate of Change and Slope</td>
<td>A.3A, A.3B, A.3C</td>
</tr>
<tr>
<td>Concept #2: Graphing and Writing Linear Equations</td>
<td>8.5A, 8.5B, 8.5E, 8.5F, 8.5H, 8.5I, A.2A, A.2B, A.2C, A.2D, A.2E, A.2F, A.2G, A.3A, A.3B, A.3C</td>
</tr>
</tbody>
</table>

**Grading Period 2**

**Unit 3: Graphing and Writing Linear Functions, Equations and Inequalities (continued)**

Estimated Date Range: Sept. 25 – Oct. 10 and Oct. 15 – Nov. 8

Note: This unit is continued from Grading Period 1. Please refer to Grading Period 1 for the Unit Overview, Big Ideas, and Essential Questions for this unit.

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<thead>
<tr>
<th>Concepts within Unit #3 (Grading Period 2)</th>
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<tr>
<td>Concept #3: Linear Function Transformations</td>
<td>A.2A, A.3C, A.3E</td>
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<tr>
<td>Concept #4: Linear Regression</td>
<td>8.5C, 8.5D, A.4A, A.4B, A.4C</td>
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<tr>
<td>Concept #5: Linear Inequalities in 2 Variables</td>
<td>A.2A, A.2H, A.3D</td>
</tr>
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</table>

**Unit 4: Systems of Linear Equations and Inequalities**

Estimated Date Range: Nov. 11 – Nov. 22 and Dec. 2 – Dec. 19

Note: Includes 7 days for Semester Exams and review

**Unit Overview:** In this unit, students will write and solve systems of two linear equations in two variables. Students will write and solve systems from tables, graphs and verbal descriptions for both mathematical and real-world situations. Students will solve systems using tables, graphs, and algebraically. Students will also graph systems of linear inequalities.

**Big Ideas:**
- Analyzing the given information helps to determine an appropriate method to solve systems of equations
- Solutions to systems of equations and inequalities can represent solutions to real-world problems.

**Essential Questions**
- How do you select a method to solve a system of two linear equations?
- How can you interpret the solution to a system of equations or a system of inequalities?

<table>
<thead>
<tr>
<th>Concepts within Unit #4</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Writing Systems of Equations</td>
<td>A.2I</td>
</tr>
<tr>
<td>Concept #2: Representing Graphically Systems of Equations</td>
<td>A.2I, A.3F, A.3G</td>
</tr>
<tr>
<td>Concept #3: Solving Systems of Equations</td>
<td>A.2I, A.3F, A.3G, A.5C,</td>
</tr>
<tr>
<td>Concept #4: Systems of Linear Inequalities</td>
<td>A.3H</td>
</tr>
</tbody>
</table>
# Grading Period 3

## Unit 5: Operations of Polynomial Functions

**Estimated Date Range:** Jan. 7 - Feb. 4

**Unit Overview:** In this unit, students will apply their prior knowledge of operations of numbers to operations of polynomials including monomials. In middle school students applied properties, including the distributive property, associative and commutative properties, and used these properties to generate equivalent expressions. Students will add and subtract polynomials, multiply monomials and polynomials, divide polynomials and monomials and factor trinomials. The focus will be on operations of polynomials of degree one and two.

**Big Ideas:**
- Generating equivalent expressions using methods, including factoring, allows us to find specific information about the polynomial.
- Expressions can be rewritten in simplified equivalent forms.

**Essential Questions:**
- How and why should factors of polynomial functions be determined?
- How can simplify expressions involving exponents?

<table>
<thead>
<tr>
<th>Concepts within Unit #5</th>
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<tbody>
<tr>
<td>Concept #1: Adding and Subtracting Polynomials</td>
<td>A.10A</td>
</tr>
<tr>
<td>Concept #2: Multiplying Monomials and Polynomials</td>
<td>A.10B, A.11B</td>
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<tr>
<td>Concept #3: Dividing Monomials and Polynomials</td>
<td>A.10C, A.11B</td>
</tr>
<tr>
<td>Concept #4: Factoring Polynomials</td>
<td>A.10E, A.10D, A.10F</td>
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</table>

## Unit 6: Graphs of Quadratic Functions

**Estimated Date Range:** Feb. 5 – Mar. 6

**Unit Overview:** In this unit, students will analyze graphs of quadratic functions. Students will graph quadratic functions in several ways - by making tables, with technology, and by graphing with transformations. Students will identify and analyze the key features of the graphs they create. Context will be mathematical and real world. Students will also utilize the graph of a quadratic function to write its related equation. Students will solve quadratic equations by factoring and by graphing. The focus on solving in this unit is to make a connection between the solutions of the equation and the zeros of the graph of its related function.

