



Algebra II

Sequence Rationale



Preface

- According to the TEKS for Algebra I, students will learn:
 - What a function is
 - Gather and record data
 - Represent functions using multiple representations
 - Sketch parent functions for linear, quadratic, inverse, and exponential functions
 - Use properties and attributes of functions



In addition, students in Algebra I:

- Transform and solve equations
- Determine domain and range values for linear, quadratic, inverse, and exponential functions
- Develop the concept of slope and predict the effects of changes in m and b on the graph of $y = mx + b$
- Predict the effect of changes in a and c on the graph of $y = ax^2 + c$
- Study functions in problem situations to draw conclusions



TEKS Clarification

- According to the TEKS for Algebra II, students will use the knowledge and skills that they acquired in Algebra I and continue using the properties and attributes of functions, formulate and solve equations, identify and sketch the parent functions for not just linear, quadratic, inverse, and exponential functions, including square root logarithmic functions, and a brief study of the Conic Sections.



TEKS Clarification

- As students study these six parent functions, they are expected to:
 - Apply the properties and attributes of functions such as the interdependency of two variables and domain and range
 - Extend their knowledge of parent functions, describing parameter changes on the graphs of all six parent functions
 - Take an in-depth look at each of the six functions, noting specific characteristics for each one



TEKS Clarification

- Students will continue to build on this foundation throughout the year as they expand their understanding through other mathematical experiences such as collecting and analyzing data representing real life problems, and develop a mathematical model that can be used to solve the problem for situations representing each of the six functions.



TEKS Clarification

- Lastly, the TEKS for Algebra II ask students to connect the relationship between geometric and algebraic descriptions of conic sections. They must graph conics, identify them, relate simple parameter changes, and identify symmetries from graphs of conic sections.

The Intent of this Sequence



- The sequence was compiled to:
 - Assist teachers with planning their Algebra II course.
 - Provide resources for teachers to assist them in aligning their curriculum to the TEKS with some appropriate student activities, assessments, and a correlation to the TAKS.
 - Clarify the TEKS included in Algebra II.



The Intent of this Sequence

- The sequence and included activities reflect the teaching of “big ideas” first, followed by teaching the skills associated with these ideas or concepts. Active participation, student collaboration, data collection, classroom discussion and justification all play essential roles in the success of the sequence.



The Intent of this Sequence

- This guideline is intended to be a tool for use by teachers as a resource and a model for improving student achievement in Algebra II.
- Implementation of this guide is like that of any other resource or textbook – each teacher will personalize it in his or her own way.



Unit I: Foundations for Functions

- The intent of this unit is to introduce the six functions to be studied in Algebra II while strengthening and expanding the foundations of functions concepts previously taught in Algebra I. As the students are introduced to each function, they will note that all functions share commonalities, and also will distinguish the differences of each other.



Unit I: Foundations for Functions

- This unit will focus on the foundation concepts such as:
 - Parameter changes
 - Identifying the appropriate Domain/Range, and Independent/Dependent variables
 - Collection and analysis of data
 - Connections among multiple representations of a function (Tabular, Graphical, Verbal, and Algebraic)



Unit I: Foundations for Functions

- It is important to revisit the concepts taught in this unit, specifically the parameter changes and domain/range, as each of the six functions are addressed more specifically later in the course.
- This unit's concepts should spiral throughout the course as each new function is introduced and covered more in depth, noting again the common traits that all functions possess.



Unit II: Linear Functions

- This unit will include an in depth study of linear equations, inequalities, and systems.

There should be an emphasis on

- Understanding the multiple representations of Linear Functions (Tabular, Graphical, Verbal, and Algebraic)
- Connections to the concepts studied in the foundations for functions unit, and recognizing that all the functions have similar traits. This will be done by revisiting the data activity for linear functions that was addressed in Unit I.

Unit II: Linear Functions



- While revisiting the data activity from Unit I, emphasis should be placed on:
 - Identifying the limitations of the domain and range for the situation versus the domain and range for the function
 - Parameters for the situation, and
 - The use of this data collected to create and solve a mathematical model to make inferences and justifications.



Unit III: Quadratic Functions

- This unit will include an in depth study of quadratic equations, inequalities, and systems.

There should be an emphasis on

- Understanding the multiple representations of Quadratic Functions (Tabular, Graphical, Verbal, and Algebraic)
- Connections to the concepts studied in the foundations for functions unit, and recognizing that all the functions have similar traits. This will be done by revisiting the data activity for Quadratic functions that was addressed in Unit I.



Unit III: Quadratic Functions

- While revisiting the data activity from Unit I, emphasis should be placed on:
 - Identifying the limitations of the domain and range for the situation versus the domain and range for the function
 - Parameters for the situation, and
 - The use of this data collected to create and solve a mathematical model to make inferences and justifications.



Unit IV: Square Root Functions

- This unit will include an in depth study of quadratic equations, inequalities, and systems.

There should be an emphasis on

- Understanding the multiple representations of Square Root Functions (Tabular, Graphical, Verbal, and Algebraic)
- Connections to the concepts studied in the foundations for functions unit, and recognizing that all the functions have similar traits. This will be done by revisiting the data activity for Square Root functions that was addressed in Unit I.



Unit IV: Square Root Functions

- While revisiting the data activity from Unit I, emphasis should be placed on:
 - Identifying the limitations of the domain and range for the situation versus the domain and range for the function
 - Parameters for the situation, and
 - The use of this data collected to create and solve a mathematical model to make inferences and justifications.



Unit V: Rational Functions

- This unit will include an in depth study of Rational equations, inequalities, and systems.

There should be an emphasis on

- Understanding the multiple representations of Rational Functions (Tabular, Graphical, Verbal, and Algebraic)
- Connections to the concepts studied in the foundations for functions unit, and recognizing that all the functions have similar traits. This will be done by revisiting the data activity for Rational functions that was addressed in Unit I.



Unit V: Rational Functions

- While revisiting the data activity from Unit I, emphasis should be placed on:
 - Identifying the limitations of the domain and range for the situation versus the domain and range for the function
 - Parameters for the situation, and
 - The use of this data collected to create and solve a mathematical model to make inferences and justifications.



Unit VI: Exponential and Logarithmic Functions

- This unit will include an in depth study of Exponential and Logarithmic equations, inequalities, and systems.

There should be an emphasis on

- Understanding the multiple representations of Rational Functions (Tabular, Graphical, Verbal, and Algebraic)
- Connections to the concepts studied in the foundations for functions unit, and recognizing that all the functions have similar traits. This will be done by revisiting the data activity for Rational functions that was addressed in Unit I.



Unit VI: Exponential and Logarithmic Functions

- While revisiting the data activity from Unit I, emphasis should be placed on:
 - Identifying the limitations of the domain and range for the situation versus the domain and range for the function
 - Parameters for the situation, and
 - The use of this data collected to create and solve a mathematical model to make inferences and justifications.



Unit VII: Conics

- This unit will provide an introduction to the relationship between the algebraic and geometric representations of conics
- It will also provide opportunities for students to apply their knowledge of parameter changes in functions to each of the four quadratic relations.



Summing up the Sequence

- Since much of the focus in Algebra II is on the connections between the basics of functions studied in Algebra I and the more in-depth look that occurs in Algebra II, the sequence begins with an overview of the common traits for all six of the functions that will be covered.



Summing up the Sequence

- As each function is revisited and studied more specifically, students will
 - Study the commonalities between each function
 - Learn appropriate methods of solving functions and equations, and its inverse
 - Briefly study the quadratic relations and connect the traits seen in all six functions as they study the conic section.