**Big Ideas:**
- The graph of a function provides critical information about the function in order to interpret situations.
- The process to solve a quadratic equation must preserve equivalence. Equivalence can be preserved using inverse operations, graphing and modeling.

**Essential Questions**
- What type of information can be determined when analyzing a graph?
- What is the relationship between equivalence and solving a quadratic equation?

<table>
<thead>
<tr>
<th>Concepts within Unit #6</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Graphing and Writing Quadratic Functions</td>
<td>A.6A, A.6B, A.7A, A.7C</td>
</tr>
<tr>
<td>Concept #2: Solving Quadratic Equations by Graphing and Factoring</td>
<td>A.7A, A.7B</td>
</tr>
<tr>
<td>Concept #3: Connections and Applications of Quadratic Graphs</td>
<td>A.6C, A.7A, A.7B, A.8A</td>
</tr>
</tbody>
</table>
### Grading Period 4

#### Unit 7: Solving Quadratic Equations

**Estimated Date Range:** Mar. 16 – April 22

**Unit Overview:** In this unit, students will further extend on their knowledge on quadratic functions. In the previous unit, students solved quadratic equations by graphing and by factoring. In this unit, students will solve quadratic equations by taking square roots, completing the square and applying the quadratic formula. Students will also make connections between the solutions of a quadratic equation and the zeros of the graphs of its related function. Students will begin the unit by simplifying numerical square roots and by simplifying numeric and algebraic radical expressions. In 8th grade, students were exposed to estimating square roots.

**Big Ideas:**
- Expressions can be rewritten in simplified equivalent forms.
- The process to solve a quadratic equation must preserve equivalence. Equivalence can be preserved using inverse operations, graphing and modeling.
- A regression model can be used to make predictions from a set of data.

**Essential Questions**
- How can simplify expressions involving rational exponents and radical expressions?
- What is the relationship between equivalence and solving a quadratic equation?
- How do you make predictions using a set a data?

<table>
<thead>
<tr>
<th>Concepts within Unit #7</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Simplifying Radical Expressions</td>
<td>A.11A, A.11B</td>
</tr>
<tr>
<td>Concept #2: Solve Quadratic Equations by Square Root Method</td>
<td>A.7A, A.8A, A.11A</td>
</tr>
<tr>
<td>Concept #3: Solve Quadratic Equations by Completing the Square</td>
<td>A.7A, A.8A, A.11A</td>
</tr>
<tr>
<td>Concept #4: Solve Quadratic Equations by Quadratic Formula</td>
<td>A.7A, A.8A, A.11A</td>
</tr>
<tr>
<td>Concept #5: Quadratic Regression</td>
<td>A.8B</td>
</tr>
<tr>
<td>Concept #6: Solving Quadratic Equations by Best Method</td>
<td>A.7A, A.8A, A.8B, A.11A</td>
</tr>
</tbody>
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#### Unit 8: Exponential Functions

**Estimated Date Range:** April 23 – May 28

**Note:** Includes 2 days for state testing and 7 days for semester exams and review

**Unit Overview:** In this unit, students will extend their knowledge of functions and key features of functions to exponential functions. In Unit 2, students were introduced to Arithmetic sequences. In this unit, students will be introduced to Geometric sequences. This will lead to writing and graphing exponential functions. Students will graph exponential functions from tables and features of the equation. All exponential functions will be in the form $y = ab^x$. Students will write equations for mathematical and real world situations, including growth and decay problems. Students will also extend their understanding of regression models to include exponential regression.

**Big Ideas:**
- Using formulas for geometric sequences provides a way to analyze patterns and common ratios in tables and sequences of numbers in order to write an equation of an exponential function.
- The graph of a function provides critical information about the function in order to interpret situations.
- Exponential Functions can be represented in multiple representations - verbally, graphically, algebraically (in equation form), and tabularly.
- A regression model can be used to make predictions from a set of data.

**Essential Questions**
- How can analyzing geometric sequences assist in writing equations of exponential functions?
- What type of information can be determined when analyzing a graph?
- How are exponential functions represented?
How do you make predictions using a set of data?

<table>
<thead>
<tr>
<th>Concepts within Unit #8</th>
<th>TEKS</th>
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<tbody>
<tr>
<td>Concept #1: Geometric Sequences</td>
<td>A.12B, A.12C, A.12D</td>
</tr>
<tr>
<td>Concept #2: Graphing and Writing Exponential Functions</td>
<td>A.9A, A.9B, A.9C, A.9D</td>
</tr>
<tr>
<td>Concept #3: Exponential Regression</td>
<td>A.9A, A.9D, A.9E</td>
</tr>
</tbody>
</table>